

# Changes in Roe Herring Markets: A Review of Available Evidence

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## Abstract

Alaska's commercial roe herring fisheries occur from the southern southeast portion of the state to the Bering Sea, targeting herring as they are ready to spawn. Overall, these fisheries have experienced substantial declines in ex-vessel price and participation in the last decade. Alaska roe herring harvests are typically frozen in the round and shipped overseas for roe extraction. The roe are processed for consumption in Japan as a traditional salted herring roe product or flavored roe product. Market observers have suggested the declining price for roe herring is due to changing tastes and preferences and changing demographics in Japan. This report provides a summary of earnings, participation, and roe herring ex-vessel prices paid in Alaska's commercial roe herring fisheries, 1983-2004. Recent articles and expert commentary in industry magazines are reviewed and views about changing tastes in Japan are outlined. Changing Japanese markets are the focus in seeking an explanation for declining ex-vessel prices in Alaska's roe herring fisheries.



## 1.0 Introduction

Alaska has several gillnet and purse seine fisheries that target herring ready to spawn. The main product from the herring is roe to be processed for the traditional Japanese salted herring roe (*shio kazunoko*) market or the newer, lower valued flavored herring roe (*ajitsuke kazunoko*) market. The males and carcasses of females, after roe extraction, may become inputs into a fish meal ancillary product. Larger carcasses, characteristic of Bering Sea roe herring, may also be processed for the Japanese dried herring food markets. Roe herring harvested in Alaska are typically frozen in the round and are shipped overseas for roe extraction and further processing.

Alaska also conducts herring fisheries which target herring when they have high oil content and are best for high quality bait. For permitting purposes, the herring fisheries tend to be differentiated according to the desired product. Roe herring fisheries experienced the greatest growth in effort in the 1980s, and many have been limited. Unless CFEC limited the entire fishery as a “combined roe herring and herring” fishery, the food/bait herring fishery in the same area has remained unlimited in all areas except Kodiak.

Roe herring fisheries appear to have some management benefits over food/bait herring fisheries. Roe herring fisheries are believed to be on local stocks, so it is somewhat clearer what regulatory stocks are being harvested and therefore easier to estimate biomass and calculate harvest rates that will sustain yields. In contrast, food/bait fisheries are sometimes believed to be “mixed stock” fisheries.

Alaska roe herring fisheries developed in the 1970s following a decline of the herring resource in Japanese and Soviet waters. The ex-vessel prices for roe became relatively high in the 1980s, often exceeding \$1,000 per ton (nominal dollars) in some fisheries. Some persons believed that the roe herring fishery would permanently be the highest value use for the herring resource. Others are concerned that Japanese demand for traditional salted herring roe is declining.

The ex-vessel price for the herring within an area and time period is said to vary depending upon the size and quality of the extracted skein and the percentage roe content. The worldwide supply of roe herring and the Japanese yen to US dollar exchange rate also play important roles in determining the annual ex-vessel prices.

In the past decade, roe herring ex-vessel prices paid in Alaska fisheries have declined considerably. Market observers have suggested this is due to changing tastes and preferences and changing demographics in Japan, the main market for herring roe products. This decline in ex-vessel price for roe herring has led to declines in participation in both limited and unlimited roe herring fisheries. In several limited fisheries, entry permits often remain un-fished. Some unlimited fisheries have seen big declines in participation. In addition, processors opted to forego participation in the northern-most westward roe herring fishery in 2004 leaving permit holders without a market and a substantial quota un-harvested. If the market for roe herring continues to decline it is possible other fisheries will lack buyers.

This report discusses summary harvest and gross earnings information available for Alaska's roe herring fisheries. A time series of annual ex-vessel price estimates is provided for select fisheries. Recent articles and expert commentary in industry magazines are reviewed and views about changing tastes in Japan are outlined. Changing Japanese markets are the focus in seeking an explanation for declining ex-vessels prices in Alaska's roe herring fisheries.

## 2.0 Statewide participation and earnings in Alaska roe herring fisheries

Alaska's commercial roe herring fisheries begin early March in southern Southeast portion of the state and end mid-July in the northern most Bering Sea fishery. Many areas conduct both a purse seine and gillnet roe herring fishery. Participation and earnings across the fisheries have varied widely since development in the 1970s.

The combined ex-vessel value of Alaska's commercial roe herring purse seine and gillnet fisheries is shown below. Total harvest volume over the 1983 to 2004 period has been lowest in recent years, with a period low of 31,500 tons in 2002.<sup>1</sup> During the same period, the highest statewide volume landed in Alaska's roe herring fisheries was almost twice that of the 2002 harvest; in 1992, 61,476 tons were landed. The total ex-vessel value across the same fisheries and period also is lowest in recent years. The total ex-vessel value of the fisheries peaked in 1996 at \$56.5 million. The following year, despite a slight increase in harvests, total ex-vessel value dropped to only \$15.2 million.

The value of the fisheries has not recovered. Interest in Alaska's roe herring fisheries has declined as the price paid for the resource has declined. The table below shows dramatic reduction in statewide participation following the 1996 peak in total gross earnings. In 1996, landings were recorded on 2,471 permits; but in 2004, landings were recorded on only 350 permits. Despite healthy biomass estimates, the Norton Sound commercial roe herring fishery (the latest in the state) did not occur in 2004 due to lack of participation from processors.

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<sup>1</sup> Unless noted, "ton" in this report refers to a short ton which is 2,000 pounds.

Total participation, harvest, and earnings (nominal dollars) in Alaska's commercial roe herring purse seine and gillnet fisheries, 1983-2004\*

2004	Permits w/landings	350	1993	Permits w/landings	1,144
	Price/ton	\$299		Price/ton	\$398
	Tons landed	33,511		Tons landed	45,386
	Gross earnings (mill\$)	\$10.0		Gross earnings (mill\$)	\$18.1
2003	Permits w/landings	417	1992	Permits w/landings	1,515
	Price/ton	\$241		Price/ton	\$408
	Tons landed	34,105		Tons landed	61,476
	Gross earnings (mill\$)	\$8.2		Gross earnings (mill\$)	\$25.1
2002	Permits w/landings	482	1991	Permits w/landings	1,615
	Price/ton	\$273		Price/ton	\$548
	Tons landed	31,500		Tons landed	42,451
	Gross earnings (mill\$)	\$8.6		Gross earnings (mill\$)	\$23.2
2001	Permits w/landings	649	1990	Permits w/landings	1,748
	Price/ton	\$271		Price/ton	\$631
	Tons landed	40,290		Tons landed	37,481
	Gross earnings (mill\$)	\$10.9		Gross earnings (mill\$)	\$23.7
2000	Permits w/landings	993	1989	Permits w/landings	2,213
	Price/ton	\$272		Price/ton	\$408
	Tons landed	32,401		Tons landed	40,471
	Gross earnings (mill\$)	\$8.8		Gross earnings (mill\$)	\$16.5
1999	Permits w/landings	1,114	1988	Permits w/landings	2,079
	Price/ton	\$418		Price/ton	\$972
	Tons landed	38,834		Tons landed	48,958
	Gross earnings (mill\$)	\$16.2		Gross earnings (mill\$)	\$47.6
1998	Permits w/landings	1,104	1987	Permits w/landings	2,227
	Price/ton	\$285		Price/ton	\$889
	Tons landed	43,226		Tons landed	44,285
	Gross earnings (mill\$)	\$12.3		Gross earnings (mill\$)	\$39.4
1997	Permits w/landings	2,009	1986	Permits w/landings	1,870
	Price/ton	\$285		Price/ton	\$768
	Tons landed	53,262		Tons landed	48,588
	Gross earnings (mill\$)	\$15.2		Gross earnings (mill\$)	\$37.3
1996	Permits w/landings	2,471	1985	Permits w/landings	1,790
	Price/ton	\$1,121		Price/ton	\$663
	Tons landed	50,396		Tons landed	53,880
	Gross earnings (mill\$)	\$56.5		Gross earnings (mill\$)	\$35.7
1995	Permits w/landings	1,641	1984	Permits w/landings	1,416
	Price/ton	\$948		Price/ton	\$441
	Tons landed	49,386		Tons landed	43,004
	Gross earnings (mill\$)	\$46.8		Gross earnings (mill\$)	\$18.9
1994	Permits w/landings	1,382	1983	Permits w/landings	1,506
	Price/ton	\$474		Price/ton	\$547
	Tons landed	47,421		Tons landed	47,479
	Gross earnings (mill\$)	\$22.5		Gross earnings (mill\$)	\$26.0

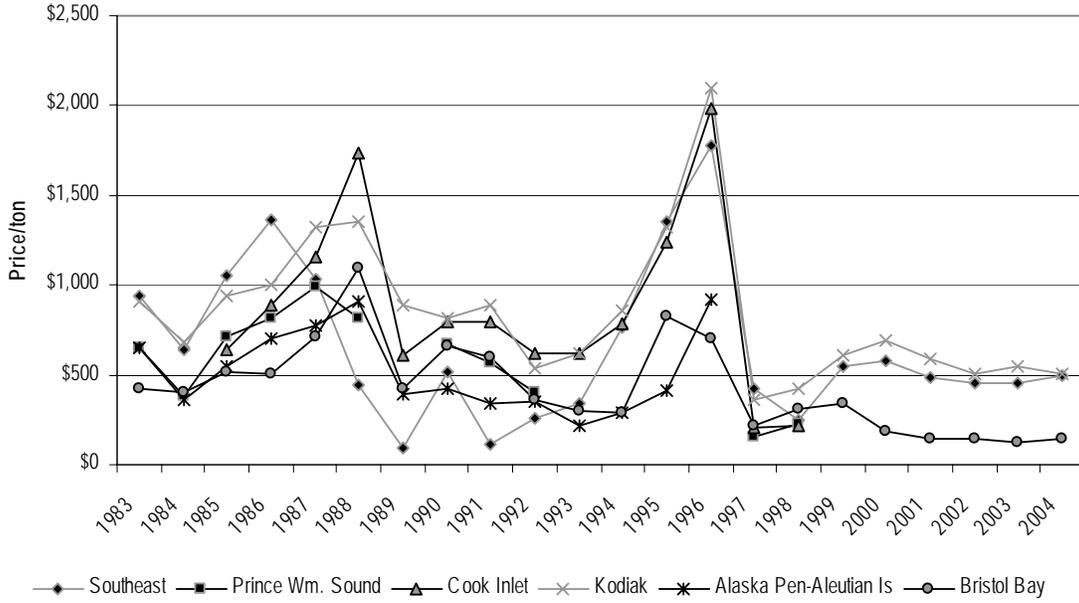
\* Purse seine fisheries included: Southeast (G01A), Prince William Sound (G01E), Cook Inlet (G01H), Kodiak (G01K), Chignik (G01L), Alaska Peninsula-Aleutian Islands (G01M), Bristol Bay (G01T), Kotzebue (G01X)

Gillnet fisheries included: Southeast (G34A), Prince William Sound (G34E), Cook Inlet (G34H), Westward (G34J), Kodiak (G31K/G34K), Alaska Peninsula-Aleutian Islands (G34M), Nelson Island (G34N), Bering Sea (G34O), Security Cove (G34S), Togiak (G34T), Nunivak Island (G34U), Cape Avinof (G34V), Goodnews Bay (G34W), Kotzebue (G34X), Cape Romanzof (G34Y), Norton Sound (G34Z)

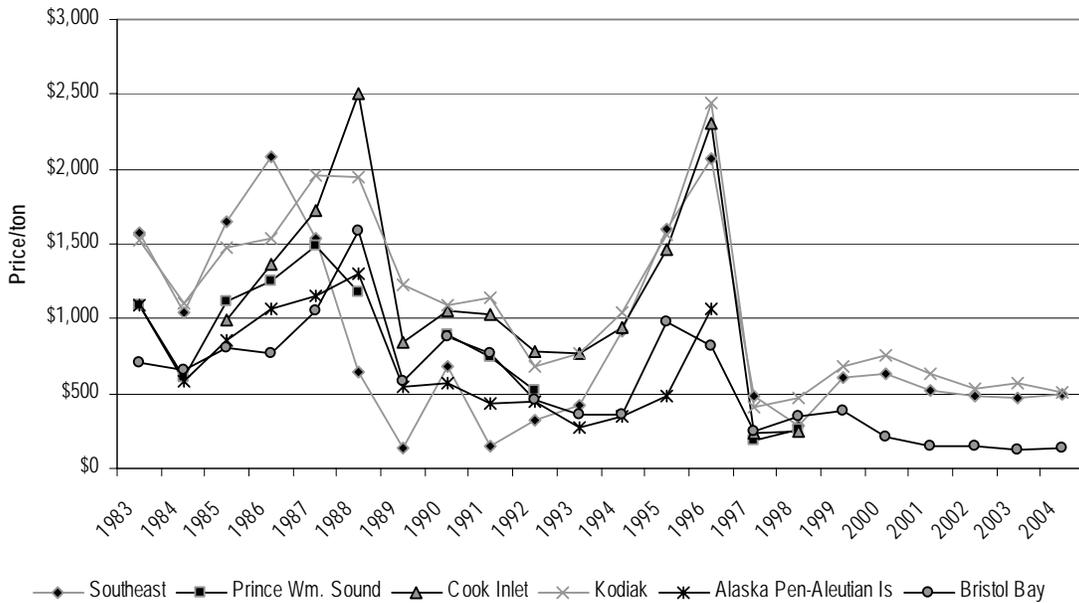
Ex-vessel prices per short ton paid for roe herring in select roe herring purse seine and gillnet fisheries are shown on the following charts. The Commercial Fisheries Entry Commission estimates ex-vessel prices annually by area, gear type, and delivery condition for all Alaska herring fishery landings recorded on fish tickets. Estimates are made using values reported on fish tickets and information gathered from processors through the Commercial Operator Annual Report, administered by the Alaska Department of Fish and Game. The roe herring prices shown below are estimates based on roe herring deliveries only, excluding any food or bait herring landings made on roe herring fishery permits.

Ex-vessel prices peaked in most roe herring fisheries in 1988 and again in 1996. These peaks are followed by steep declines in ex-vessel prices in 1989 and 1997. The charts that follow show average ex-vessel roe herring price estimates first in nominal dollars and then in real 2004 dollars for select purse seine and for select gillnet fisheries. The decline in ex-vessel prices appears to be more pronounced when prices are converted to real (constant-value) 2004 dollars.

Average ex-vessel roe herring price paid in select roe herring purse seine fisheries, nominal dollars

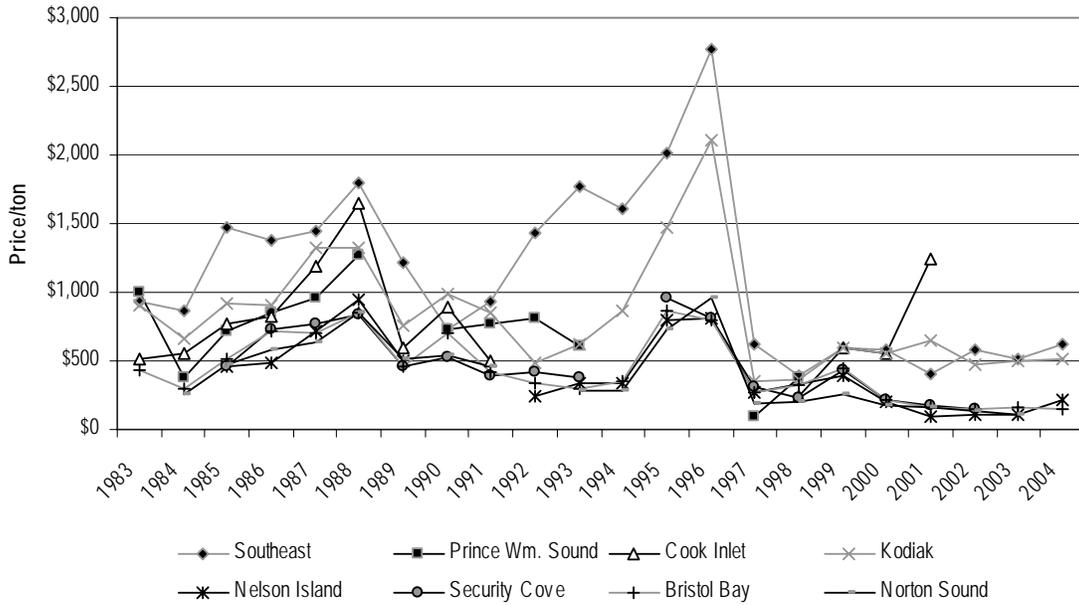


Average ex-vessel roe herring price paid in select roe herring purse seine fisheries, 2004 dollars\*

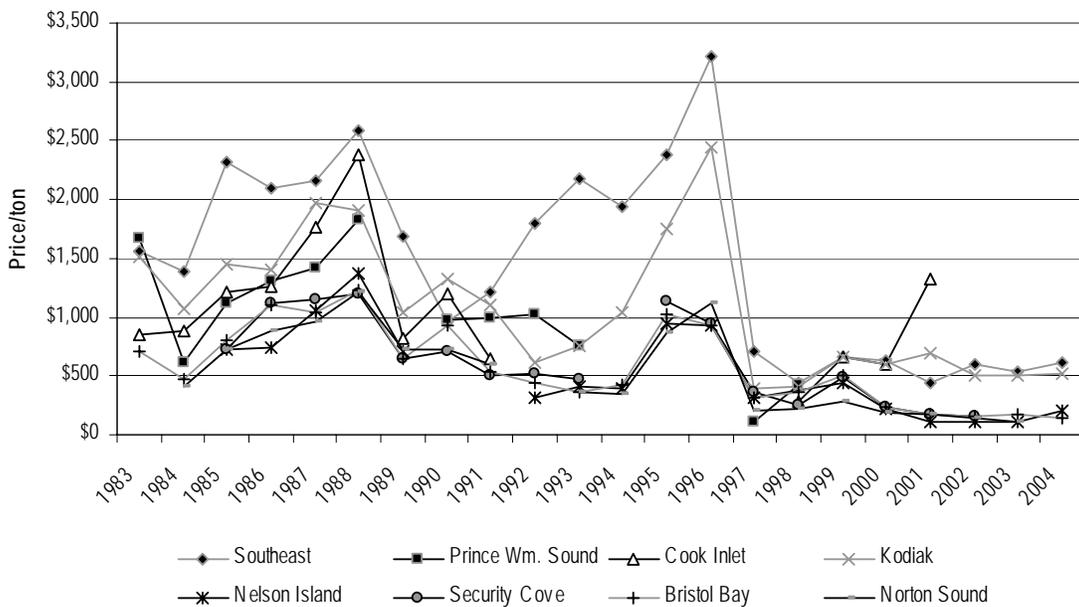


\* Note: Ex-vessel prices were adjusted to 2004 dollars using implicit price deflators for gross domestic product.

Average ex-vessel roe herring price paid in select roe herring gillnet fisheries, nominal dollars



Average ex-vessel roe herring price paid in select roe herring gillnet fisheries, 2004 dollars\*



\* Note: Ex-vessel prices were adjusted to 2004 dollars using implicit price deflators for gross domestic product.

### 3.0 Japanese herring roe market

Ex-vessel price paid to Alaska fishermen is influenced by the world-wide supply of roe herring, the wholesale prices for herring roe products in Japan, and the exchange rate between the yen and the dollar. This section addresses each of those factors. The table below shows the Japanese herring roe annual supply, 1994 through 2003, as provided by analyst Bill Atkinson.

British Columbia has been the main source of extracted Pacific herring roe to Japan and the dominate supplier of the highest grade herring roe used in the “branded gift pack” market. High quality salted kazunoko is packaged in decorative trays and sold through department stores or other gift outlets for the Japanese New Year. Most other Pacific herring roe enter the “home pack” salted kazunoko market. Lower grade Pacific herring roe (skeins that are misshapen, broken, or less desirable in color) is suitable for flavored herring roe, sold for year round home consumption through supermarkets. The smaller size and softer texture of Atlantic roe make it less suitable for the salted kazunoko market. Atlantic herring roe fills the balance of the flavored herring roe producer needs. Alaska ships most product to Japan or China as roe herring (whole fish) for reprocessing, thus extracted herring roe exports are minimal. Across the period shown, the total supply of herring roe in Japan has trended downward. The seasonal supply of Pacific herring roe, however, has been relatively stable in the most recent years shown.

Japanese herring roe supply (in metric tons)<sup>2</sup>

Source	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Beginning inventory:	3,650	3,900	3,100	4,450	5,050	3,740	4,600	5,000	4,300	4,200
Pacific herring roe:										
Canada	5,929	3,913	2,800	4,200	5,095	4,650	4,272	4,264	4,582	4,710
United States	850	881	1,720	2,310	478	314	442	157	48	-
China	359	1,260	-	2,400	2,956	1,965	2,715	2,358	2,343	2,550
Russia	96	101	300	300	188	112	212	144	261	280
Total	7,234	6,155	4,820	9,210	8,717	7,041	7,641	6,923	7,234	7,540
Pacific roe herring:										
North America	4,000	3,300	3,600	3,470	2,440	2,800	2,320	2,750	2,530	2,760
Russia	100	300	400	500	420	300	450	490	1,120	860
Total	4,100	3,600	4,000	3,970	2,860	3,100	2,770	3,240	3,650	3,620
Pacific total:	11,334	9,755	8,820	13,180	11,577	10,141	10,411	10,163	10,884	11,160
Atlantic total:	9,756	10,191	7,950	5,750	5,886	5,364	6,587	6,132	5,905	5,180
Season total:*	21,116	20,021	16,770	19,130	17,576	15,956	17,491	16,688	16,791	16,340
Total supply:*	24,766	23,921	19,870	23,580	22,626	19,696	22,091	21,688	21,091	20,540

Source: Drouin, Michel. 2004. Roe by the numbers. *Pacific Fishing*. April 2004. Data for this article were provided by Bill Atkinson (publisher of *Bill Atkinson's News Report* and author of *Pacific Fishing Japan Update* column).

\*Note that season totals in the table are as presented in the article cited, but are as much as 3 percent higher than the sum of Pacific and Atlantic source roe. This overage carries through to total supply and is not accounted for in the data provided.

<sup>2</sup> This table breaks Pacific herring roe sources into 2 product forms: product received as roe and product received as roe herring (whole fish). The quantities shown in this table for either product form are a measure of the roe received and exclude carcass weights.

The table above shows supply from Russia more than doubled from 2001 to 2002. According to commentary offered by Bill Atkinson in commercial fishing and seafood trade magazines, Russia has continued to expand their role in the Japanese herring roe market. In recent editions of the *Japan Update* market news column published in Pacific Fishing, Atkinson discusses the influence of a growing Russian roe herring fishery on the market.

“The Russian roe-herring fishery has continued to increase over the past several years, and this is providing considerable competition for all roe marketed for home consumption. The retail price for Russian roe was about 1,980 yen/kg last year, and it totally dominated the market during December of last year (*Japan Update*, July 2005).”

“With an improved quality seen over the past few years and the still reasonable prices, Russian herring roe has taken a dominant position in the year-end marketplace...The impact of Russian herring roe on the market will be a major topic of discussion between makers and importers this year. With the exception of a few specialty needs, such as the limited gift-pack market, future successes will depend on a combination of quality product offered at “reasonable” prices (*Japan Update*, April 2005).”

The National Marine Fisheries Service, Southwest Regional Office produces summary data on Japanese seafood markets, including *Average Wholesale Prices and Sales Volume of Selected Fishery Products at 10 Major Central Wholesale Markets in Japan*. The report shows a steady decline in the annual wholesale price of salted herring roe from 1996 through 2004 (reported in yen per kilogram). While price followed a steady downward trend, the quantity traded during the reporting period and in reported markets fluctuated from year to year with a high of 7,054 metric tons in 1998 and low of 5,875 in 1996. In the three most recent years, the quantity reported ranges from 5,946 to 6,451 metric tons.

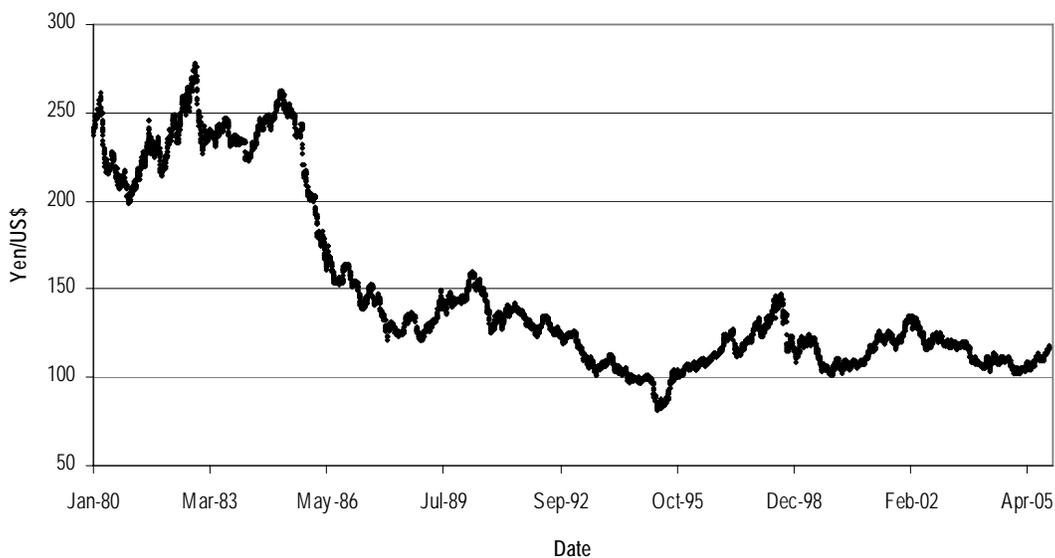
Average wholesale price and sales volume of salted herring roe at 10 major wholesale markets in Japan, 1996-2004

	Price (yen/kg)	Quantity (MT)
2004	2,343	6,451
2003	2,581	5,946
2002	2,650	6,431
2001	2,734	6,591
2000	2,763	6,838
1999	2,836	6,956
1998	2,879	7,054
1997	3,372	6,298
1996	4,663	5,875

Source: National Marine Fisheries Service, Southwest Regional Office, *Average wholesale prices and sales volume of selected fishery products at 10 major central wholesale markets in Japan (yen/kg)* available online at <http://swr.ucsd.edu/fmd/sunee/salesvol/svw.htm>

Trends in wholesale price measured in dollars differ from trends in price measured in yen. According to Johnson and Knapp, a long-term decline in Japanese wholesale prices for salted herring roe was partly offset by an upward trend in the value of the yen relative to the dollar (Johnson and Knapp, 2000). In some years, however, a decreasing Japanese wholesale price for salted herring roe measured in yen was exaggerated by a decline in the value of the yen relative to the dollar. In 1997, most notably, a steep decline in Japanese wholesale price was intensified by a two-year decline in the value of the yen. Yen to US dollar exchange rates are provided in the figure below. Thus Alaska ex-vessel roe herring prices reflect both changes in the Japanese wholesale prices and changes in the exchange rate.

Japanese yen/US dollar exchange rate, January 1980-November 2005



Source: Federal Reserve Statistical Release H.10, Foreign Exchange Rates, available online at <http://www.federalreserve.gov/releases/H10/hist/default.htm>

The changing market for Alaska's roe herring has received substantial attention from Alaska newspapers and commercial fishing trade magazines in recent years. The April 2004 issue of *Pacific Fishing* featured several stories on the world-wide market for roe. An article by Michel Drouin, *Roe supply and demand: How Japan's market appetite for herring, salmon, and pollock roe is playing out for U.S. fishermen and processors*, addressed changes in demand for herring roe. Bill Atkinson is recognized as the source for the article selections provided below.

“In the past, everything closed down for the first three days of the year, and people would stockpile traditional foods for that period. Now, supermarkets are open through the holidays, and aside from eating a few token pieces of herring roe, the purchases are not much different than rest of the year. This change has depressed both sales volume and price levels.”

“Herring roe and urchin roe are losing their position as high-end luxury products. Increasingly, they are becoming standard fare in supermarkets, with prices set to win bargain-hunting consumers.”

“A smaller market for gift packs remains, with person-to-person and family-to-family gift exchange. But the fast-paced lifestyle of younger Japanese has put a premium on convenience, which has undercut demand for traditional salted herring roe.”<sup>3</sup>

The 2004 *Pacific Fishing StatsPack* issue (an annual comprehensive report on recent harvests, forecasts for the coming year, and industry trends) included the following outlook for herring roe markets in the *Herring Forecast* section of the report.

“There’s no shortage of herring quota in 2004. With over 80,000 tons available from California to Alaska, it would normally be a big year. But herring markets have changed, and 2004 won’t be a bonanza. Demand for kazunoko (salted herring roe) continues to sag as younger Japanese eschew the traditional foods of their parents... Now, convenience and economy rule the herring roe market in Japan (*StatsPack*, March 2004).”

“Japanese are still eating herring roe: they just prefer flavored over salted roes more and more, providing growth in the flavored roe market. But it’s the lower-end, lower-value product sold in five-pound pails rather than fancy trays. At half the price and twice the convenience (flavored roes are open-and-eat food) it’s understandable why the times, and the tastes, are changing (*StatsPack*, March 2004).”

#### 4.0 The future for Alaska roe herring fisheries

In summary, industry commentary and harvest and price data show trends of decreasing total herring roe supply to Japan, declining wholesale price paid in Japan, and declining ex-vessel price paid in Alaska roe herring fisheries. In a 2001 paper titled *Changing Markets for Alaska Roe Herring*, Johnson and Knapp review industry observers’ perceptions of explanations for reduced demand for traditional salted herring roe in Japan as follows:

- A prolonged recession in Japan.
- More personal travel during holidays, resulting in less time at home to participate in traditional activities such as those associated with kazunoko.
- Development of substitute products as holiday gifts, including salted and smoked salmon, smoked ham, and liquor.

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<sup>3</sup> Traditional Japanese salted herring roe (kazunoko) requires the consumer to soak the dried product overnight in fresh water to extract most of the salt.

- Changing corporate culture resulting in curtailment of company gift-giving... which discourages or prohibits officials from accepting gifts from the corporations they regulate--such as high value branded kazunoko gift packs.
- Changing demographics of Japan's population...The younger generation tends to be more health conscious, seeking diets lower in salt. The younger generation is also more convenience-oriented and less patient with the rituals of traditional cooking.

To substantiate these perceptions of reduced demand, Johnson and Knapp point to comparisons of average estimated consumption of salted herring roe and average wholesale prices for salted herring roe over four three-year periods: 1988-1990, 1991-1993, 1994-1996, and 1997-1999. The table below shows consumption and price summary data used in the study. Their work suggests the Japanese demand curve for traditional salted herring roe is shifting inward; at any given volume, prices Japanese consumers are willing to pay for salted herring roe are declining.<sup>4</sup>

	Estimated consumption of salted herring roe (MT)	Avg. wholesale price of salted herring roe (yen/kilo)
Average, 1988-1990	10,737	3,933
Average, 1994-1996	9,713	3,561
Percent change	-10%	-9%
Average, 1991-1993	11,803	3,413
Average, 1997-1999	9,925	2,612
Percent change	-16%	-23%

*Source:* Johnson T and Knapp G. 2001. Changing markets for Alaska roe herring. Funk F, Blackburn J, Hay D, Paul AJ, Stephenson R, Toresen R, Witherell D, editors. Alaska Sea Grant College Program, Fairbanks, AK. University of Alaska Sea Grant. AK-SG-01-04, 2001.

Johnson and Knapp offer the following summary statements looking to the future of herring roe markets.

“Imports and distributors interviewed for this research generally were pessimistic about the future of herring roe products, expressing a widely held view that demand will continue to diminish into the foreseeable future. However, some of them, and more commonly kazunoko processors, believe that demand can be stimulated by lowering the price, developing new products, or employing new ways of marketing familiar products.”

“Perhaps the greatest concern to the Alaska herring industry should be declining Japanese demand for traditional salted herring roe. If Pacific herring harvests

<sup>4</sup> Note that Johnson and Knapp highlighted ranges of years for comparison that resulted in a decrease in consumption accompanied by a decrease in price; evidence of an inward shifting demand curve. Applying their method to contiguous periods of time fails to produce the same results. Changes between periods 1 and 2, 2 and 3, and 3 and 4 are consistent with movement along a stationary demand curve (higher prices occur in periods of lower quantity and lower prices occur in periods of higher quantity). By looking at periods over longer time gaps, the data tend to support the theory that demand is gradually shifting inward as tastes and preferences for herring roe products change.

remain at levels of the past decade, it is likely that Japanese wholesale prices for salted herring roe--and prices paid to Alaska fishermen--will remain low and may fall further.”

“Alaska herring may serve as a reminder that viable commercial fisheries depend not only on fishery resources, but also on the markets from which resources derive their value.”

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