

Fall 2016

# SOCKEYE

## Market Analysis



# BRISTOL BAY

Regional Seafood  
Development Association

PREPARED BY

  
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Bristol Bay Regional Seafood Development Association (BBRSDA) is tasked with increasing the value of Bristol Bay sockeye and has contracted with McDowell Group to produce bi-annual sockeye market reports. These reports analyze market conditions for sockeye products, investigate market issues, examine historical trends, and discuss impacts on Bristol Bay fishermen. Key findings are listed below:

U.S. markets for fresh and refreshed Bristol Bay sockeye products offer the best potential for sustainable growth and higher resource values. High farmed salmon prices and poor North American salmon harvests have put Bristol Bay producers in a favorable position. Expanding these markets will require continued improvement in sockeye quality and successful marketing efforts. Fishermen who provide high quality fish to these growing market channels will be in the best position to benefit.

## Summary of Market Conditions and Fishery Performance

- Wholesale prices for sockeye products have trended up in recent months, despite another large Bristol Bay harvest. Product also appears to be moving faster in 2016, as first wholesale sales volumes during May-August exceeded those of the previous year. Wholesale prices of farmed salmon are also up considerably over the past 12 months.
- Net processing revenue, defined as the difference between first wholesale revenue earned by processors from selling Bristol Bay sockeye less ex-vessel payment to fishermen, increased substantially during the 2015 harvest year. Final net processing revenue estimates for the 2016 harvest year will not be available until next summer, but are expected to be well above the four-year moving average. Increasing net processing revenues suggest that the financial position of Bristol Bay's processing sector has improved substantially since the 2014 harvest year cycle, which improves the outlook for future ex-vessel values.
- Global sockeye harvests were again very strong in 2016, primarily due to another large run in Bristol Bay. Based on preliminary harvest estimates, the 2016 season produced the largest global sockeye harvest since 1996. However, farmed production will likely decline in 2016. Farmed salmon makes up the majority of market supply and production is expected to remain below 2015 levels for several years.
- First wholesale prices for frozen H&G Bristol Bay sockeye tend to be about \$1.50 per processed pound, after adjusting round weight product to processed weight. This markup has fluctuated between \$1.20 and \$2.01 per processed pound in recent years, but has been close to the \$1.50 average in the most recent harvest years (2015-2016).
- The preliminary ex-vessel value of Bristol Bay sockeye increased 66 percent in 2016, due to a price increase and strong harvest volume. The value of all other Alaska sockeye declined 7 percent.
- After a couple years of negative trends, currency rate movements have generally been favorable for Alaska sockeye producers in 2016.

- The estimated market value of Bristol Bay salmon driftnet permits is up 22 percent, or approximately \$24,000, from the beginning of the year.

## Improving Fishing Performance through Quality and Planning

This report features an analysis of fishing performance in the Bristol Bay driftnet fishery, as well as a discussion about how much additional gross earnings fishermen can earn by receiving quality bonuses. This information is presented for the benefit of member driftnet fishermen, for their business planning purposes.

Fishing performance in the fishery varies significantly from boat to boat, but the distribution of earnings is similar from year to year. Boats at the higher end of the earnings scale often gross over three times the amount of boats at the bottom of the spectrum. Further, slightly less than 30 percent of permits account for half of the fishery’s gross earnings, while about half of the fleet accounts for 25 percent of the value. Though all segments of the fleet benefitted from rising average earnings and prices (in most years) since 2005, earnings distribution has not changed substantially in percentage terms. The key difference is that top-end fishermen now make much more in absolute dollar terms than the bottom half of the fleet. Numerous factors explain the earnings gap, such as boat/crew size, success in finding the fish, permit stacking, fishing style, and bonus payments.

For more information about the driftnet fishery’s performance, see page 29.

Implementing quality-oriented practices such as chilling, bleeding, or floating fish is one way to increase gross fishing revenue. Investing in RSW systems and implementing improved handling practices carry substantial costs, but the increase in prices through quality bonuses are significant – quality-oriented fishermen generally received 30

to 50 percent higher prices in 2015 than dry boats. The increase in potential gross fishing revenue provides an attractive payback period for RSW units, and assistance/financing programs are available for fishermen.

In addition to providing direct benefits, improving quality has residual benefits for the fleet. Higher quality results in less discounting, more positive consumer experiences, and maximizes the value of the resource. When wholesale prices are higher a larger share of the value tends to go to raw material producers, the fishermen.

## Optimal Chilling Percentage for the Bristol Bay Driftnet Fleet

Ideally, all chilled Bristol Bay sockeye would be directed to fillet and head/gut (H&G) lines and unchilled sockeye would be used in canned product. Chilled sockeye produces higher quality fillet products that require fewer discounts, whereas there is currently very little difference in canned prices depending on whether the fish was chilled or not. Chilling 100 percent of the harvest would be even better, but given the higher cost of chilled sockeye there is currently not an incentive to chill fish that are destined for canned production. Therefore, the optimal level of chilled sockeye production is based on the percentage of canned production. In reality, it is

### Average Bristol Bay Salmon Driftnet Gross Earnings per Vessel & Harvest Volume (in lbs.), by Percentile, 2015

Harvest Year/Cycle	Average Cohort Gross Earnings	Average Cohort Harvest Volume
Top 20 <sup>th</sup> Percentile	\$102,000	154,700
40 <sup>th</sup> Percentile	\$73,900	123,900
60 <sup>th</sup> Percentile	\$54,600	92,500
80 <sup>th</sup> Percentile	\$35,900	59,900

Note: Figures are rounded. Based on cohort analysis of Bristol Bay driftnet fishery.  
Source: McDowell Group estimates, based on CFEC data.

impossible to perfectly allocate chilled/unchilled fish to the optimum product form during the busy Bristol Bay salmon season, so there should also be a buffer percentage built in to assure that enough chilled fish are available to account for these situations.

The optimal chilling percentage is defined as 100 percent less the percentage of the harvest put into canned products, plus a 5 percent buffer. For 2015, the optimal chilling percentage was estimated at 82 percent. Chilling this amount would have ensured that enough chilled sockeye were available to satisfy all H&G and fillet production. However, only 55 percent of the Bay's driftnet harvest was chilled. This 27 percent gap means an estimated 35.2 million pounds of unchilled sockeye went into fillet and H&G products. The actual/optimal chilling gap has increased in recent years as canned production has decreased, as a percentage of total production.

**Table 1. Chilling Performance by Bristol Bay Driftnet Fleet and Estimated Optimal Chilling Percentage, 2010-2015**

Year	Driftnet Harvest Volume (Millions lbs.)	Drift Pct. Unchilled	Drift Pct. Chilled	Pct. of Round Harvest Canned*	Optimal Chill Pct.	Gap Between Actual/Optimal Chill Pct.
2010	136.0	53%	46%	27%	78%	32%
2011	110.1	47%	53%	25%	80%	27%
2012	109.4	41%	59%	41%	64%	5%
2013	81.0	44%	56%	39%	66%	10%
2014	132.3	49%	51%	33%	72%	21%
2015	157.4	44%	55%	23%	82%	27%

\*These data were calculated by McDowell Group based on COAR production and harvest statistics, similar data found in the 2015 BBRSDA Canning percentages published in the BBRSDA Processor Survey were found to be significantly higher than estimates made using ADF&G production/harvest data.

Note: Chilling percentages may not sum to 100 percent due to rounding.

Source: ADF&G, Northern Economics (2015 BBRSDA Processor Survey), and McDowell Group estimates.

Closing the gap and tapping into unrealized resource potential will require adding more RSW-equipped boats to the fleet or a greater use of slush ice. Based on all data currently available, the timing for making this investment appears favorable. Bristol Bay runs have been very healthy and escapement has been good in recent years. Although final 2016 figures are not yet available, preliminary data suggests the average Bristol Bay driftnetter did better than most previous years. Market conditions are also improving for most fresh and frozen forms, significantly aided by a downturn in farmed salmon production and stabilizing currency markets. In short, investment conditions for RSW systems appear relatively more favorable than 2014 when fishermen turned in a good year but faced deteriorating conditions in the wholesale market.

# Glossary of Terms and Abbreviations

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## Abbreviations and Acronyms

ADOR	Alaska Department of Revenue
ADF&G	Alaska Department of Fish and Game
ASMI	Alaska Seafood Marketing Institute
ASPR	Alaska Salmon Price and Production Reports (published by ADOR)
BBRSDA	Bristol Bay Regional Seafood Development Corporation
BBFA	Bristol Bay Fishermen's Association
EV	Ex-Vessel terms
COAR	Commercial Operators Annual Report (published by Alaska Dept. of Fish and Game)
DFO	Canadian Department of Fisheries and Oceans
FAO	United Nations Fisheries and Aquaculture Organization
FW	First wholesale terms
H&G	Headed and gutted
HY	Harvest year cycle
MSC	Marine Stewardship Council
NMFS	National Marine Fisheries Service
PACFIN	Pacific Fisheries Information Network

## Glossary of Terms

Ex-Vessel Value/Price	The value or price paid to fishermen by a processor for whole fish.
First Wholesale Value	The value (or average price) of processed product sold by processors to entities outside of their affiliate network. Typically refers to the value of product as it leaves Alaska.
First Wholesale Volume	The weight of processed product sold by processors to entities outside of their affiliate network. Also referred to as production volume.
Harvest Year Cycle	Refers to the 12 month period when most sockeye are caught and sold into the wholesale market. The harvest year cycle runs from May of the harvest year through April of the following year. Aligning the data by sales season, as opposed to calendar year provides a better basis for comparing first wholesale data to ex-vessel data. This period is also referred to as the annual sales cycle.
Net Processing Revenue	The difference between first wholesale revenue earned by primary processors during the annual sales cycle, less ex-vessel payments to fishermen during the corresponding period. Also referred to as gross processing profit in previous reports.
Refreshed Sockeye	Refers to frozen H&G product which has been thawed out and filleted. This is usually done at secondary processing plants near final consumer markets by local seafood distribution companies. Processed, chilled sides are then delivered to retailers and restaurants.
Round Weight	The weight of a whole fish as it is delivered to the processor in an uncut and unprocessed state.



# Introduction and Data Sources

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The Bristol Bay Regional Seafood Development Association (BBRSDA) has commissioned McDowell Group, Inc. to analyze sockeye markets and report findings bi-annually since 2013.

In business since 1972, McDowell Group is Alaska's most experienced research and consulting firm. McDowell Group has served as a market-research contractor for the Alaska Seafood Marketing Institute for the past 16 years and has conducted market research, feasibility studies, and other seafood industry-related projects for public and private sector clients throughout Alaska and elsewhere in North America.

## Study Purpose and Scope of Work

BBRSDA represents the world's largest group of sockeye fishermen and is tasked with increasing the value of Bristol Bay salmon (principally sockeye). In addition to bi-annual reports, the *Sockeye Market Analysis* project includes summary presentations at the direction of BBRSDA Board and staff. The project tracks market trends affecting sockeye salmon to help BBRSDA direct promotional efforts, inform its members, and react effectively to emerging issues and trends.

Past analyses can be viewed or downloaded from BBRSDA's website ([www.bbrsda.com](http://www.bbrsda.com)) or requested by contacting McDowell Group staff at [seafood@mcdowellgroup.net](mailto:seafood@mcdowellgroup.net).

## Methodology and Data Sources

McDowell Group compiled data from government agencies, including the Alaska Department of Fish and Game (ADF&G), the Alaska Department of Revenue (ADOR), and export data from the National Marine Fisheries Service (NMFS).

Specific data sources used in this report are summarized below:

### **ADF&G Fish Ticket Data**

Bristol Bay fish tickets often contain no documentation of ex-vessel price or value for salmon. However, in cases where ex-vessel price has been omitted from fish tickets an average price is applied to the harvest volume based on information collected by fishery biologists in each region. More information about ADF&G fish tickets can be found at: <http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.fishtickets>.

### **ADF&G Commercial Operators Annual Report (COAR)**

The first buyer of raw fish, persons who catch and process fish, and persons who catch and have fish processed by another business are required to file an annual report of their purchasing and processing activities. This report is called the Commercial Operator's Annual Report (COAR) and is due by April 1 of the following year. Historical COAR data extending through 2014 is used as a supplementary information source in this sockeye market analysis.

COAR contain data on seafood purchasing, processed production volume, and both ex-vessel and wholesale values of seafood products. The buying information from COAR is reported by species, area of purchase, condition of fisheries resources at the time of purchase, type of gear used in the harvest, pounds purchased, and ex-vessel value. The ex-vessel value in COAR includes any post-season adjustments or bonuses paid after the fish was purchased. Production information from COAR is reported by species, area of processing, process type (frozen, canned, smoked, etc.), product type (fillets, surimi, sections, etc.), net weight of the processed product, and the first wholesale value. More information about COAR data can be found at: <http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.coar>.

### **ADOR Alaska Salmon Price and Production Reports (ASPR)**

The Alaska Salmon Price Report (ASPR) covers first wholesale volume and value - by species and area - for six key Alaska salmon products. First wholesale is defined as the value and volume at the point when product is sold to an entity outside of the processor's affiliate network. The data set includes all processors that sold more than one million pounds of processed salmon products in the previous calendar year, which includes the majority of Alaska's wholesale production of salmon products. The ASPR is a major data source for salmon market analysis. ASPR reports are available on the ADOR website at: <http://www.tax.alaska.gov/programs/programs/reports/index.aspx?60624>

Data from these sources have been structured to provide information applicable to Bristol Bay sockeye to the fullest extent possible. Where the timing of data releases by the agencies causes gaps, McDowell Group has developed estimates based on historical ratios and other relationships.

## **Limitations of Data and Analysis**

Commercial fishing is a heavily regulated business and government agencies collect data on a wide range of variables, from harvest to price to participation. As wild fish move closer to the consumer, publically available data diminishes. For instance, there is no readily accessible public data on the average retail price of canned salmon or the amount of sockeye fillets sold by individual retailers. This data gap has been addressed, to the extent practical, by purchasing point-of-purchase information and interviewing sockeye buyers. McDowell Group also maintains subscriptions to most major trade press outlets and was able to use trade-press data to supplement the public information and provide additional context.

## **Legal Disclaimer**

The views expressed herein do not necessarily represent those of the Bristol Bay Regional Seafood Development Association.

# Ex-Vessel vs. Frozen H&G Prices

## Price Comparison

Frozen, headed/gutted sockeye is the most prominent product form derived from Bristol Bay salmon fisheries. Therefore, some fishermen have suggested using the product as a basis for comparing ex-vessel and first wholesale prices, to determine a fair ex-vessel price given wholesale market conditions. This section explores this relationship and related data in detail.

ASPR first wholesale data for frozen H&G Bristol Bay sockeye is compared to base ex-vessel sockeye prices in the table below. First wholesale prices are based on product sold by processors between June of the harvest year through the following May for each harvest year cycle (e.g. June 2007 – May 2008 = 2007 harvest year). This adjustment ties first wholesale sales to the proper harvest year, as the vast majority of frozen H&G sales occur within 12 months of the fishery opening.

**Table 2. Ex-Vessel and Frozen H&G First Wholesale Prices, Bristol Bay Sockeye, 2005-2016**

Harvest Year (HY)	Avg. Base Ex-vessel Price/lb.	Frozen H&G Avg. FW Price/lb. based on HY Sales	Base Price as Pct. of FW Price	FW-Final Adj. Price Difference*	Sockeye Harvest Volume (Millions lbs.)	Avg. Driftnet Earnings per Permit
2005	\$0.62	\$2.42	26%	\$1.40	155	\$55,673
2006	\$0.55	\$1.89	29%	\$0.83	165	\$65,128
2007	\$0.62	\$2.02	31%	\$0.98	173	\$66,836
2008	\$0.68	\$2.38	29%	\$1.26	160	\$68,169
2009	\$0.70	\$2.54	28%	\$1.35	182	\$84,492
2010	\$0.95	\$2.99	32%	\$1.42	170	\$89,784
2011	\$1.00	\$3.21	31%	\$1.54	135	\$86,325
2012	\$1.00	\$2.83	35%	\$1.20	119	\$77,954
2013	\$1.50	\$4.22	36%	\$2.01	92	\$85,687
2014	\$1.20	\$3.10	39%	\$1.29	161	\$118,244
2015	\$0.50	\$2.41	21%	\$1.56	185	\$51,782
2016**	\$0.76	\$2.83	27%	\$1.61	202	\$104,000

\*Equals the average first wholesale frozen H&G price minus the average final Bristol Bay sockeye price divided by a recovery rate of 74 percent. These adjustments account for the fact that final prices include supplemental payments and adjust the weight basis from round pounds to a H&G basis. This figure represents the amount of value retained by processors per H&G pound. Figures for 2016 will change based on actual final 2016 prices and frozen H&G prices.

\*\*Harvest year 2016 figures only include three months of first wholesale sales data (through August 2016), as such first wholesale prices will likely change as more sales data becomes available. Average driftnet earnings are estimated, based on preliminary data.

Note: All figures are nominal.

Source: McDowell Group estimates, based on ADF&G and ADOR.

Ex-vessel prices for Bristol Bay sockeye have fallen substantially since 2014, both in actual terms and as a percentage of first wholesale frozen H&G prices. However, significant first wholesale price movements often produce a relatively larger change in ex-vessel price, in percentage terms. When first wholesale prices decline, ex-vessel prices tend to contract even more leading to a lower base price as a percentage of frozen H&G price. When first wholesale prices increase, ex-vessel prices tend to increase even more. For example, from 2011 to 2014, frozen H&G sockeye from Bristol Bay averaged \$3.34/lb and base ex-vessel prices averaged 35 percent of that amount. By comparison, first wholesale price averaged \$2.37/lb between 2005-2010 and base ex-vessel price averaged 29 percent of the first wholesale price.

Intuitively, this makes sense because outside of buying fish many costs for processors are relatively fixed. So long as harvest volume is not too different than the forecast, it costs processors about the same amount per pound to process frozen H&G sockeye whether the product is worth \$2.00/lb or \$4.00/lb.<sup>1</sup> Assuming processors have enough capacity, the additional revenue realized when prices are high is generally used to bid up fish prices. Based on available data, this appears to have been the case between 2009 and 2013. Further, the markup between ex-vessel price (adjusted for lost weight) and the first wholesale price of frozen H&G sockeye from Bristol Bay is fairly stable on average, which is discussed in more detail below.

This variable relationship makes it difficult to create a straightforward pricing system based on frozen H&G prices, as the relationship is not static across the wholesale price spectrum. Base ex-vessel prices equal to 35 percent of the frozen H&G price might be workable for processors when the wholesale market is over \$4.00/lb. as was the case in 2013, but 35 percent may not be feasible when prices are below \$3.00/lb – based on historical ex-vessel and first wholesale pricing data.

Another way to analyze this data is to consider how much value or revenue processors receive for frozen H&G sockeye, after subtracting what they paid for fish. This amount is calculated as the frozen H&G Bristol Bay sockeye price less the final ex-vessel price (including all bonuses/supplements) divided by a recovery rate of 74 percent. Processors pay fishermen in round weight terms, but only realize revenue based on the processed weight. On average, one round pound of sockeye will yield about 0.74 pounds of frozen H&G sockeye.<sup>2</sup> In reality, processors are also able to recover additional value from the remaining parts of the fish by selling roe or other ancillary products such as fish meal. However, sockeye roe revenue tends to be fairly consistent over time, regardless of harvest volume and revenues derived from ancillary products are relatively small compared to other major product forms. So for purposes of analyzing the relationship between ex-vessel price and frozen H&G price, it is appropriate to exclude the value added by roe or other products.

## Frozen H&G Markup

Table 3 shows final ex-vessel prices for Bristol Bay sockeye, frozen H&G prices, and the amount of value retained by processors after debiting the cost of fish per processed H&G pound. The amount of net revenue realized by processors varies from year to year, but showed a strong upward trend between 2006 and 2011. This suggests that processing costs in Bristol Bay increased during this time and/or processors simply realized larger profits from frozen H&G sockeye products. Even if the latter is true, fishermen also probably realized higher profits during this period, as average ex-vessel earnings per driftnet permit fished increased from \$65,128 in 2006 to \$85,687 in 2013.

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<sup>1</sup> This is a simplified illustration of processing costs. Unit costs do tend to be consistent from year to year; however, unit costs can be higher in years when there is lower harvest volume to absorb fixed costs or lower if the run is large and arrives at the expected time.

<sup>2</sup> Frozen H&G yields tend to range between 0.66 to 0.82 pounds of processed product per round pound, depending on fish size and cutting specifications. Smaller fish tend to produce smaller yields.

**Table 3. Ex-Vessel and Frozen H&G First Wholesale Prices, Bristol Bay Sockeye, 2005-2016**

Harvest Year (HY)	Avg. Final Ex-vessel Price/lb.	Frozen H&G Avg. FW Price/lb. based on HY Sales	FW-Final Adj. Price Difference*	5-year Avg. FW-Final Adj. Price Difference	Sockeye Harvest Volume (Millions lbs.)
2005	\$0.76	\$2.42	\$1.40	-	155
2006	\$0.78	\$1.89	\$0.83	-	165
2007	\$0.77	\$2.02	\$0.98	-	173
2008	\$0.83	\$2.38	\$1.26	-	160
2009	\$0.88	\$2.54	\$1.35	\$1.16	182
2010	\$1.16	\$2.99	\$1.42	\$1.17	170
2011	\$1.24	\$3.21	\$1.54	\$1.31	135
2012	\$1.21	\$2.83	\$1.20	\$1.35	119
2013	\$1.64	\$4.22	\$2.01	\$1.50	92
2014	\$1.34	\$3.10	\$1.29	\$1.49	161
2015	\$0.63	\$2.41	\$1.56	\$1.52	185
2016**	\$0.92 (est.)	\$2.83	\$1.58	\$1.53	202

\*Equals the average first wholesale frozen H&G price minus the average final Bristol Bay sockeye price divided by a recovery rate of 74 percent. These adjustments account for the fact that final prices include supplemental payments and adjust the weight basis from round pounds to a H&G basis. This figure represents the amount of net value retained by processors per pound of frozen H&G sockeye sold, less the amount they paid for fish.

\*\*Harvest year figures for 2016 only include three months of first wholesale sales data (through August 2016), as such first wholesale prices will likely change as more sales data becomes available.

Note: All figures are nominal.

Source: McDowell Group estimates, based on ADF&G and ADOR.

Interviews with Bristol Bay processors suggest that while all companies strive to hit annual profit targets, processors realize that the business is inherently risky and variable. Processors often minimize this risk by waiting until the season is mostly complete to post ex-vessel prices; however, the wholesale market can still end up being different than initially projected when prices are set (usually in mid-July). Processing companies tend to evaluate the success of their business based on the average of multiple years. Profits may be minimal or even negative in some years, but so long as profits are above a certain threshold over the course of several years the business can remain solvent. Therefore, it can be instructive to average net frozen H&G revenues over the course of several years.

Table 3 shows the five-year average of net frozen H&G revenue per pound since 2005. This moving average has been relatively consistent in recent years, at approximately \$1.50 of net value per frozen H&G pound sold. In other words, Bristol Bay processors have earned about \$1.50 per frozen H&G pound of sockeye sold in recent years, after paying fishermen. This net revenue must pay for all other processing costs, in addition to contributing to business-sustaining profits.

Perhaps the most interesting finding is that markups were largest when ex-vessel prices peaked in 2013. If the \$1.50/lb markup is used as a measuring stick for fair ex-vessel prices, then the 2013 final ex-vessel price should have been \$2.01/lb ( $(\$4.22/\text{lb.} - \$1.50) \times 0.74$ ), 25 percent greater than the \$1.64/lb received. However, production volume was much lower in 2013, which may explain the higher markup. Markups tend to be larger in businesses with lower volume, in order to cover fixed costs. Markups fell substantially the following year in 2014. Based on the average markup of \$1.50/lb, the final ex-vessel price should have been \$1.18/lb in 2014 but fishermen were paid \$1.34/lb.

## Implications of Establishing an Ex-Vessel Pricing Model for Bristol Bay Sockeye

Given that the data clearly show processors generally markup frozen H&G sockeye by \$1.50/lb., it might seem reasonable to use these findings as a basis for setting ex-vessel prices. However, the implications of using a static markup to create a "fair" ex-vessel pricing model involves several important considerations:

1. There is a significant timing problem. Final frozen H&G prices are not known until well after the season. This would mean prices could not be set until the following spring and fishermen would get paid much later.
2. Pegging ex-vessel price to a static markup means that all future benefits from developing other product lines, such as fish meal, fish oil, fillets, or other products will be retained solely by processors.
3. Future ex-vessel prices would not reflect changing unit costs associated with processing. Fishermen would not realize any gains or have to pay any costs associated with efficiency gains or losses.
4. Such a system would create an incentive to underreport first wholesale prices, which could artificially lower ex-vessel prices. Currently, first wholesale data provided to the State of Alaska has been found to be reliable; however, the ability to audit frozen H&G prices across all markets is limited.
5. Ex-vessel prices would not reflect changing values associated with other traditional product lines.
6. Is \$1.50/lb a fair markup? This is the average difference which has been paid to fishermen in recent years going back to approximately 2009, but that may not mean it will result in a feasible long term arrangement for fishermen or processors.
7. Processors and fishermen are not required to accept any binding price-setting system. Even if a system could be implemented it could stifle competition by excluding new processors who wish to enter the Bay and build a fleet by paying above market ex-vessel prices.

Some of these factors may result in lower ex-vessel prices than would otherwise likely be paid under the current price-setting process, and would likely result in fishermen being paid at a later date. The reality is that wholesale prices are not fully known until the product is actually sold, which in the case of frozen H&G sockeye takes about a full calendar year. Further, the ability to maintain accurate wholesale pricing data is questionable - an extremely important consideration to any process which seeks to use first wholesale prices as a basis for ex-vessel price.

# Ex-Vessel and First Wholesale Cash Flow Analysis

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Comparing ex-vessel sockeye prices to frozen H&G prices is one way of evaluating prices; however, the most robust way to evaluate price may be to consider the total value earned by processors and fishermen over time. The amount of first wholesale revenue paid to fishermen through ex-vessel prices, as well as the gross marginal amount retained by processors provide strong clues as to the future direction of ex-vessel prices and/or value.

## KEY FINDINGS:

- Net processing revenue was the lowest on record during the 2014 harvest year, but was the highest on record during the following harvest year
- At this point, it appears as though net processing revenue will likely be above average in 2016, which is good news heading into 2017 as it means Bristol Bay processors likely have sufficient capital to competitively bid for sockeye (however, final 2016 net processing revenue figures will not be available until next summer)
- Despite the recent increase in net processing revenue, the four year moving average is still well below figures posted several years earlier

Trends in processors' cash flow have a direct bearing on ex-vessel prices and the competitiveness of the fishery. Cash flows can be tracked by comparing first wholesale sales value to the ex-vessel value paid for the fish, in this case Bristol Bay sockeye.

Analyzing processing sector cash flows using ex-vessel and first wholesale data requires a few adjustments and conventions:

1. In this chapter we focus on a calculated statistic called **Net Processing Revenue**, which is an estimate of revenue earned by Bristol Bay processors for selling key sockeye products (H&G, fillets, canned, and roe) made in the region, less the ex-vessel cost of sockeye (i.e. payments to fishermen).
2. First wholesale sales are compiled according to a customized "sales cycle" intended to better imitate the actual wild salmon sales season. Because first wholesale data is generally broken into trimesters and most commercial salmon fisheries start up in May/June, we treat the period of May through the following April as one 12-month "sales cycle." For example, salmon caught in July 2014 and sold by Alaska processors in February 2015 would be part of the 2014 harvest year (also referred to as the 2014 sales cycle). Compiling the sales data in this manner, as opposed to a calendar year basis, allows for a better comparison to ex-vessel figures.

Table 4 (shown on the following page) summarizes historical first wholesale value and ex-vessel value, as well as net processing revenue over time. Net processing value increased significantly from 2003 through 2011, but contracted substantially between 2011 and 2014. With low ex-vessel prices paid out in 2015 and a large harvest, net processing revenue increased sharply during the 2015 sales cycle despite lower wholesale prices. In fact, net

processing revenue earned during the 2015 sales cycle was the highest figure reported dating back to when reliable data became available in 2001.

The increase in net processing revenue largely explains why the base price increased 50 percent in 2016, which coupled with the large harvest, resulted in a larger total ex-vessel value in 2016. In hindsight, the ex-vessel price paid out in 2014 was greater than what processors probably should have paid out, given that wholesale prices declined sharply and net processing revenue plummeted to \$71 million – a figure well below even the difficult years of the early 2000s after accounting for inflation. Conversely, the 2015 base ex-vessel price of \$0.50/lb. was probably too low, given the total first wholesale value realized by processors from selling 2015 production. Neither of the prices were indicative of the actual wholesale market conditions, due to the timing of numerous market-changing factors.

The dramatic price shifts in 2014 and 2015 represented a move by processors to recoup lost cash flow and bring average net processing revenues more in line with historical averages. When looked at as a whole, the 2014 and 2015 harvest years produced an average annual net processing revenue of \$152 million. This figure is still well below many of the previous years, but was likely a necessary course of action in order to recapitalize processing operations in order to remain viable.

**Table 4. Net Processing Revenue Derived from Bristol Bay Sockeye, in \$Millions, 2001-2015**

Harvest Year/Cycle	First Wholesale Value	Final Ex-Vessel Value	Net Processing Revenue (NPR)	NPR Four Year Avg.	Next Year's Ex-Vessel Value
2001	\$117	\$38	\$79	-	\$32
2002	140	32	108	-	47
2003	123	47	77	-	76
2004	176	76	99	91	96
2005	194	96	98	95	110
2006	242	110	131	101	119
2007	265	119	146	119	118
2008	283	118	165	135	142
2009	338	142	196	160	177
2010	384	177	207	179	155
2011	363	155	208	194	140
2012	311	140	172	196	149
2013	289	149	140	182	217
2014	289	217	71	148	121
2015	353	121	232	154	185*

\*2016 final ex-vessel value is estimated base on relationships seen in prior years, as final ex-vessel value figures will not be available until the spring of 2017.

Note: NPR = Net Processing Revenue.

Source: ADF&G, ADOR, and McDowell Group estimates.

These data may be interpreted differently by processors or fishermen, but despite the hardship caused by lower prices over the past couple years the increased cash flow is a positive signal going forward. In past years, there was a strong relationship between rising net processing values and rising ex-vessel value/prices. As processors did better, fishermen benefited as well.



Although first wholesale sales data is not yet complete for the 2016 harvest year, early indications are that first wholesale value and net processing revenue will likely remain high. Average prices are up and product has sold faster this year, compared to the last couple years. It is too early to tell whether 2016 net processing revenue will exceed the prior year's figure of \$232 million; however, a large harvest and higher wholesale prices will likely lead to an increase in the four-year average trend for net processing revenue. These are encouraging signals looking ahead to 2017, although the forecast, actual harvest volume, and other factors will also dictate where prices and total ex-vessel value go in 2017.

Supply and production forecasts for sockeye and other competing salmon species have a significant impact on future ex-vessel and first wholesale prices. This chapter examines recent production trends and the outlook for future supply.

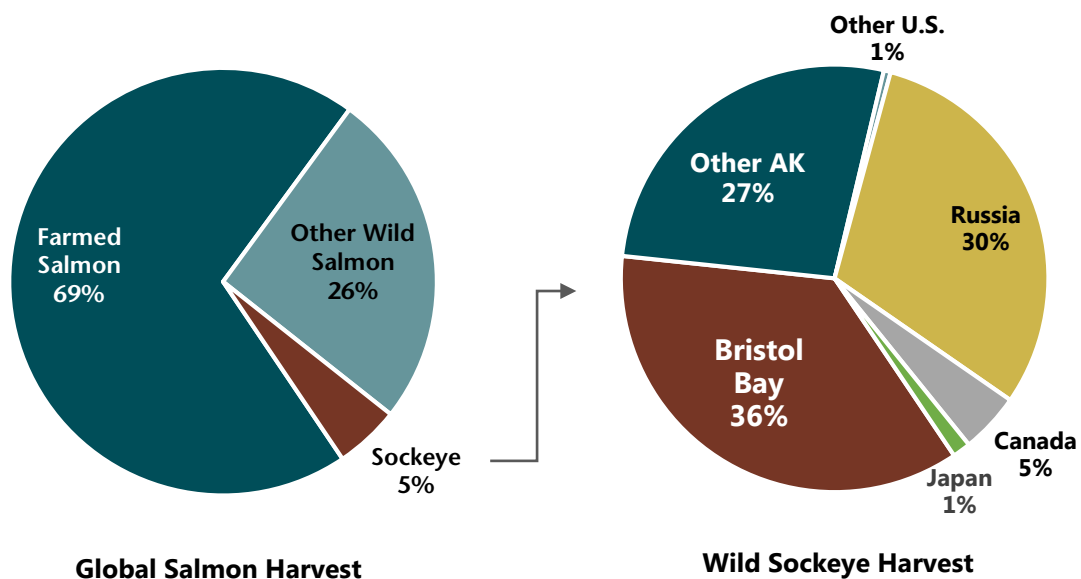
## KEY FINDINGS

- Global sockeye harvests likely increased in 2016, posting the largest harvest since 1996. This year marks the third year in a row of above-average global sockeye supply.
- Sockeye harvests pale in comparison to farmed salmon production. However, after years of production growth, farmed salmon supply is expected to decrease in 2016 and remain lower than 2015 levels for several years.

## Sockeye

Compared to global salmon production, sockeye are relatively rare creatures. Like other wild salmon species, sockeye harvests fluctuate but generally comprise 4 to 7 percent of global salmon production and 13 to 20 percent of wild salmon harvests. Between 2011 and 2014, sockeye accounted for 5 percent of the world's salmon harvest by volume and 16 percent of the world's wild salmon harvest.

**Figure 1. Global Salmon Harvest and Sockeye Harvest by Region, 2011-2014 Average**



Source: ADF&G, FAO, and PACFIN.

Bristol Bay accounted for 36 percent of global sockeye production between 2011 and 2014. However, over the past 25 years, the Bay produced 44 percent of the world's sockeye harvest (based on best available data). Russia is the next largest sockeye producer. All other regions in Alaska combined generally produce less sockeye than Bristol Bay, but still account for more than a quarter of global production. Canada and Japan are the only other

notable sockeye producers. Canada's harvests tend to jump to the 20 to 50 million pound range once every four years, with the last large harvest occurring in 2014.

Global sockeye harvests fell to 301 million pounds in 2013, the lowest figure since 2003. Harvests increased 78 million pounds in the following year posting the largest production figure since the mid-1990s. The sudden shift in supply during 2014, in addition to other factors, dramatically affected market conditions and led to lower prices in 2015. Sockeye supply remained steady in 2015. Harvests in Alaska and Russia increased significantly, but those gains were offset by the down year cycle in Canada.

Based on available data and preliminary harvest estimates, it appears that overall sockeye supply increased in 2016 to approximately 417 million pounds. Bristol Bay fishermen again netted a bumper harvest, in an otherwise dismal Alaska salmon fishing season. Official Russian sockeye harvest data is not yet available, but trade data and news reports suggest the country's 2016 sockeye harvest will exceed the prior year.

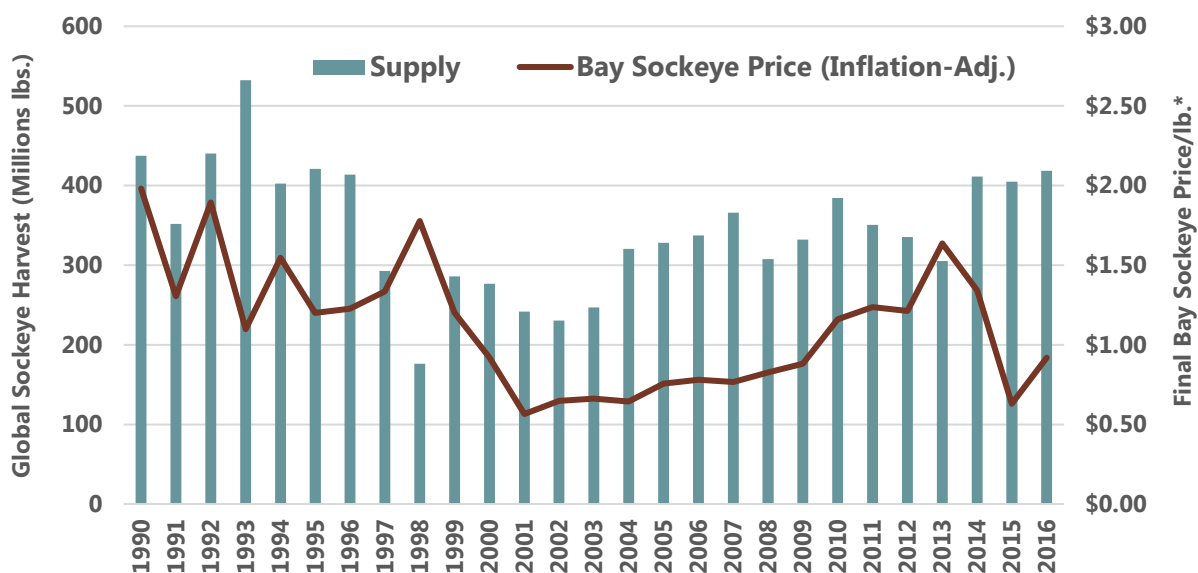
**Table 5. Global Sockeye Harvest by Region, Millions Pounds, 2010-2016**

Category	2010	2011	2012	2013	2014	2015P	2016P
Alaska Total	243	249	214	178	245	280	286
<b>Bristol Bay</b>	<b>170</b>	<b>135</b>	<b>119</b>	<b>92</b>	<b>161</b>	<b>185</b>	<b>202</b>
Other AK Areas	73	114	95	86	85	96	85
Other U.S. Areas	11.6	1.8	0.9	0.2	4.3	0.5	<0.1
Russia	80	90	112	122	104	113	128
Canada	44	7	5	1	52	6	3
Japan	6	4	5	5	6	N/A	N/A
<b>Total</b>	<b>384</b>	<b>351</b>	<b>335</b>	<b>305</b>	<b>411</b>	<b>399</b>	<b>417</b>
<b>Bristol Bay Pct.</b>	<b>45%</b>	<b>39%</b>	<b>36%</b>	<b>31%</b>	<b>40%</b>	<b>46%</b>	<b>48%</b>
<b>Bristol Bay Sockeye Base Price/lb.</b>	<b>\$0.95</b>	<b>\$1.00</b>	<b>\$1.00</b>	<b>\$1.50</b>	<b>\$1.20</b>	<b>\$0.50</b>	<b>\$0.76</b>

Note: 2015 and 2016 figures are preliminary.

Source: ADF&G, PACFIN, FAO, DFO, Russia FFA, and McDowell Group estimates.

**Figure 2. Global Sockeye Supply versus Bristol Bay Sockeye Price, 1990-2016**



\*Historical prices are adjusted for inflation and are shown in 2015 dollars. Final 2016 price is estimated.

Note: 2016 supply figures are preliminary estimates.

Source: ADF&G (COAR) and McDowell Group estimates.

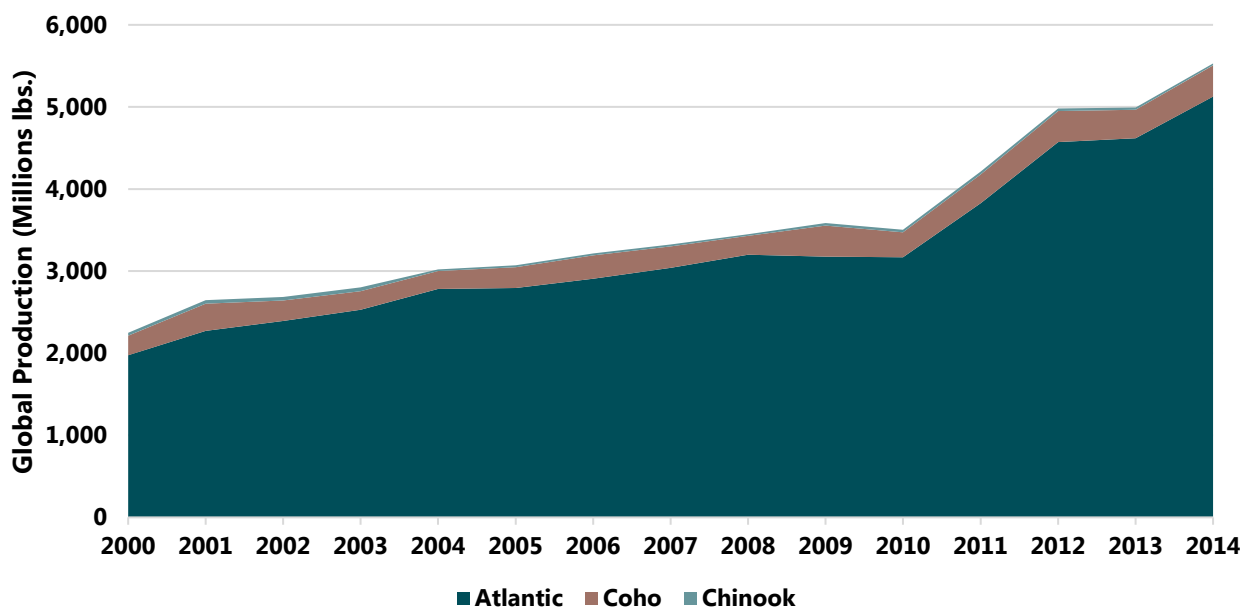
The last three seasons (2014-2016) produced the largest global sockeye harvests since the mid-1990s. However, prices for Bristol Bay sockeye were generally higher back then after adjusting for inflation. Several factors were different in the mid-1990s. Farmed salmon production was just beginning to ramp up, the U.S. dollar was weaker versus the yen in most of the mid-1990 years, the Japanese economy was very strong, and the average sockeye weight in Bristol Bay was larger in the mid-1990s versus 2015 and 2016. If current year estimates are confirmed by final harvest statistics, the 2016 season will rank as the largest global sockeye harvest since 1995, and one of the largest on record.

## Farmed Salmon

Although a growing number of consumers differentiate between farmed and wild salmon, the price and availability of farmed Atlantic salmon still has a meaningful impact on values for sockeye and other wild salmon species in North American and European markets.

Farmed salmon production expanded 146 percent between 2000 and 2014; adding 3.3 billion pounds to global salmon supply – a figure far greater than all the world’s wild salmon fisheries combined. Farmed salmon growth stalled in the late 2000s due to the Infectious Salmon Anemia (ISA) crisis in Chile, but has rebounded sharply since then. Aquaculture figures tracked by the Food and Agriculture Organization of the United Nations are the most widely available farmed salmon production statistics, though the data has a substantial time lag as 2014 is still the most recent available year.

**Figure 3. Farmed Salmon Production Growth, 2000-2014**



Source: FAO.

Norway and Chile are by far the largest farmed salmon producing countries, accounting for 50 and 32 percent of global production, respectively. After years of production growth, both countries expect to see declines in 2016 and the outlook for further production growth is limited over the next several years.

Atlantic production was expected to contract even prior to the “red tide” event in Chile, due to a reduction in Norwegian biomass as producers attempt to mitigate impacts from sea lice. Kontali Analyse estimates farmed Atlantic salmon production will contract by 6 percent in 2016, primarily due to a toxic algae bloom in Chile that killed more than 100,000 metric tons of Atlantic and coho salmon in early March.<sup>3</sup> Lost production from the algal bloom is equal to 12 percent of Chile’s estimated annual production. Chilean producers are expected to lose \$800 million worth of production (of all salmon species). Nordea Bank expects Atlantic salmon production to be flat over the next five years, while other estimates for 2017 suggest flat to lower production.

A review of Norwegian and Chilean export statistics supports these projections. The volume of salmon products exported by the two countries was generally down in the second quarter of 2016 compared to the same period in 2015.

Farmed salmon prices have soared to near record levels due to shorter supplies. Higher farmed salmon prices are supportive for sockeye fishermen. Sockeye generally sell for a premium to farmed salmon; however, sockeye demand is strongly influenced by farmed salmon pricing in some markets.

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<sup>3</sup><http://www.seafoodnews.com/Story/1010142/Toxic-Algae-Bloom-Deepens-Impact-on-Chile-Salmon-Will-Push-Down-This-Years-Production-13-percent->

# Wholesale Sockeye Market Analysis

Wholesale prices have a direct impact on future ex-vessel prices. This section examines trends in the wholesale market for major sockeye products as well as competing salmon products.

## KEY FINDINGS:

- Despite another large sockeye harvest, wholesale prices for all key sockeye products are trending up although they remain far below recent peak levels
- At the wholesale level, Alaska sockeye products generally sold quicker following the 2016 season, with frozen and roe products fetching higher prices
- Farmed production is expected to decline in 2016 then grow slowly for several years
- Farmed salmon wholesale prices are near record levels and are expected to remain there for at least another year
- Currency rate movements have generally been favorable in 2016

## Key Products and Markets for Bristol Bay Sockeye

The table below summarizes key product forms and related markets. Understanding the relative size of each product form and market is necessary to evaluate the importance of changes in those markets. For a more detailed analysis of product/market composition and the entire Bristol Bay sockeye supply chain, please see the *Spring 2015 Sockeye Market Report*.

**Table 6. Major Bristol Bay Sockeye Product Forms and Markets**

Product Form	Major Markets	Estimated Pct. of First Wholesale Value - 2015
Headed/Gutted	Japan, Europe, and North America	50%
Canned Salmon	UK, Canada, U.S., and Australia	25%
Frozen Fillets	U.S.	20%
Roe	Japan	3%

Source: ADF&G (COAR), ASPR, NMFS trade data, Global Trade Atlas, industry interviews, and McDowell Group estimates.

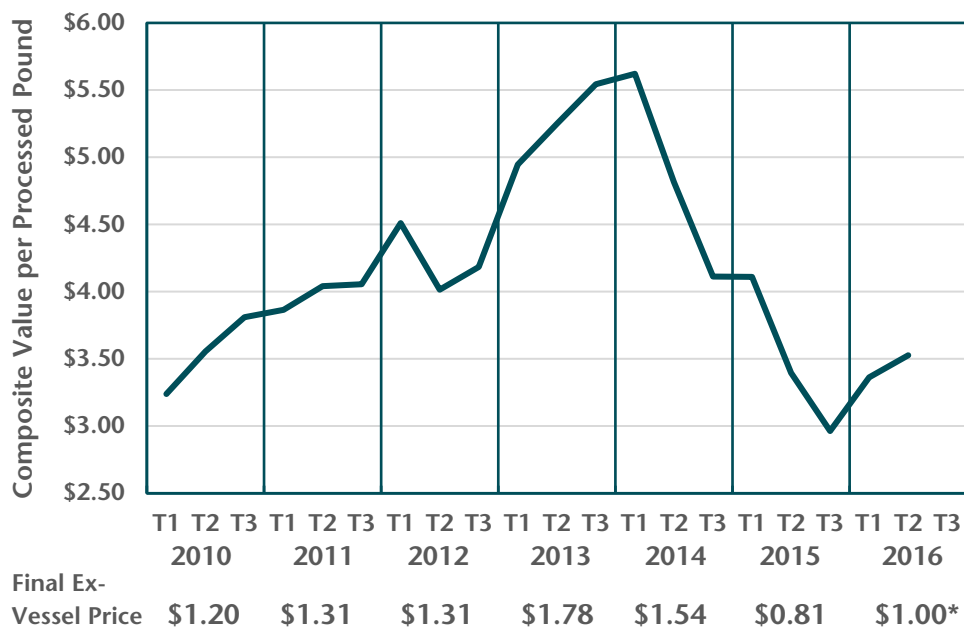
## Wholesale Market Analysis for Key Sockeye Products

Collectively, first wholesale sockeye prices are up since late 2015, and average prices for sockeye products sold during the second trimester of 2016 are up slightly from the same period in the prior year (see Figure 4). Prices for every major sockeye product form have increased during the most recent trimester with available data (May-August 2016).

Ex-vessel prices tend to track movements of average first wholesale prices. Ex-vessel and first wholesale prices fell substantially from 2014 through 2015. Although final 2016 ex-vessel prices will not be available until next

spring, it is estimated that the average statewide sockeye price will increase to approximately \$1.00 per pound based on preliminary 2016 prices and the typical increase seen after factoring in bonus/supplemental payments.

**Figure 4. Average First Wholesale Value per Pound, All Major Alaska Sockeye Products, by Trimester and Average Final Ex-Vessel Price for Alaska Sockeye, 2010-2016**



\*Final 2016 price is estimated.  
Source: ADOR (ASPR), ADF&G (COAR), and McDowell Group estimates.

Market conditions for major product forms are summarized in following sections.

*Note: Charts in the following section represent unit values per processed pound. Unit values are equal to the first wholesale revenue divided by the number of pounds sold for each product form. This average price (i.e. unit value) is not a perfect proxy for product form prices because sizing and other specifications can change from year to year. For example, smaller frozen sockeye sell for a substantial discount to medium and larger sized product. Therefore, an increase in the number of small sockeye (as there was during 2014, 2015, and 2016) can drag down average price for frozen H&G sockeye – even if prices for each size did not change. Regardless of this technicality, unit values are an important measure of value over time because they track how much revenue is being generated from each pound of frozen sockeye production. As such, they are a better indicator for value trends than prices for individual sizes.*

## Frozen H&G Sockeye

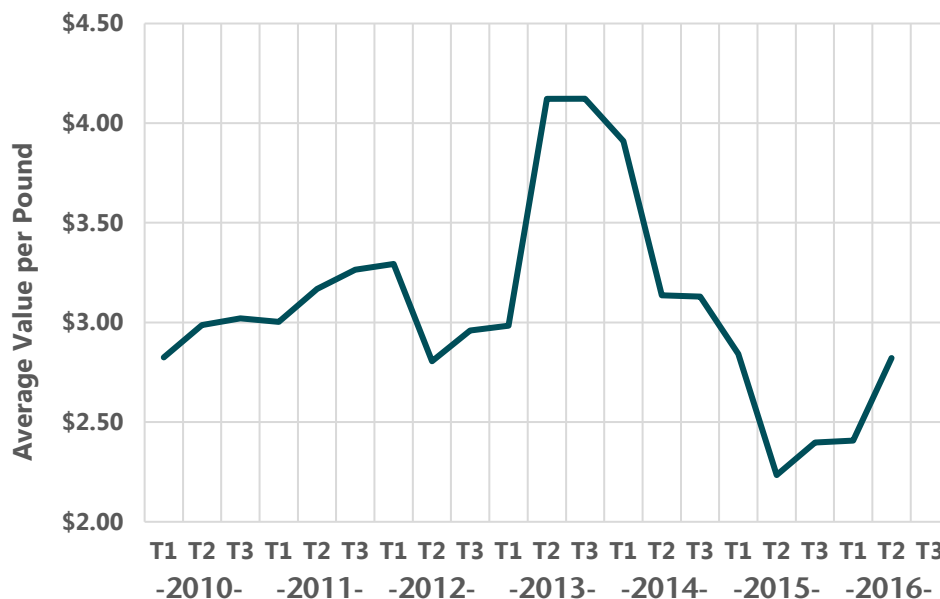
**KEY MARKETS: JAPAN, EUROPE, AND NORTH AMERICA**  
**ESTIMATED PCT. OF BRISTOL BAY SOCKEYE FIRST WHOLESALE VALUE (2015): 50 PERCENT**

Key market developments for frozen sockeye are as follows:

- Frozen H&G sockeye prices went up 26 percent during the second trimester in 2016, an increase of 59 cents per pound
- Sales of frozen sockeye have turned over faster through August 2016, compared to prior years
- Sockeye sizes increased slightly in 2016, from 5.2 lbs. to 5.4 lbs., based on preliminary harvest data

Frozen sockeye prices increased sharply from early 2013 through early 2014, due to smaller harvests and a weak dollar. Harvest volumes increased significantly in 2014 and 2015 and the percentage of smaller sockeye increased as well. This coincided with an extraordinary shift in exchange rates that led to a stronger U.S. dollar. These events resulted in a sharp decline for frozen sockeye prices. However, unit values ticked up during the most recent trimester, based on available data (T3-2015) – the first increase in over two years.

**Figure 5. Average First Wholesale Value per Pound, Frozen H&G Alaska Sockeye, by Trimester, 2010-2015**



**Final Ex-Vessel Price for Bristol Bay Sockeye (Average)**

2010	2011	2012	2013	2014	2015	2016
\$1.07	\$1.17	\$1.18	\$1.61	\$1.34	\$0.63	\$0.92*

\*Final price for 2016 is estimated.  
Source: ADOR (ASPR), ADF&G (COAR), and McDowell Group estimates.

Frozen H&G sockeye pricing is highly dependent on fish size. Frozen H&G sockeye are generally categorized into three sizes: 2-4 lbs., 4-6 lbs., 6-9 lbs. (based on the processed H&G weight). The 4-6 lb. medium size is historically the most common size category; however, as sockeye size has declined in recent years the percentage of 2-4 lb. product has increased. Wholesale prices for 2-4 lb. fish are generally about 20 percent less than the 4-6 lb. size. Size influences prices for larger fish as well, as prices on 6-9 lb. fish are generally about 20 percent above the 4-6 lb. size.

Different size categories also have different markets. Smaller frozen sockeye primarily go to Japan, where consumers are more price sensitive and dishes lend themselves better to smaller, thinner fillets. Larger fillets (6-9 lbs.) tend to be sold to European markets, where many of the fish are smoked. Although Japan and Europe also buy some 4-6 lb. fish, the U.S. is the key market for medium-sized fish. Frozen sockeye are generally sold to retail and wholesale distributors who thaw out the product and sell frozen fillets to consumers and restaurants.

First wholesale sales of frozen H&G sockeye occurred relatively faster in 2016, compared to 2014 and 2015. Sales of frozen H&G sockeye increased 38 percent during the second trimester in 2016, which primarily consists



of new season product. This indicates that despite increasing prices, wholesale buyers were very active early in the wholesale buying season.

**Table 7. First Wholesale Sales Volume of Frozen H&G Alaska Sockeye, by Trimester, Millions of Pounds, 2010-2015**

	2011	2012	2013	2014	2015	2016	Pct. Change YoY
Trimester 1 (Jan.-Apr.)	7.8	6.6	3.0	3.4	10.5	10.8	+3%
Trimester 2 (May-Aug.)	36.5	26.1	18.3	13.8	38.9	53.6	+38%
Trimester 3 (Sep.-Dec.)	33.2	29.3	17.5	29.6	54.6	-	-
Annual Production	86.8	61.4	56.0	77.6	111.9	N/A	-
BBay Harvest Volume	134.7	119.2	92.0	160.6	192.1	201.6	5%

Source: ADOR (ASPR).

## Canned Sockeye

### KEY MARKETS: UK, CANADA, U.S., AND AUSTRALIA

### ESTIMATED PCT. OF BRISTOL BAY SOCKEYE FIRST WHOLESALE VALUE (2015): 25 PERCENT

Key market developments for canned sockeye are as follows:

- Canned sockeye prices increased slightly during the most recent trimester, but remain well below prices seen in prior years
- The “Brexit” decision led to a weaker British pound and is expected to result in lower demand for canned sockeye.
- Canned sockeye production has trended down in recent years, despite larger harvests
- Improvements in frozen capacity have reduced the role that canned product forms play in maximizing plant throughput capacity

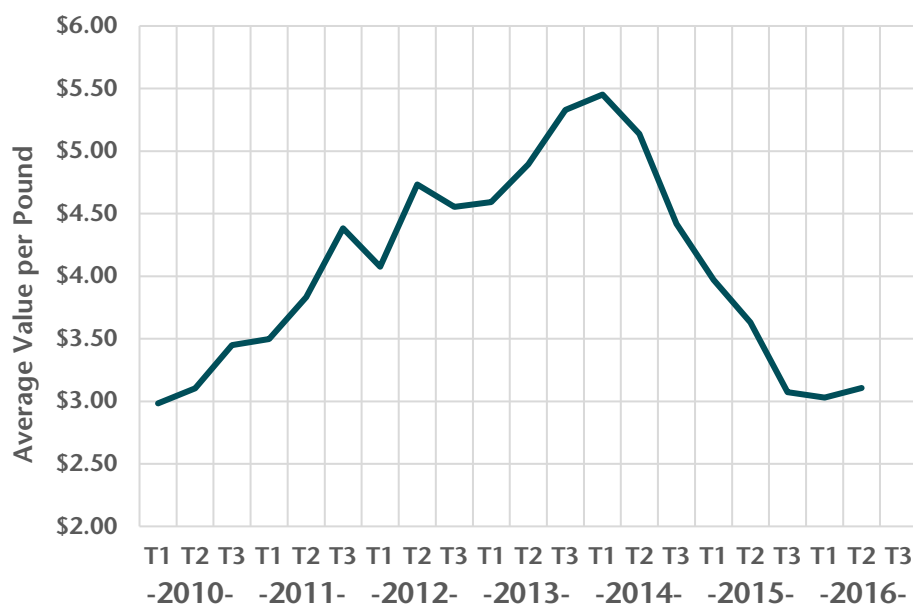
Unit values of canned Alaska sockeye are down 43 percent from the peak in early 2014 (see Figure 5). Bristol Bay typically produces at least two-thirds of the state’s total canned red salmon pack, and in some years accounts for more than three quarters of total production. As a result, the region has more exposure to the canned red salmon market than other sockeye fisheries.

High canned sockeye prices, currency fluctuations, and demographic shifts have changed the market considerably. Many retailers reduced the amount of shelf space allocated to canned sockeye from 2012 to 2014, as retail prices for talls often exceeded \$9.00 per can. Once shelf space and product facings are reduced, it can take years to regain their prominence on grocery store shelves. In addition, many UK retailers began putting a bigger emphasis on cheaper canned pink salmon as an alternative to more expensive sockeye. Canned salmon consumers tend to be older, and as a result the product category is not seen as a growth-oriented product – making the prospect for regaining shelf space even more difficult. Finally, although prices for canned sockeye are down considerably in U.S. dollar terms, the equivalent price has not fallen as much for UK and Canadian buyers due to weaker currencies in those countries.

Canned is an important product form for a couple reasons. First, canning sockeye allows processors to greatly extend the shelf life of the resource well beyond a single year. This allows packers to even out production despite variations in harvest volume, and spread out sales during large or lean years. Secondly, processing plants have

historically turned to canned production as a means of increasing plant throughput. Large canning lines allowed processors to ramp up processing capacity and deal with large, peak harvest volumes. Increasingly, this is becoming less of a factor in processors' product form decision making process. Processors have made investments in freezing capacity and efficiency, which are ultimately paid for with profits made from fish caught by fishermen. Now plants are able to freeze increasingly larger volumes more quickly, meaning that when runs peak processors don't have to turn to canning as a means of absorbing supply. However, there are exceptions to this, both in terms of specific plants and in terms of circumstance. For example, in 2014 canned prices were high and the run was much larger than originally forecast. These factors led to a spike in canned production during that year, and unfortunately created excess inventory, which exacerbated price declines.

**Figure 6. Average First Wholesale Value per Pound, Canned Alaska Sockeye – Half Cans, by Trimester, 2010-2015**



Source: ADOR (ASPR).

Although canned production statistics won't be available for several months, anecdotal reports suggest canned production was minimal in 2016 and likely declined year-on-year, despite a larger Bristol Bay sockeye harvest. Lower canned prices, larger inventories, and the "Brexit" vote likely played a key role in minimizing canned production in 2016.

Inventory positions have reportedly improved over the past year, partly due to lower prices, but mostly because of federal government purchases. The Alaska Seafood Marketing Institute coordinated the purchase of nearly 900,000 half-can sized cases (24-count) in late 2015. This product will be used in food banks and other U.S. food aid programs, through a federal program which seeks to purchase U.S. commodities during periods of oversupply and low producer prices. The \$30 million purchase, which is sold through bids submitted by processors, has helped bring down inventories.

Despite these positive inventory developments, the outlook for canned sockeye prices must be tempered. From a supply chain sustainability standpoint, it is clear that prices exceeded the sustainable threshold during 2014. Likewise, canned prices are now generally below what processors can earn in the frozen market and have resulted in low prices for fishermen. Hopefully the market can find a more sustainable equilibrium going forward

and prices can return to somewhere in the middle so canned production can continue to absorb production of smaller fish, unchilled fish, or those with visual defects, while still providing a reasonable return for all segments of the supply chain.

## Sockeye Fillets

### KEY MARKETS: U.S. AND CANADA

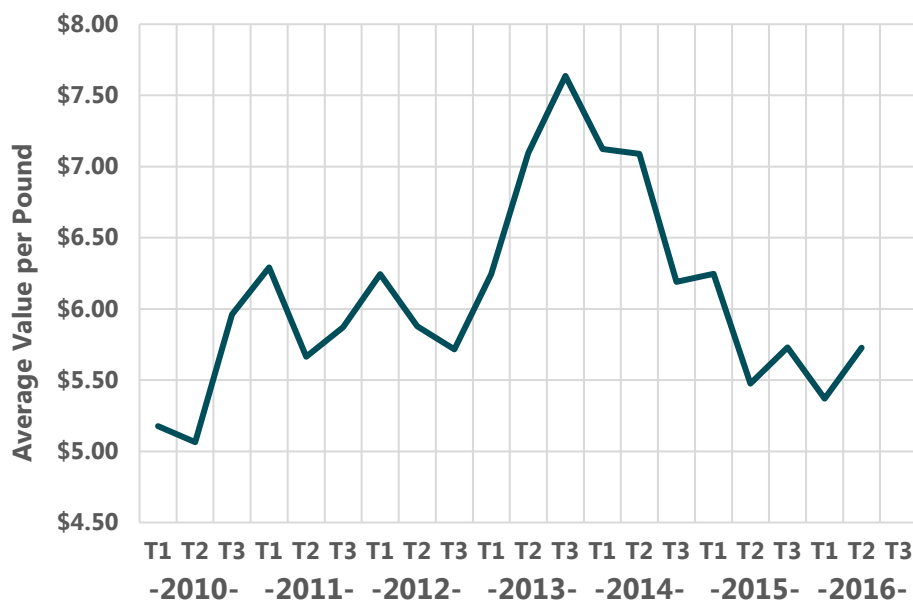
**ESTIMATED PCT. OF BRISTOL BAY SOCKEYE FIRST WHOLESALE VALUE (2015): 20 PERCENT (FRESH & FROZEN)**

Factors influencing sales volume and pricing for frozen Alaska sockeye fillets:

- Fillet market follows trends in the frozen H&G market, which are often used to produce chilled fillets
- Prices increased 4.6 percent, in year-on-year terms, during the second trimester of 2016

Unit values of frozen Alaska sockeye fillets are still down 25 percent from the peak in late 2013, but are higher than they were a year ago (see Figure 8). Average fillet prices did not increase as much as frozen H&G prices, in year-on-year terms. This could be due to slightly larger fish being harvested in 2016, which affects frozen H&G prices more so than fillets. It could also be an indication of stronger demand from U.S. retailers who use thawed and filleted frozen H&G salmon in their fresh seafood cases. This refreshed product has generally received favorable marks from retailers. The sales data shown below applies to once-frozen fillets. These fillets are often sold at grocery stores in the U.S. as either frozen or thawed/chilled products.

**Figure 7. Average First Wholesale Value per Pound, Frozen Alaska Sockeye Fillets, by Trimester, 2010-2016**



Source: ADOR (ASPR).

Sales volumes are moving faster than in previous years, indicating strong demand. Frozen sockeye fillet sales increased 18 percent in year-on-year terms, a significant bump considering the 2016 Alaska sockeye harvest was about the same as the prior year. Again, these numbers suggest the wholesale market is not having any trouble absorbing additional product even at slightly higher prices.

Bristol Bay frozen fillet production was split approximately 60/40, between frozen/IQF or other formats and vacuum-packed products in 2014. The latter sells for a higher price, but costs more to produce both in terms of materials and processing time.

## Sockeye Roe

### KEY MARKET: JAPAN

### ESTIMATED PCT. OF BRISTOL BAY SOCKEYE FIRST WHOLESALE VALUE (2015): 3 PERCENT

Factors influencing sales volume and pricing for frozen Alaska sockeye roe:

- Poor pink salmon harvest greatly reduced the expected supply of salmon roe
- Poor Hokkaido and a below average Alaska chum harvest have reduced supplies of high-end roe products
- A stronger Japanese yen, compared with the prior year also helped boost roe prices (in U.S. dollar terms)

Roe typically accounts for 5 to 6 percent of total first wholesale revenue; however, the category made up a smaller contribution to total revenue during the 2015 sales cycle due to lower prices. Although roe is a small part of the sockeye's total first wholesale value, roe prices can have a significant impact on processors' profitability and the willingness to pay higher ex-vessel prices. For example, one round pound of Alaska sockeye produced about 20 cents of roe value in 2013 when prices were near peak levels. Roe generated only about 9 cents per round sockeye pound in 2015, as roe prices were 49 percent lower than 2013. Roe prices have a greater impact on pink and chum salmon, where the value of roe comprises a higher percentage of total wholesale value. Lower roe prices are the primary reason Alaska pink salmon prices have declined sharply in recent years.

Table 7 provides first wholesale information about Alaska sockeye roe sales corresponding with harvest years (not necessarily calendar year sales). Most of Alaska's salmon roe is exported to foreign markets, primarily Japan, either soon after the harvest season.

Alaska sockeye roe prices are affected by many factors, but the yen/USD exchange rate and production volume usually have the largest impact on first wholesale prices. Roe prices tend to be higher when the Japanese yen is strong and lower if the yen is weak, as the product is more expensive from the buyer's perspective in the latter situation. Despite the impact of exchange rates, Alaska sockeye roe sales tend to produce consistent sales revenue each year, often between \$30 and \$35 million.

Roe sales data was withheld for confidentiality reasons during the final trimester of the 2015 sales cycle. However, roe revenue generated from the 2015 harvest year likely fell short of previous years based on low prices and roe production volumes.

*See table on following page.*

**Table 8. Alaska Sockeye Roe Sales Value and Unit Value, 2008-2016**

Harvest Year	Sales Volume (Millions lbs.)	Sales Value (\$Millions)	Pct. of Total Sales Value	Average First Wholesale Value/lb.	August Yen/USD Exchange Rate
2008	4.4	\$29.8	6.5%	\$6.72	109.4
2009	5.9	29.9	5.5%	5.06	95.0
2010	5.8	29.7	5.0%	5.11	85.6
2011	5.8	34.4	5.1%	5.89	77.1 (strong yen)
2012	4.8	34.7	5.6%	7.19	78.7
2013	4.6	35.0	6.1%	7.53	97.9
2014	5.4	33.0	5.8%	6.07	102.9
2015*	6.4	24.6	3.8%	3.81	123.3 (weak yen)
2016	Incomplete	Incomplete	N/A	4.39	101.3

\*Sales data only includes product sold between May 2015 and December 2015, sales made between January 2016 and April 2016 were withheld for confidentiality reasons.

Source: ADOR (ASPR) and OANDA.com, compiled by McDowell Group.

Like many other products, roe sales occurred faster in 2016 as well. Despite the flat harvest volume, roe sales jumped 30 percent in volume and 59 percent in value during the first trimester of the 2016 sales season (compared to the same period of the previous sales cycle). Average prices were up 22 percent between the two periods.

Roe data shown in the table above includes all product types, consisting primarily of green roe (frozen, unsalted salmon roe skeins) and sujiko (frozen, salted salmon roe skeins). Sujiko takes longer for processors to produce, since it must be salted according to exact specifications. As a result of the additional processing, sujiko is more valuable than green roe, selling for a premium of 50 to 60 percent per pound in most years.

The roe production mix in Bristol Bay tends to be fairly consistent from year to year. Processors often produce more green roe but the production value of each product type is usually similar due to sujiko fetching higher prices.

## Farmed Salmon Market Conditions

### Farmed Salmon

Factors influencing pricing for farmed salmon products:

- Lower production figures due to an algal bloom in Chile and sea lice in Norway
- Farmed production expected to remain flat for several years
- Stronger currencies in Norway and Chile, since beginning of the year, relative to the U.S. dollar and euro

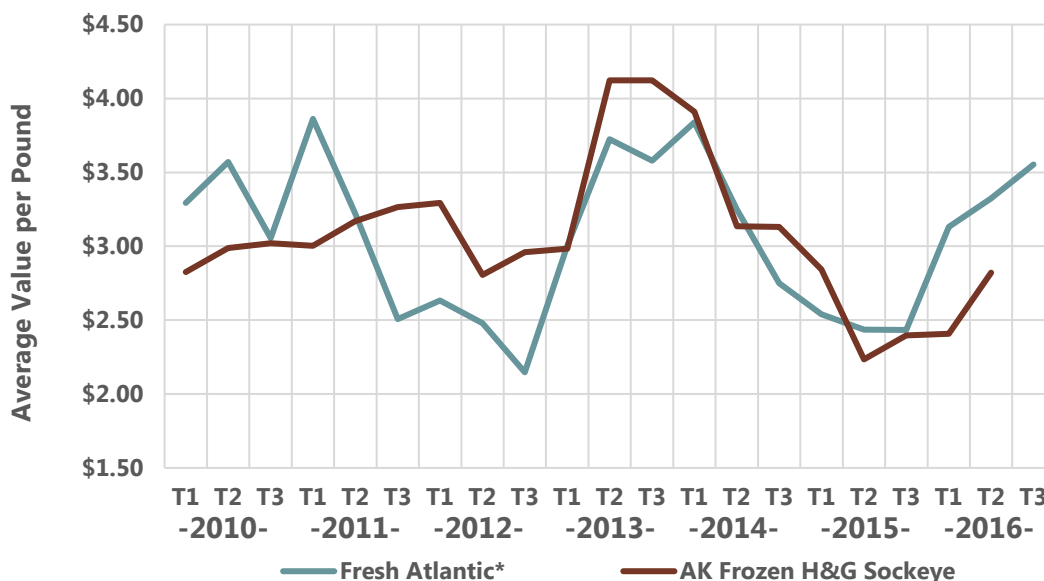
Farmed salmon prices have risen dramatically over the past 12 months, which is good news for Alaska's salmon industry (see Figure 8). In dollar terms, farmed salmon prices are currently near record levels. Prices are considerably above record levels, if denominated in the currencies of major producers (the Norwegian kroner

and Chilean peso). In the U.S., farmed salmon prices increased sharply this past spring after an algal bloom killed over 20 million farmed salmon in Chile.

Typically, farmed salmon production grows with each passing year. Over time, this growth has been factored into market behavior, although there have been periods where supply outgrew demand and prices declined. Recent forecasts by several foreign banks that follow the farmed salmon industry indicate production will fall in 2016 and remain below 2015 levels for the next several years. In June, Bank Nordea increased its average farmed salmon price estimates for 2016 and 2017, citing supply concerns. The Norwegian bank is forecasting a 6.8 percent decline in 2016 Atlantic salmon production, and does not believe global production will surpass last year's figure until 2019.<sup>4</sup> Due to the general growth pattern of the farmed salmon industry, this period of lower to flat production will likely have substantial impacts.

Perpetually propelling farmed salmon production upward has met with environmental challenges in recent years. Sea lice in Norway has impacted farming practices and blunted production growth. Meanwhile, Chilean producers have turned increasingly to antibiotics to ward off disease – a fact that has not escaped the attention of major buyers.

**Figure 8. Average Wholesale Price per Pound of Atlantic and Sockeye Salmon, by Trimester, 2010-2016**



\*Fresh, wholefish (Head-on, gutted), Atlantic salmon, Chilean origin, 10-12 lbs., FOB Los Angeles. Source: Urner Barry and ADOR (ASPR).

Although many consumers differentiate between wild and farmed salmon, many major buyers still react to pricing differences. As farmed salmon production dwarfs the supply of wild salmon, farmed product creates a natural baseline for wild salmon species. In the U.S. and Japan, sockeye prices generally slot in above farmed salmon prices. This generally leads to greater interest in sockeye when farmed salmon prices increase.

<sup>4</sup> <https://www.undercurrentnews.com/2016/06/28/bank-world-farmed-salmon-output-wont-pass-last-years-level-until-2019/>

# Difference in Ex-Vessel Value and Price by Region

**Key Finding:** Price differentials between Bristol Bay sockeye and other Alaska sockeye generally improved in 2016, due to higher Bay prices compared to price movements in the Alaska Peninsula, Kodiak, and Cook Inlet regions. Total ex-vessel sockeye value increased substantially in the Bay in 2016, but declined for all other areas, collectively.

## Ex-Vessel Price in Other Alaska Sockeye Fisheries

Bristol Bay sockeye prices increased relative to the average ex-vessel price of all other Alaska sockeye. The price differential between Bristol Bay reds and all other Alaska sockeye narrowed from 53 cents in 2015 to 40 cents in 2016, based on preliminary pricing data. However, the price and harvest volume out of the Alaska Peninsula sockeye is the driving factor here. In 2015, Alaska Peninsula fishermen received a higher price than Bristol Bay fishermen and accounted for 35 percent of the non-Bristol Bay sockeye harvest in Alaska. In 2016, Alaska Peninsula fishermen received a slightly lower average base price but accounted for 40 percent of the non-Bristol Bay sockeye harvest, dragging down the average price for non-Bristol Bay sockeye fisheries.

Bristol Bay sockeye prices were once again well below prices paid to sockeye fishermen in Prince William Sound, Cook Inlet, and Kodiak. The differential increased compared to Prince William Sound fish, but declined compared to sockeye from Cook Inlet and Kodiak. A low Prince William Sound sockeye run coupled with a strong fresh market likely explains the increasing premium among the two regions. Once bonuses and other supplemental payments are taken into account, the 2016 differentials could change.

**Table 9. Ex-Vessel Price of Bristol Bay Sockeye versus Other Regions, 2011-2016**

Region	2011	2012	2013	2014	2015	2016P
<b>Average Ex-Vessel Price/lb.</b>						
Prince William Sound	\$1.86	\$1.82	\$2.45	\$2.42	\$1.98	\$2.24
Cook Inlet	1.42	1.46	2.18	2.11	1.54	1.53
Kodiak	1.53	1.47	1.82	1.83	0.93	0.99
Alaska Peninsula	1.24	1.26	1.66	1.41	0.75	0.74
<b>Other Alaska Sockeye Avg.</b>	<b>\$1.47</b>	<b>\$1.49</b>	<b>\$1.96</b>	<b>\$1.91</b>	<b>\$1.17</b>	<b>\$1.16</b>
<b>Bristol Bay</b>	<b>\$1.17</b>	<b>\$1.18</b>	<b>\$1.61</b>	<b>\$1.35</b>	<b>\$0.64</b>	<b>\$0.76</b>
<b>Difference with Bristol Bay</b>						
Prince William Sound	\$0.69	\$0.64	\$0.84	\$1.08	\$1.34	\$1.48
Cook Inlet	0.25	0.28	0.57	0.77	0.90	0.77
Kodiak	0.36	0.29	0.21	0.49	0.29	0.23
Alaska Peninsula	0.07	0.08	0.05	0.07	0.11	-0.02
<b>Other Alaska Sockeye Avg.</b>	<b>\$0.30</b>	<b>\$0.31</b>	<b>\$0.35</b>	<b>\$0.57</b>	<b>\$0.53</b>	<b>\$0.40</b>

Note: 2011-2015 prices represent the final average price including bonuses and other additional payments to fishermen, 2016 prices reflect preliminary base prices without supplements.  
Source: ADF&G.

## Ex-Vessel Value of Other Alaska Sockeye Fisheries

Even though Bristol Bay sockeye prices remained low, compared to Prince William Sound and Cook Inlet, the difference in total ex-vessel value is an important consideration. Although prices in Bristol Bay generally fell by a larger percentage from 2013 to 2015, total ex-vessel value has generally been higher in Bristol Bay compared to other regions. Larger harvests in Bristol Bay have helped maintain total value in the Bay, while other areas have not harvested enough sockeye to keep pace despite relatively higher prices.

Table 10 summarizes the total ex-vessel value of Alaska sockeye from key producing areas. The 2014 season represented a relative windfall for Bristol Bay fishermen, relative to sockeye fishermen in other areas of the state. Prince William Sound and Kodiak also had a good season in 2014, but the increase in Bristol Bay volume and value was a significant market event driving prices and total value lower for all regions in 2015.

Based on preliminary prices, Bristol Bay fared much better than other sockeye producing areas in 2016. Preliminary ex-vessel value increased 66 percent in the Bay during 2016, compared to the previous year's preliminary ex-vessel value. Meanwhile, the collective value of other sockeye fisheries fell 7 percent in 2016. This is primarily due to lower sockeye harvests in Prince William Sound, Cook Inlet, and Kodiak, areas which receive premium prices.

**Table 10. Ex-Vessel Value of Bristol Bay Sockeye versus Sockeye from Other Alaska Regions, 2011-2016**

Region	2011	2012	2013	2014	2015	2016P
<b>Total Ex-Vessel Value (\$Millions)</b>						
Pr. William Sound	\$39.4	\$45.4	\$34.0	\$47.5	\$35.5	\$23.1
Cook Inlet	50.1	32.2	37.4	32.8	22.9	23.0
Kodiak	20.5	18.3	26.9	31.1	13.9	10.6
Alaska Peninsula	20.9	20.5	28.4	26.8	23.5	25.2
<b>Other AK Sockeye</b>	<b>\$157.7</b>	<b>\$134.4</b>	<b>\$163.8</b>	<b>\$159.8</b>	<b>\$112.4</b>	<b>\$98.2</b>
<b>Bristol Bay</b>	<b>\$154.7</b>	<b>\$139.7</b>	<b>\$148.7</b>	<b>\$209.6</b>	<b>\$121.2</b>	<b>\$153.2</b>

Note: 2011-2015 prices represent the final ex-vessel value including bonuses and other additional payments to fishermen, 2016 values reflect preliminary base prices without supplements.  
Source: ADF&G.



# Bristol Bay Driftnet Fishery Performance

This section analyzes salmon fishing performance within the Bristol Bay driftnet fleet. BBRSDA member fishermen can use this data to compare how their gross annual earnings stacked up to the rest of the fleet. Data comes from the Commercial Fisheries Entry Commission (CFEC), and includes the value of bonuses and other supplemental payments.

CFEC produces quartile tables on most limited entry fisheries. Each fishery is divided into four quartiles, with an equal share of that fishery's annual gross earnings. Permit records are sorted according to total individual gross earnings for each year from greatest to least, for each fishery. Permits are then placed in a quartile based on their position in the sort. Each quartile contains roughly 25 percent of the total gross earnings, but it takes less high-earning fishermen to fill the upper quartile compared to each successive quartile. The data is useful for fishermen because it allows them to evaluate their performance versus other boats in the fishery.

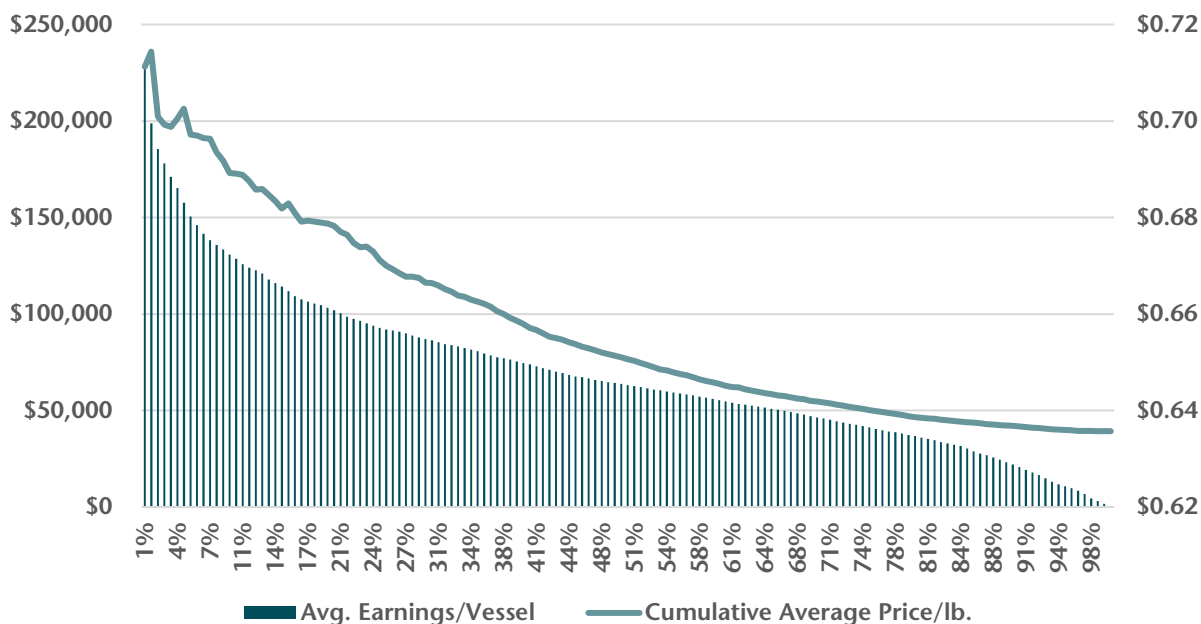
**Table 11. Bristol Bay Driftnet Fishing Performance by Gross Earnings Quartile, 2000-2016**

Year	Avg. Gross Earnings	Avg. Gross Earnings/Permit Per Quartile				Number of Permits Per Quartile			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2000	\$37,527	\$68,684	\$48,080	\$37,226	\$22,539	249	356	459	759
2001	20,699	46,088	28,920	20,825	11,241	176	280	389	721
2002	21,480	56,323	37,553	25,136	9,803	113	169	253	649
2003	26,685	60,953	40,001	27,547	13,858	156	237	345	686
2004	46,541	94,521	65,860	50,002	24,884	174	249	328	660
2005	55,673	119,927	77,459	57,364	30,146	168	260	351	668
2006	65,128	149,003	97,287	68,403	33,568	161	247	351	716
2007	66,836	129,105	93,328	69,949	36,928	190	263	350	665
2008	68,169	139,086	95,159	71,669	37,024	180	263	349	677
2009	84,492	174,181	118,707	88,396	45,757	175	257	345	667
2010	89,784	183,622	130,856	95,913	47,537	183	256	349	706
2011	86,325	187,085	123,542	89,539	46,026	176	266	367	715
2012	77,954	165,777	113,274	81,854	41,282	178	260	360	715
2013	85,687	192,949	123,657	88,981	45,131	165	258	358	707
2014	118,241	249,207	167,263	123,348	63,589	183	272	369	717
2015	67,885	153,237	100,517	71,765	35,094	171	261	365	748

Note: Starting in 2004 the true Permits Number may be under-counted and Average Gross Earnings may be over-estimated, resulting from Board of Fisheries regulations allowing the option for two S03T permit holders to jointly operate and fish together from a single vessel. All figures are in nominal terms.  
Source: CFEC.

While the data above is helpful, it does not provide a highly detailed picture of where fishermen fall on the earnings scale. To better understand the fishery's earnings distribution, CFEC staff grouped Bristol Bay driftnet vessels by sets of 10 in order from highest earning to lowest earning vessels. The chart on the following page provides a more detailed tool for fishermen who wish to understand how their 2015 fishery performance compares to the rest of the fleet.

**Figure 9. Average Bristol Bay Driftnet Gross Earnings per Vessel, by Earnings Percentile, 2015**



Notes: Vessels were sorted by gross earnings from greatest to least, and averaged in groups of 10 permits. The bars represent the average gross earnings in each 10-vessel cohort. Percentiles reflect the percentage of active driftnet permits which earned more than the corresponding average gross earnings figure. Average prices reflect the average price received by all fishermen in the corresponding percentile and above.  
Source: CFEC.

The chart above provides a tool for Bristol Bay driftnet fishermen to evaluate their performance in 2015. For example, if a fisherman landed \$75,000 in 2015, that would place them in the top 39<sup>th</sup> percentile. Gross earnings by percentile for 2011 to 2015 is provided in Table 12 below.

**Table 12. Bristol Bay Driftnet Fishing Performance by Gross Earnings Quartile, 2000-2016**

Percentile	2011	2012	2013	2014	2015
Top 10 <sup>th</sup> Percentile	\$159,107	\$143,984	\$160,199	\$213,243	\$128,709
20 <sup>th</sup> Percentile	126,923	117,741	127,191	175,330	101,864
30 <sup>th</sup> Percentile	110,942	100,681	107,474	150,921	86,382
40 <sup>th</sup> Percentile	93,882	86,717	94,191	131,369	73,897
50 <sup>th</sup> Percentile	82,592	74,356	82,742	115,173	63,145
60 <sup>th</sup> Percentile	71,021	64,437	71,589	100,472	54,632
70 <sup>th</sup> Percentile	62,558	56,326	59,825	85,526	45,931
80 <sup>th</sup> Percentile	49,807	43,657	48,657	72,414	36,782
90 <sup>th</sup> Percentile	35,348	32,456	35,718	48,399	22,085
Average Gross Earnings/Vessel	\$91,107	\$82,305	\$90,556	\$124,549	\$70,250

Note: Vessels were sorted by gross earnings from greatest to least for each year, and averaged in groups of 10 vessels. Figures represent the average earnings per vessel for the 10-vessel group nearest to the corresponding percentile.  
Source: CFEC.

Fishing performance tends to be highly variable in the Bristol Bay salmon driftnet fishery, meaning there is a very large difference between boats at the top of the earnings spectrum versus those at the lower end. In most years, about half of the fleet falls into the bottom earnings quartile. Not surprisingly, fishermen who populate the upper reaches of the earnings scale generally receive higher prices as a result of quality bonuses. Across the earnings spectrum, average price received tends to decline as gross earnings per permit declines. Higher

grossing fishermen tend to receive higher prices. This supports the claim that most Bristol Bay highliners not only catch large volumes of fish, but also improve their earnings through quality bonuses.



*Photo Courtesy of Alaska Seafood.*

Fishery performance of individual boats varies from year to year, but based on anecdotal reports many fishermen likely place in a similar ranking position during most years. Performance is always highly dependent upon where the fish come in the strongest. In some years, different river systems do better than others, or fishing may be better in shallow/deeper water. However, there are factors over which fishermen have greater control, such as boat/crew size, quality bonuses, permit stacking, mechanical failures, and fishing style. These factors also play a big role in

determining where a fisherman ends up on the earnings spectrum. Of course, these latter factors do entail costs.

Analyzing fishing performance of quartile groups over time suggests that while average earnings have increased, the distribution of fishery earnings has remained stable. The percentage of permits occupying the top two quartiles has changed very little since 2003. Slightly less than 30 percent of the fleet still accounts for half of the fishery’s gross earnings, same as it was a decade ago. Similarly, slightly less than half of all permits still account for just 25 percent of the fishery’s gross earnings.

The key difference is that Bristol Bay driftnet fishery earnings are up over the past decade, so while fishermen at the lower end are seeing a decent bump in gross earnings, fishermen at the top are grossing significantly more in absolute dollars. Top quartile fishermen saw their average gross earnings increase 50 percent (\$67,127) from the 2007-2008 period to 2014-2015 (years are averaged to minimize volatility). The bottom quartile registered a 33 percent (\$12,366) increase during the same period. Obviously, a 33 percent increase in gross earnings is great news, but there is a big difference between an increase of \$67,127 and one of \$12,366 over a seven-year period. These data suggest that highliner fishermen who have continued to invest in their operation have generally earned a healthy return on their investment. See Table 13 for a more information.

**Table 13. Comparative Gross Earnings Quartile Performance for the Bristol Bay Salmon Driftnet Fleet**

Comparison Periods	Difference Between 2014-2015 and Earlier Periods				
	Avg. Annual Gross Earnings	Q1	Q2	Q3	Q4
2007-2008 vs. 2014-2015	\$25,528	\$67,127	\$39,647	\$26,748	\$12,366
2010-2011 vs. 2014-2015	\$4,944	\$15,869	\$6,691	\$4,831	\$2,560

Note: Starting in 2004 the true Permits Number may be under-counted and Average Gross Earnings may be over-estimated, resulting from Board of Fisheries regulations allowing the option for two S03T permit holders to jointly operate and fish together from a single vessel. Comparisons are based on nominal figures. Source: CFEC.

For more information on the fishery’s historical performance, see Table 17 in the Appendix.

# The Value of Improving Quality

This section provides information about the value of improving Bristol Bay salmon quality, as well as a discussion regarding the practices used by many of the driftnet fleet's top producers based on interviews with fishermen. Fishermen interested in learning more about chilling their harvest are encouraged to visit the BBRSDA website at <http://www.bbrrsda.com/chilling> and can find videos about maintaining quality in gillnet fisheries at <https://seagrant.uaf.edu/map/fisheries/salmonquality/videos/index.html>.

## Recent Bonus Prices and Structure

All major Bristol Bay processors either require fish to be chilled or pay chilling bonuses to fishermen. The standard convention among most processors in recent years has been to pay a 15 cent bonus per round pound. Several processors offer additional bonuses for bleeding fish, using salmon slides or mats, and managing brailer bag weights (either by floating or keep them below a set weight). In addition to quality bonuses, many processors paid production bonuses. Trident paid production bonuses up to 10 cents per pound, and many other processors reportedly offered similar production bonuses. In 2015, a few processors paid higher prices for late season fish as well (Leader Creek and Copper River Seafoods).

**Table 14. 2015 Bristol Bay Ex-Vessel Salmon Prices by Processor**

Processor	2015 Base Price/lb.	RSW Bonus	Additional Quality Bonuses
Copper River Seafoods	\$0.75*	-	Base price requires chilling/bleeding
Leader Creek Seafoods	\$0.60	-	Up to \$0.22 for bleeding/slide/more
Alaska General Seafoods	\$0.50	\$0.15	
Icicle Seafoods	\$0.50	\$0.15	
North Pacific Seafoods (Red Salmon)	\$0.50	\$0.15	
Ocean Beauty Seafoods	\$0.50	\$0.15	
Peter Pan Seafoods	\$0.50	\$0.15	
Silver Bay Seafoods	\$0.50	\$0.15	Up to \$0.10 for floating/bleeding
Trident Seafoods	\$0.50	\$0.15	

Note: Leader Creek Seafoods requires fish to be chilled.  
Source: Bristol Bay Fishermen's Association.

Processors have clearly promoted quality and production through bonus structures. Bonus payments remained stable in 2015 even though the base price declined by 58 percent from the prior year. This greatly increased the relative importance of quality and production bonuses in 2015, explored in detail below. These additional payments are necessary to incentivize fishermen to deliver large amounts of top quality fish, and pay for the investments necessary to achieve higher quality sockeye harvests in Bristol Bay.

## Direct Benefits of Chilling for Fish: Higher Prices

It is widely known that chilling fish with refrigerated seawater (RSW) systems or slush ice substantially improves quality. As a result, all large Bristol Bay processors pay a bonus for chilled fish. Industry convention in recent years has been to pay 15 cents extra per pound for chilled sockeye.

The relative impact of chilling bonuses is larger when prices are lower. Harvest volumes were low in 2013 and prices were high. The premium on chilled fish in 2013 was just 10 percent, and the average permit could have made an additional \$7,760 by delivering chilled fish. In 2015, harvest volumes increased substantially and the base price dropped to \$0.50/lb. The premium on chilled fish jumped to 30 percent, meaning boats with RSW could make 30 percent more than those delivering unchilled fish. The 2015 season was generally a very tough year for fishermen, but chilling bonuses substantially eased the sting of a low base price (see Table 15).

**Table 15. Value of Chilling Bristol Bay Sockeye for Driftnet Fishermen, 2013 vs. 2015**

Category	2013	2015
Average Base Sockeye Price	\$1.50	\$0.50
RSW/Chilling Bonus per pound	\$0.15	\$0.15
Chilled Fish Premium (Pct.)	10%	30%
Average Driftnet Sockeye Harvest (lbs.)	51,730	101,904
Average Base Sockeye Ex-Vessel Value per Permit	\$77,595	\$50,952
Average Chilling Premium per Permit Fished	\$7,760	\$15,286

Source: ADF&G, BBFA, CFEC, and McDowell Group estimates.

Chilling fish requires investment by fishermen. Installing RSW units and insulating fish holds can cost upwards of \$30,000. RSW is a substantial cost, but as the table above illustrates, the payback on investment is relatively attractive. Over the course of a fisherman’s career, the investment should pay for itself many times over. BBRSDA offers an interactive financial planning tool on its website where driftnet fishermen can calculate the payback period and return on investment in a RSW system. The planning tool can be found at: <http://www.bbrsda.com/chilling>.



*Photo Courtesy of Bob Waldrop.*

Additionally, many fishermen may not have a choice in coming years. The message from major processors is clear: chill or be chilled. Three processors already require chilling while two other large processors have informed their fleet that they will stop buying unchilled fish altogether beginning in 2018.

While the case for earning higher returns through investments in RSW systems is compelling, each fishermen has unique circumstances. Older fishermen near the end of their careers may be less inclined to make a large investment in RSW near the end of their career. Although it does raise the value of their vessel, especially in light of processor chilling mandates, there is no guarantee that fishermen would recoup their investment when selling their vessel. Also, some boats may lack the space and power needed to affordably accommodate RSW systems.

## Better Handling, Better Quality, Better Prices, Sustainable Markets

In addition to chilling, several processors pay bonuses for bleeding, capping brailer weights, and using salmon slides. These additional quality bonuses can add 10 cents per pound or more to ex-vessel prices. In 2015, this pushed the total value of quality bonuses over 50 percent of the base price for some processors and their fishermen. Some fishermen received up to 95 cents per pound in 2015 for later season fish, substantially above the 50 cent base price during a year with tremendous volume.

Improved handling will likely become even more important in years to come, as the canned product form is expected to comprise a lower share of production going forward as demand for canned salmon is slowly waning. Bruising, gaping, and other quality defects are much more apparent in fillet products, compared to canned products. Changes in the canned market are an important development because fish with quality defects are often directed to the canning line where appearance is less of an issue. Less canning means a smaller outlet for lesser quality fish. Therefore, the difference in value between top quality fish and lesser quality fish will likely increase. In this scenario, fishermen who deliver top quality fish will get better prices and be in a better position to retain their market or switch to a higher-paying processor than fishermen who deliver lower quality fish.

### A Quality Oriented Fishing Process

Interviews with Bristol Bay fishermen revealed a clear message. Boats that receive the highest prices and earn the most money through larger harvests make quality an integral part of their fishing operation without sacrificing volume. Many have dedicated crew for bleeding, managing brailer weights, floating fish, and other tasks that ensure the boat receives quality bonuses. These boats typically feature crews of three or four plus a skipper, allowing them to fish continuously through long openings and maintain functions needed to achieve bonuses. Many also stack permits providing them the ability to have more net in the water at any given time. These boats have a plan for both quality and volume, and as a result maximize the value of their fishing time and investment.

However, becoming a Bristol Bay highliner does require investment, planning, risk-taking, and some good luck. Quality consultant Mark Buckley summarized his recommendation for younger fishermen hoping to make the most of their Bristol Bay fishing operation as follows (these comments are consistent with input from other fishermen as well):

If I were a young fisherman looking to excel in the fishery, I'd say the first order of business is to find a way to get an RSW system on my boat. That way I can maximize my fishing time by following the fish instead of following the ice barge, while still getting the chilling bonus. It's also important that a fisherman's boat and deck machinery have enough power and size to produce as much volume as possible. Harvesters need to analyze their operation holistically, identifying actions/upgrades that will provide the best return on investment in terms of getting higher prices and maximizing harvest potential. Then it is important to create a reputation for my boat as one that delivers quality fish. Once I've established that reputation as a quality producer, I'll be in a better position to seek out processors who pay top prices or get more favorable prices through my current processor. I'd try to find the best crew I could, and if possible hire enough crew to ensure our boat is able to fish as long as possible when the openers get longer.



Obviously, growing a fishing operation to support a larger crew, with a larger hold, with RSW capacity requires substantial costs. The costs and the risks associated with making these investments are factors that every fisherman must consider against the context of their own financial capabilities and career goals. While these actions may be common knowledge for some fishermen, this is a general account of how many fishermen have created an opportunity to achieve prices well above the normal base price and have maximized the value of their access to the fishery.

## Quality Programs and Vessel Upgrade Assistance

Fishermen wishing to invest in a RSW system can find assistance and financing from a variety of sources:

- BBEDC offers grants to watershed residents to assist with the purchase of RSW systems, more information available at [http://www.bbedc.com/?page\\_id=1761](http://www.bbedc.com/?page_id=1761).
- BBEDC also offers grants up to \$1,000 to assist watershed residents with costs associated with maintaining RSW systems and receiving technical consultation, more information available at [http://www.bbedc.com/?page\\_id=328](http://www.bbedc.com/?page_id=328).
- The State of Alaska provides financing for fishermen wishing to upgrade their vessel with RSW systems, as well as other upgrades. More information available at: <https://www.commerce.alaska.gov/web/ded/FIN/LoanPrograms/CommercialFishingLoanProgram/VesselUpgradeorGearPurchaseUpgrade.aspx>.
- Some processors may be willing to assist with RSW upgrades, fishermen are encouraged to reach out to their fleet managers.

BBRSDA is committed to supplying ice to the fleet and increasing its use on the fishing grounds. Although RSW is the preferred chilling method, ice is still the cheapest way for most fishermen to begin chilling at least a percentage of their harvest. The organization funds two ice barges and provides funding assistance to processors who wish to purchase ice making and/or distribution equipment for use in the Bay.

## Indirect Benefits of Quality

Quality defects detract from the wholesale value of fishery products and in the end, fishermen end up bearing the cost. Processors have to give substantial discounts on fillet and headed/gutted products with quality defects. In some cases low quality fish cannot be sold at all, and are simply wasted or put into lower margin product forms (such as fishmeal). This reduces processors' overall wholesale revenue, leaving less money available to bid for fish. While it is true that some fish with quality defects can be directed to canning lines where the impact on wholesale price is often negligible, this window appears to be slowly closing.

Bristol Bay processors have a vast array of resources at their disposal. They can access markets around the world. They have invested millions of dollars in maximizing processing efficiency and are beginning to expand production of ancillary products such as fish meal and fish oil. The entire processing sector is highly incentivized to efficiently maximize the value of each sockeye harvested in Bristol Bay, and there are enough companies with different business lines now involved in the fishery to ensure competition over the long term. Processors need top quality product in order to maximize resource value and leverage operation assets.

However, quality can only be preserved, it cannot be added once the fish has been compromised. Therefore, fishermen have a critical role to play in the development of their industry. Raising the potential value of the resource through quality increases marginal processing revenue and, in turn, the potential for increasing ex-vessel value for everyone in the fleet.

The Bristol Bay Regional Seafood Development Association has the same goal as fishermen: maximize returns for member fishermen. The research conducted for this report series, as well as other sources confirm that higher quality fish fetch better prices in the wholesale market, and higher wholesale prices make the raw material more valuable. Ex-vessel value is directly linked to the wholesale value of fishery products. This is why so much effort is directed towards improving quality and raising the wholesale value of fish through branding and other efforts.

## Branding Efforts Require Quality

BBRSDA is launching a branding pilot project this fall, where retailers in the Boulder, Colorado market will be selling branded Bristol Bay sockeye. The project will provide a market test for branded product, which could result in growing demand for premium Bristol Bay sockeye in future years if the effort can be replicated in other markets as planned. Creating a branded identity is a bold step, but a reasonable one given the strong marketing aspects inherent in Bristol Bay sockeye. However, selling branded product puts a greater emphasis on consistently delivering top quality fish. The pilot project has strict quality standards in place. Quality will play a pivotal role if the brand is to grow.



**BRISTOL BAY**  
ALASKA'S SOCKEYE SALMON

## Chilling Trends and the Optimal Chilling Percentage

Progress in chilling higher percentages of the harvest has occurred, but a significant portion of the Bay's driftnet catch is still delivered from dry (unchilled) boats. The good news is that the percentage of chilled fish increased from 25 percent to 55 percent between 2008 and 2015. The bad news is 44 percent of the harvest is still delivered unchilled (see Table 16 on the following page).

Ideally, 100 percent of the harvest would be chilled, but that outcome requires significant investment. A more appropriate question is: what is the optimal chilling percentage for the fleet? The optimal, profit-maximizing mix depends largely on canned production, which presents a moving target.

As previously noted, chilling is much less of an issue if the fish is destined for a canning line. However, the percentage of canned production is shrinking in Bristol Bay – falling from 41 percent in 2012 to 23 percent in 2015 – and is expected to remain well below historical averages going forward. In 2015, 44 percent of the fish delivered by Bristol Bay driftnetters was unchilled – leaving a 22 percent gap and forcing at least 35 million pounds of unchilled sockeye to other product forms



In reality, some chilled fish end up going into a can and vice versa. This occurs for a variety of reasons, but as processors attempt to maximize value and processing throughput, they sometimes cannot rationalize shutting down one product line due to a lack of chilled fish while unchilled fish pile up in front of another. Therefore, the optimal chilling percentage may need to be adjusted slightly higher to account for the realities of the Bristol Bay fishery. A buffer of 5 percent is used in the figures below. This means the optimal percent of chilled harvest would have been 82 percent or greater in 2015 (1 – 23 percent to canning lines + 5 percent buffer).

**Table 16. Chilling Performance by Bristol Bay Driftnet Fleet and Estimated Optimal Chilling Percentage, 2010-2015**

Year	Harvest Volume (Millions lbs.)	Pct. Unchilled	Pct. Chilled	Pct. of Round Harvest Canned*	Optimal Chill Pct.	Spread Between Actual/Optimal Chill Pct.
2010	136.0	53%	46%	27%	78%	32%
2011	110.1	47%	53%	25%	80%	27%
2012	109.4	41%	59%	41%	64%	5%
2013	81.0	44%	56%	39%	66%	10%
2014	132.3	49%	51%	33%	72%	21%
2015	157.4	44%	55%	23%	82%	27%

\*These data were calculated by McDowell Group based on COAR production and harvest statistics, similar data found in the 2015 BBRSDA Processor survey were found to be significantly higher than estimates made using ADF&G production/harvest data.

Note: Not all processors could estimate the division of RSW vs. ice chilled product. Chilling percentages may not sum to 100 percent due to rounding.

Source: ADF&G, Northern Economics (2015 BBRSDA Processor Survey), and McDowell Group estimates.

The spread between actual and optimal has increased since 2012, as canning production (as a percentage of the harvest) has decreased. The difference between the actual amount chilled in 2015 and the optimal level was around 27 percent. Closing the chilling gap between actual and optimal performance would have required chilling approximately 35.2 million additional round pounds of sockeye. Given that the average Bristol Bay driftnetter caught 101,900 pounds – this would require an additional 345 (average) boats to chill their fish.

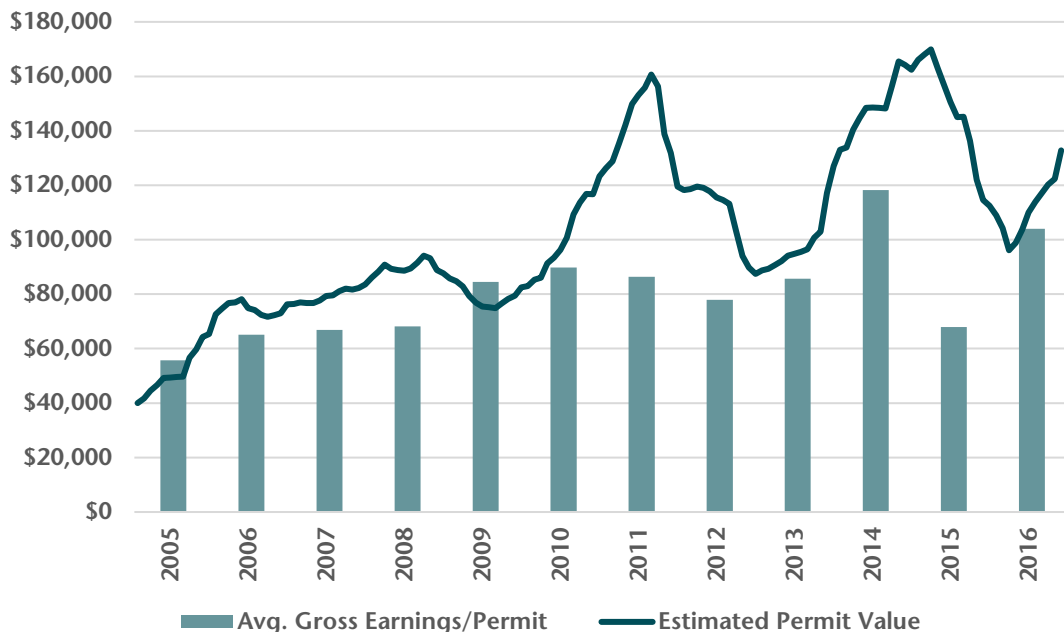
# Bristol Bay Salmon Driftnet Permit Market Value

Bristol Bay driftnet permit prices in 2016 are up 22 percent, or approximately \$24,000, from the beginning of the year. A major permit broker reports bids in excess of \$130,000 and asking prices as low as \$135,000. Permit sales activity has been relatively slow in recent weeks, according to reports in this month's *Pacific Fishing* magazine.

The big question on everyone's mind is always where will permit prices go in the future? There are strong cases for movement in either direction.

First, the case for higher prices. Based on historical trends between Bay driftnet permit prices and average earnings in the fishery, permit prices appear relatively cheap. However, changes in average fishery earnings have not always produced a similar response in permit prices. The market outlook has improved versus early 2015. The 2016 season was very good for most fishermen, posting average earnings above most previous years. However, unlike 2014, the relationship between ex-vessel and wholesale prices appears more sustainable heading into next season. One never knows what Mother Nature has in store, but based on all the analysis conducted for this report it is unlikely that the fishery will endure another "makeup" year in 2017, as was the case in 2015.

**Figure 10. Estimated Bristol Bay Salmon Driftnet Permit Value and Average Gross Earnings, 2005-2016**



Source: CFEC and Permit Master (via *Pacific Fishing* magazine), compiled by McDowell Group.

There are factors that could put downward pressure on permit prices. The announcement that two major processors will stop buying fish from dry boats in 2018 could push fishermen who are unable or unwilling to chill fish to put their permit up for sale. More permits for sale could drive prices down. In addition, fishery earnings across Alaska have generally declined since 2013, and were especially bad in 2016 outside the Bay. This may limit the amount of capital collectively available from potential buyers, compared to past years.

Permit prices have been volatile for several years, though it appears interest rates (the cost to borrow money) have not been a primary cause of the volatility. Interest rates play an indirect role in the market value of most assets. The lower the rate, the less interest required to finance its purchase, which can cause asset prices to rise. Interest rates have been trending down for nearly a decade, but the prime lending rate (the common reference point for business lending) has been flat since 2009. See the Appendix for a table of recently estimated permit values.

**Table 17. Performance in Bristol Bay Salmon Driftnet Fishery, 2000-2016**

Year	Harvest Volume (Millions lbs.)	Active Permits	Ex-Vessel Value (\$Millions)	Average Gross Earnings per Active Permit	Final Average Sockeye Price
2000	104.7	1,823	\$68.4	\$37,527	\$0.67
2001	80.6	1,566	32.4	20,699	0.42
2002	54.2	1,184	25.4	21,480	0.49
2003	78.5	1,424	38.0	26,685	0.51
2004	131.2	1,411	65.7	46,541	0.51
2005	135.6	1,447	80.6	55,673	0.62
2006	153.5	1,475	96.1	65,128	0.66
2007	153.9	1,468	98.1	66,836	0.67
2008	139.1	1,469	100.1	68,169	0.75
2009	156.5	1,444	122.0	84,492	0.80
2010	147.2	1,494	134.1	89,784	1.07
2011	114.3	1,524	131.6	86,325	1.17
2012	103.8	1,513	117.9	77,954	1.18
2013	84.4	1,488	127.5	85,687	1.61
2014	140.5	1,541	182.2	118,241	1.35
2015	165.0	1,545	104.9	67,885	0.63
2016	175.8*	N/A	161.7*	104,000*	0.92*

\*2016 figures are estimated based on preliminary data and historical relationships.  
Sources: CFEC, ADF&G (COAR), McDowell Group estimates.

**Table 18. Estimated Market Value of Bristol Bay Salmon Driftnet Permits, 2000-2016**

<b>Month-Year</b>	<b>Estimated Market Value</b>
January, 2014	\$133,000
February, 2014	133,900
March, 2014	140,400
April, 2014	144,700
May, 2014	148,400
June, 2014	148,600
July, 2014	148,400
August, 2014	148,200
September, 2014	156,400
October, 2014	165,500
November, 2014	164,200
December, 2014	162,400
January, 2015	166,100
February, 2015	168,100
March, 2015	169,900
April, 2015	163,000
May, 2015	156,800
June, 2015	150,500
July, 2015	145,000
August, 2015	145,100
September, 2015	136,300
October, 2015	122,000
November, 2015	114,600
December, 2015	112,500
January, 2016	109,000
February, 2016	104,200
March, 2016	96,100
April, 2016	98,800
May, 2016	103,600
June, 2016	110,000
July, 2016	113,900
August, 2016	117,100
September, 2016	120,200
October, 2016	122,400

Source: CFEC.