northern economics inc.

November 5, 2008

Bob Waldrop,
Executive Director
Bristol Bay Regional Seafood Development Association
14220 Hancock Drive
Anchorage, AK 99515

Dear Bob,

Thank you for contracting with Northern Economics, Inc. to conduct a survey of processors who operated in the 2008 Bristol Bay salmon fishery. This letter serves as an updated final report for the project.

Over the last three weeks we have worked with the eleven major processors that you identified and asked them to complete the survey that we collaboratively designed. The survey instrument consists of 18 questions about the processors, their operations in Bristol Bay in 2008, and their perceptions about how the fishery is changing. The operational questions focus on processors' purchase of chilled product and the distribution of their production between four major product forms.[1]

All eleven processors that we contacted responded to the survey. These processors reported that they processed more than 163.5 million pounds of raw product in 2008. The total production recorded by the survey is approximately 94 percent of the production for the fishery recorded via ADF&G fish tickets. We believe that these results create a strong base for tracking how the fishery may change in the future as well as providing an insightful picture of the production and chilling in the current fishery. The following sections discuss the results of the survey by topic.

Raw Product Purchases and Chilling

Our survey respondents said that they purchased 163.5 million pounds (Mlb) of raw, round weight, product in the 2008 Bristol Bay salmon fishery. Approximately 28.6 percent of this product was chilled using refrigerated sea water (RSW) or slush ice. The remaining 71.4 percent or 116.7 Mlb of raw product was not chilled prior to delivery. Respondents purchased 134.7 Mlb from the drift fleet; this amount is equal to 82.4 percent of the total purchases made by respondents. Drift vessels accounted for 87.6 percent of the chilled product that respondents purchased in 2008. Respondents' total purchases of chilled raw product from drift vessels equaled 32.5 Mlb.

Table 1. Raw Product Purchases 2008

	Total Purchases		Drift Fleet Purchases		
	Pounds	**Percent of Total**	**Pounds**	**Percent of Drift**	**Percent of Total**
Chilled	46,730,000	28.6	32,530,000	24.1	69.6
Unchilled	116,730,000	71.4	102,200,000	75.9	87.6
Total	**163,460,000**	**100.0**	**134,730,000**	**100.0**	**82.4**

Source: Northern Economics, Inc. 2008

[1] The full survey instrument is contained in Appendix A of this letter report.

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The survey asked respondents how they used their 2008 raw product purchases. Respondents reported that canned product and H&G frozen product were the two most common product forms, accounting for nearly 90 percent of all raw product purchases. Purchases for canned production edged out purchases for the H&G frozen production at 74.6 Mlb vs. 71.2 Mlb (see Table 2 and Figure 1). We note that based on standard product recovery rates, the H&G Frozen product form may have been the largest product form post primary processing. Filleted product production used 9.9 percent of respondents' 2008 purchases while the H&G Fresh and "other" product forms used just 0.5 percent and 0.4 percent of total purchases respectively.

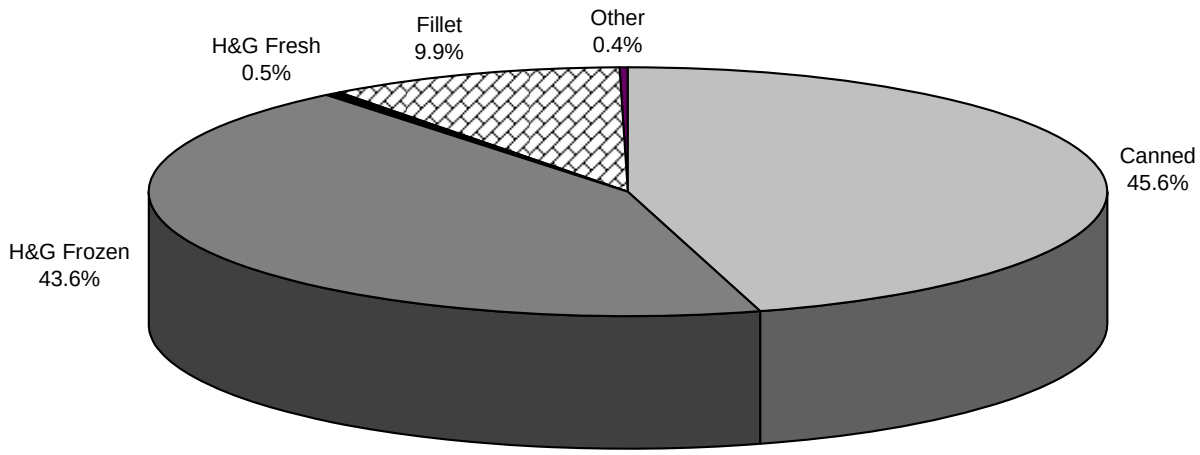
The analysis showed a moderate correlation (0.64) between the portion of a processor's raw product purchases that were chilled by permit holders prior to delivery and the portion of raw product that the processor used to create H&G Fresh or Fillet product forms. Conversely, the processors with the lower portion of their product iced tended to focus on either H&G Frozen product or canned product. There are exceptions to these rules as some processors with average or above average chilled product purchases also focus on the H&G Frozen product form.

Table 2. 2008 Finished Product Form

Product Form	Raw Product		Finished Product	
	Pounds	Percent	Pounds	Percent
Canned[2]	74,560,000	45.6	49,960,000	44.1
H&G Frozen	71,230,000	43.6	52,710,000	46.6
H&G Fresh	800,000	0.5	590,000	0.5
Fillet	16,200,000	9.9	9,230,000	8.2
Other	680,000	0.4	680,000	0.6
Total	163,460,000	100.0	113,170,000	100.0

Source: Northern Economics, Inc. 2008

Figure 1. Usage of Raw Product by Processed Product Form



Source: Northern Economics, Inc. 2008

[2] This figure includes the product that processors ship outside of the bay.

Respondents reported 27.5 Mlb of raw product as being shipped out of the bay for primary processing. This amount is 16.8 percent of the total amount reported. Product that is shipped outside the bay has traditionally been used to produce canned product.

Table 3. Raw Product

Raw Product Processed Outside the Bay	Pounds	Percent
	27,530,000	16.8

Source: Northern Economics, Inc. 2008

Product Chilled Prior to Delivery

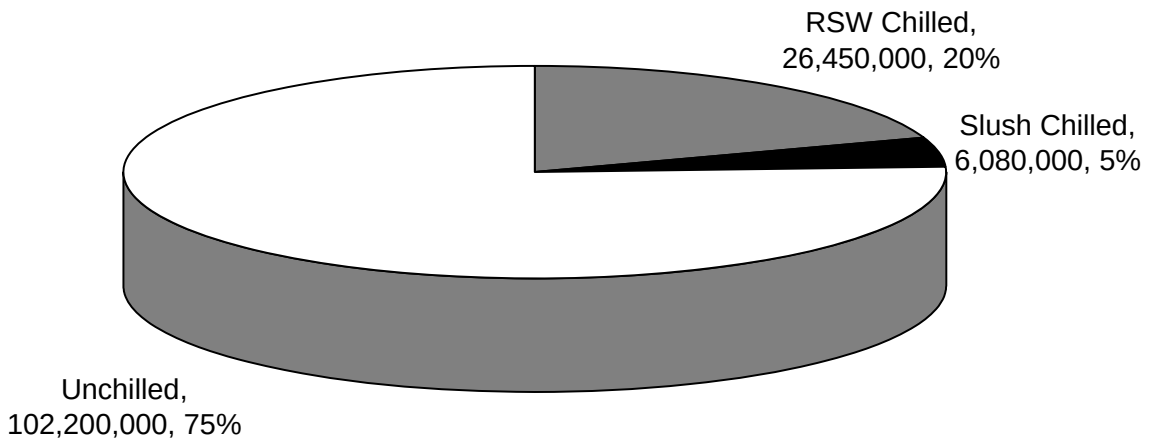
We asked respondents to tell us about how permit holders were chilling their product prior to delivery. Overall, drift permit holders chilled 25 percent, or 32.5 Mlb, of the raw product they delivered in 2008 prior to delivery (see Figure 2). Respondents indicated that over 81 percent of their chilled product came from vessels using RSW systems. The remaining 18.7 percent was provided by vessel using slush ice (see Table 4).

Table 4. Chilling Methods in 2008

Chilling Method	Pounds	Percent
RSW	26,450,000	81.3
Slush	6,080,000	18.7
Total	32,530,000	100.0

Source: Northern Economics, Inc. 2008

Figure 2. Chilling Method in the Drift Fleet (2008)



Source: Northern Economics, Inc. 2008

In addition, the analysis notes the following about permit holder chilling habits:

- Processors were more likely to report a higher percentage of slush ice usage if they were providing ice to permit holders via the ice production facilities located at their processing plants. In other words, processor support is a key ingredient in the use of slush ice.

- Interestingly, the processors who reported providing ice are not necessarily the processors focusing on fillet production. There is no correlation between the type of chilling system used and the primary product form.
- The portion of a processor's raw product that is chilled prior to delivery is not strongly correlated with the amount of product a processor purchased in 2008. In other words, as groups, larger and smaller processors do not differ significantly in the portion of their purchases that are chilled prior to delivery.

The survey also asked respondents how the portion of raw product that is chilled prior to delivery changes through the season. Before the analysis began we expected that the portion of the product that is chilled at the peak of the season would be substantially lower than the amount chilled on the season shoulders given the compressed nature and strong peaks of the Bristol Bay sockeye run. However, the data respondents provided showed less variation than we expected. The analysis created a "chilling index," which shows that the portion of raw product that is chilled prior to delivery is approximately 15 percent higher during season shoulders than at the season peak (see Table 5). In other words, the peak of the season does reduce the portion of the product that gets chilled, but not by overwhelming amounts.

Table 5. Chilling Through the Season[3]

Category	First Third of the Season (Before July 1)	Peak of the Season (July 1-July 15)	Last Third of the Season (After July 15)
Chilling Index	115	100	115

Source: Northern Economics, Inc. 2008

Processor Drift Fleets

The survey asked respondents *"In 2008 how many drift net boats did you consider to be part of 'your fleet.' A boat would be counted as part of your fleet if they were contractually obligated to deliver to your company or if you felt they made more than 50 of their deliveries to your processing plants."* Respondents reported a total of 1,162 vessels met this definition. The largest fleets contained more than 150 vessels, while the smallest fleets contained less than a dozen vessels. A majority of survey respondents reported fleet sizes between 75 and 125 vessels. Overall, the average fleet size was 97 vessels with a median of 98 vessels.

Table 6. Processor Fleets

	Total	Average	Median
Drift Boats in Fleet	1,162	97	98

Source: Northern Economics, Inc. 2008

The survey asked respondents to characterize the vessels in their fleet by how consistently they iced their raw product before delivery (see Table 7). The data show that nearly 87 percent of boats either ice nearly all of the time (i.e., more than 75 percent of the time) or very rarely (i.e., less than 25 percent of the time). The remaining 13 percent of the boats did not consistently chill their catch.

[3] The analysis is unable to directly report the amount of chilled product delivered in each of the three time periods asked by this question as the survey did not ask respondents to break down their total chilled deliveries by time period. The amounts could be estimated by applying a standard distribution to deliveries based on ADF&G data of the 2008 run.

These data support the early conclusion reached from the chilling index data as a higher variation in chilling frequency by individual boats because of seasonality would lead to a higher variation in the chilling index.

Table 7. Chilling Frequency by Vessel in 2008

Drift Vessels	Percent of Boats that Chilled			
	>75 of the Time	50 to 75 of the Time	25 to 50 of the Time	<25 of the Time
Number[4]	335	104	51	672
Percent ()	33.2	10.8	5.1	50.9

Source: Northern Economics, Inc. 2008

Ice Making Capability

Respondents' daily ice making capacity in 2008 totaled 760 tons with approximately 85 tons (11.8 percent) available to permit holders.[5] The average ice-making capability was nearly 69.1 tons per day per processor, while the median was 7.7 tons per day. Approximately 50 percent of the processors made ice available to permit holders, but these processors had the highest percentage of their drift fleets using slush ice for cooling.

Table 8. Ice Making Capacities in 2008

Category	Total	Average	Median
Ice Available to Permit Holders (Tons)	85	7.7	5
Total Daily Ice Production (Tons)	760	69.1	50

Source: Northern Economics, Inc. 2008

Open Ended Responses

The survey asked respondents three open ended questions. The first question asked about chilling and product quality: *"Does your company notice differences in the quality of the raw product depending on the type of the chilling system used by the fishermen? If yes, please explain."* In general, the respondents' answers revealed the following:

1. Both types of chilling produce a fresher, firmer product than vessels without chilling produce.
2. Slush ice is generally considered to be superior to RSW as long as there is enough ice available to properly cool the fish and the ice is evenly distributed. This increase in quality comes at a cost of reduced volume per delivery.
3. Under certain, limited, circumstances, RSW can provide a product that is equal to slush iced product. Respondents mentioned a floating RSW system that pumps colder RSW from the bottom of the tank to the top of the tank where warmer fish are located. Respondents noted a need for a very robust RSW system for this method to work.
4. Very poorly designed or operated RSW systems do not necessarily deliver a product that is superior to unchilled product.

[4] The number of vessels is estimated. One respondent reported based on deliveries as opposed to boats. In order to avoid indirectly breaking confidentiality, that respondent's data were distributed based on the average exhibited by other processor fleets. Interestingly, the data based on deliveries showed the same pattern as the data based on vessels.

[5] One processor did not respond to this question.

5. Spray RSW systems are not perceived as being as high in quality as floating RSW systems or slush ice systems.

The second open-ended question asked respondents about permit holder characteristics and chilling: "*From your point of view, are there any characteristics that set the permit holders who more frequently chill their raw product apart from those that chill their raw product less frequently*?" In general respondents made two types of comments:

1. The first group of comments said that in general better capitalized and "more aggressive or organized" permit holders were more likely to chill their product prior to delivery. Additionally, permit holders that believed in the "quality story" and demonstrated more pride in the quality of their product were more likely to chill their harvest.
2. The second group of comments said that the availability of ice was a primary driver for chilling. Permit holders who stay in one district, particularly Egegik and Nushagak, were better able to ice. Processors said that the BBEDC barges in these districts made a positive difference, specifically *"In <<location removed>> we give ice to the fishermen, but they must get it from the cannery dock. The new BBEDC barge has increased ice use"* .Permit holders that moved frequently were less able to take advantage of icing resources.

The third open-ended question asked "*From your point of view, how has the use of chilling agents (ice or RSW) changed in the Bristol Bay salmon fishery over the last five years?*" Overall, respondents noted a steady increase in the number of permit holders that chill their harvest. One comment seems to sum up this feeling particularly well:

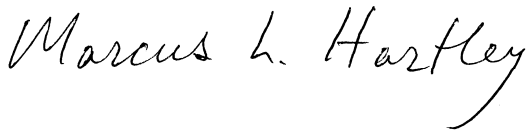
> For many years, boats were not adding new RSW systems and some were not fixing broken ones. The volumes in the Bay were too low to justify the expense. Larger runs have allowed boats to justify the expense and you see more going in every year. The ice barges have given quite a few Fishers the chance to chill without the large expense. Also, some companies that did not pay a chill bonus in the past have started to offer that to their fleet.

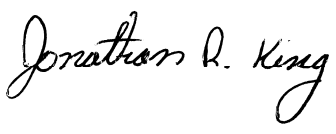
The comments also reveal that some processors noted their own capital improvements devoted to chilling fish and recognized that improvements are a two-way street if overall quality in the Bay is to increase. One particular comment stands out: *"We concentrated on getting the plant handling the fish better hoping that the fishermen will also do their part."* We interpret this comment as a sign that some processors are actively engaged in improving quality throughout the production chain.

Conclusion

We hope that this analysis meets your needs. We believe that the survey results are enlightening and that the survey instrument worked well for a first attempt. If you choose to repeat this survey in the future, we would suggest conducting it in early November as many of the processors noted that they were just calculating their results for 2008 in October. We hope that if you do repeat this survey that you will consider Northern Economics, Inc. for the work.

Best regards,





Marcus Hartley
Vice-President

Jonathan King
Senior Economist and Principal

Attachment A: 2008 Survey Instrument

The survey instrument follows this page.

1. Introduction

Welcome to the 2008 Bristol Bay Salmon Fishery Processing Survey!

The purpose of the survey is to collect information on the chilling of fish by fishermen and the distribution of finished product between 4 dominant product forms (excluding roe).

All of the data reported by individual respondents will be held in confidence by Northern Economics and will only be reported in aggregate. At no time will anyone other than Northern Economics staff have access to individual survey responses.

The aggregated survey results will be submitted to the survey sponsor, the Bristol Bay Regional Seafood Development Association (BBRSDA). BBRSDA will also distribute the same report the BBRSDA receives from Northern Economics to each participant who completes the survey. This year's survey will serve as a baseline for future years so we hope it will become a resource for all who participate.

The survey should take approximately 15 minutes to complete. Would you be willing to participate?

1. What is the name of your processing company?

2. What is your name?

3. What is your primary contact phone number?

4. Please enter your email so that we may send you a copy of the survey results.

2. Raw Product

This section asks questions about a processor's purchase of raw product (round weight fish) in 2008. Please ensure that all answers are for the 2008 season.

Please note that some questions refer to all of your operations in 2008 while other questions refer specifically to the DRIFT NET fleet.

The survey form does not accept commas, $ signs, decimals, or % symbols. Please enter whole numbers only. For example $1,254 would be entered at 1254 while 50% would be entered as 50.

1. In 2008 how many pounds of raw product (round weight fish) did your company purchase from the Bristol Bay salmon fishery?

2008 Raw Product Weight

2. In 2008, how many pounds of previously chilled raw product (using ice or refrigerated sea water (RSW)) did your company purchase in the Bristol Bay salmon fishery?

2008 Chilled Raw Product Weight

3. What percentage of each of the following categories came from the DRIFT NET fleet in 2008?

For example, if the DRIFT NET fleet accounted for 75% of your purchases you would enter 75 below.

Portion of Total Raw Product from the Drift Net Fleet

Portion of Total Chilled Raw Product from the Drift Net Fleet

4. What percentage of your 2008 purchases in the Bristol Bay salmon fishery was shipped long-haul for processing at a plant outside of Bristol Bay?

Percentage Processed Outside Bristol Bay

5. Of the raw product (round weight fish) that your company purchased in 2008, and processed INSIDE Bristol Bay, please estimate the percent that your company used for each of the following product forms. The total should equal 100. ENTER ONLY NUMBERS. DO NOT ENTER PERCENT SYMBOLS (%).

Canned Product

H&G Frozen

H&G Fresh

Fillet

Other

6. We are interested in how (or if) the portion of raw product which is chilled changes during the season. In each of these time periods, what percentage of the total raw product your company purchased from DRIFT BOATS in 2008 from the Bristol Bay salmon fishery was chilled prior to delivery?

Across the Season

First Third of the Season (Before July 1)

Peak of the Season (July 1-July 15)

Last Third of the Season (After July 15)

7. What percentage of the chilled raw product your company purchased from drift gillnet boats in 2008 from each of the following categories? The total of your answer should be 100.

RSW

Slush Ice

Other

8. Does your company notice differences in the quality of the raw product depending on the type of the chilling system used by the fishermen? If yes, please explain.

3. Your Fleet

This page asks questions about drift net boats that you consider to be part of "your fleet."

1. In 2008 how many drift net boats did you consider to be part of "your fleet." A boat would be counted as part of your fleet if they were contractually obligated to deliver to your company or if you felt they made more than 50% of their deliveries to your company in 2008.

Number of Drift Fleet Vessels

2. Please estimate the percentage of the boats in your fleet that fits into the following categories. Please make sure your answers sum to 100.

75% to 100% of their 2008 deliveries were chilled

50% to 75% of their 2008 deliveries were chilled

25% to 50% of their 2008 deliveries were chilled

Less than 25% of their 2008 deliveries were chilled

3. From your point of view, are there any characteristics that set the permit holders who more frequently chill their raw product apart from those that chill their raw product less frequently?

4. Ice Making

This section of the survey asks about your company's production of ice in 2008 and its availability to your fleet.

1. In 2008, what was your company's total daily ice making capacity in Bristol Bay in tons?

Daily Ice Production Capacity (tons)

2. What portion of your daily ice making capacity located in Bristol Bay is available for use by your drift boat fleet?

Portion Available to Your Drift Boat Fleet

3. From your point of view, how has the use of chilling agents (ice or RSW) changed in the Bristol Bay salmon fishery over the last five years?

5. Thank You!

Thank you for completing the survey. A copy of the survey results will be available from BBRSDA after November 1, 2008. BBRSDA will email a copy of the results to you using the contact information you provided with the survey.

All individual data will remain in confidence with Northern Economics.