

BSAI CRAB RATIONALIZATION EDR AUDITS

REPORT PREPARED FOR PACIFIC STATES MARINE
FISHERIES COMMISSION

2012 CALENDAR YEAR DATA

JANUARY 2014



TABLE OF CONTENTS

Introduction.....	1
Methodology	3
Support Classes	5
Catcher Vessel Audit Code Analysis	6
Processor Audit Code Analysis	8
Outlier Audit Code Analysis	9
Audit Variable Analysis	10
Burden Hour Estimate.....	11
Commendation.....	13
Conclusion	14
Appendix A	15
Appendix B	17

Background

The Bering Sea and Aleutian Islands (BSAI) Crab Rationalization Program was developed to create a quota system that grants exclusive harvesting and processing rights to crab harvesters, processors, and communities. The rationalized fishery began in fall 2005 with quota allocated to harvesters and processors based on historical participation in the fishery. Because of the expected impact on the industry, an economic data collection program was developed to better understand the economic impacts on the industry.

Economic data reports (EDRs) were developed to obtain information about the crab operations of harvesters and processors to help monitor how costs and economic returns of various stakeholders in BSAI crab fisheries are affected by rationalization. In order to ensure that the data submitted by respondents in the EDRs is accurate, Congress and the North Pacific Fishery Management Council specified that EDR data be subject to mandatory audits conducted by the third party collection agent, Pacific States Marine Fisheries Commission (PSMFC). PSMFC contracted AKT to develop and implement an EDR review and verification system which involves reviewing the data contained within submitted EDRs, conducting verification audits for those EDRs containing data values outside of the expected range, and conducting random audits for a certain percentage of submitted EDRs.

The EDRs were developed to help determine the effects of the rationalization program, including changes to the costs of production and the effect of consolidation. National Marine Fisheries Service (NMFS) sought to understand the general trends over the years and the effects of rationalization to translate to other fisheries that are beginning similar programs.

This validation process is a continuation of similar work done in years 2006 to 2011. Prior years' data is audited in the current year; for example the 2011 data was audited in 2012.

In summary, the purpose of the economic data report and data validation is to:

- 1) Aid the Council and NMFS in assessing the success of the program;
- 2) Understand the economic performance of crab fisherman;
- 3) Understand how the economic performance has changed after rationalization;
- 4) Isolate the effects attributable to the crab rationalization program;
- 5) Assess the validity of data reported in submitted EDRs; and
- 6) Provide guidance on improvements in the EDR process to improve the validity of future data reporting.

Key Participants and Roles

The key participants in the project include:

- **National Marine Fisheries Service (NMFS)** – initiator of the audit process and end-user of the information contained in the EDRs
- **Pacific States Marine Fisheries Commission (PSMFC)** – collector and manager of the data collected through the EDRs
- **AKT LLP** – independent accountants and consultants selected to audit and validate the information collected in the EDRs
- Participants in the crab rationalization program

Scope of Work

The following procedures were requested to be performed in the scope of work for this project:

- 1) **Random Audits** – Review and verification of a subset of data values reported in a randomly selected sample of EDRs.
- 2) **Outlier Audits** – Review and verification of data values reported in EDRs that contained multiple outlier variables. These outliers were identified through analysis performed by NMFS. Analysis is conducted as needed, based on prior year audit results and statistical analysis.
- 3) **For Cause Audits** – Review and verification of data values reported in EDRs that were non-compliant or that failed the audit process in the previous EDR calendar year.

The methodology to address the procedures above is outlined later in this report.

Based upon conversations with NMFS and PSMFC, the key objectives of the audit were outlined as follows:

- Validate key data
- Identify problems with the data or EDR instructions and make suggestions for future reporting
- Promote compliance with timely and accurate data reporting requirements
- Identify appropriate changes to data when missing or incorrect
- Characterize, and in some cases quantify, the level of accuracy associated with particular data elements

Key Information

The current analysis is based on the data collected from participants of the BSAI crab rationalization program for the year 2012. A statistical sample was determined based upon a total submitted population of 105, which was comprised of all unique submitters of information. The sample was determined based upon achieving a 95% confidence level with a precision level of 15% in terms of assessing the accuracy of the submitted data (see Appendix A for detailed discussion of the statistical basis of the sample). The following table summarizes the number of EDRs submitted by type and the resulting sample size.

Type	# of EDRs Submitted 2012	Sample Size 2012
Catcher Vessel	81	24
Catcher Processor	3	1
Shoreside/Floating Processor	21	6

AKT, PSMFC, and NMFS worked together to determine the best process to analyze data submitted through the EDR process and to determine the methodology to sample and audit the data submitted in the EDRs. The process was based on prior year experience with improvements made to benefit the participants. The following is a summary of the steps taken throughout the audit process.

- 1) **Determine appropriate variables to validate.** The significance of the data for random audits and available audit evidence is considered when determining the appropriate variables to validate. This is a collaborative process between PSMFC, NMFS, and AKT.
- 2) **Determine population subject to random audit.** The sample size is determined using a statistical model with a 95% confidence level and a 15% precision level. See Appendix A for a discussion of the statistical basis used for selection.
- 3) **Determine outlier audit population.** Based upon its analysis of the EDR data without vessel identity, NMFS identifies the population that it desires to validate through an outlier audit. These audits focus on EDRs for which significant outliers were identified through analytical review. Ten vessels and one processor were identified as having outlier variables for the 2012 EDR data year.
- 4) **Determine for-cause audits.** Vessels selected for for-cause audits are those that did not comply with an audit request in the previous year. Four vessels were selected for audit in the 2012 EDR data year as a result of a failed audit in the prior year.
- 5) **Gather and crosscheck EDR data to be audited.** EDR data pertaining to the variables selected for auditing are transferred to AKT from PSMFC. AKT uses a standard auditing analysis spreadsheet and imports data from PSMFC into this format.
- 6) **Request information subject to audit for random, outlier and for-cause audits.** Selected vessels and processors are asked to provide supporting information for the variables selected for validation. They are given one month to comply with the request, though extensions are granted on an as-needed basis. If the selected vessels and processors do not comply within one month, they are individually contacted, and additional contact efforts are made as needed to ensure that each selected vessel and processor has an opportunity to respond in a timely manner.
- 7) **Validate information by comparing with supporting documentation.** AKT reviews the supporting documentation submitted by vessels and processors and compares the supported values to those submitted on the original EDR. Detailed notes regarding the basis and quality of information are maintained in order to evaluate the validity of selected data. The vessels or processors are contacted as needed for further clarifications and additional supporting documents.
- 8) **Summarize the results of the audit verification process.** Each audited variable is classified within a support category, which classify and summarize the validity of the audit evidence received, allowing for effective and meaningful overall analysis.
- 9) **Compile a burden hour estimate.** Selected vessels and processors are asked to estimate the amount of time dedicated to compiling their EDR submissions. The resulting responses are summarized into estimated burden hours by respondent type.

Audit Methodology

AKT selects vessels or processors for random audit based upon the statistical sample outlined in Appendix A. AKT works with NMFS and PSMFC to determine the appropriate variables to validate.

For each data variable requested, AKT critically evaluates the support provided by the selected vessel or processor. Information is evaluated against third party support, such as invoices or fish tickets; internally-generated information, such as crew settlement sheets, general ledger details, invoices, detailed internal reports, or financial statements; and estimates made, including an assessment of the reasonableness of assumptions. Supporting documentation for internally-generated spreadsheets is requested on a judgmental basis. AKT also notes when no support is available to evaluate the information.

Many of the records provided to AKT are unique, specifically for the vessels. The processor reporting tends to be more formal and standardized, reflecting the large company nature of those operations. Because the material provided is so unique, the audit process begins with a detailed review of each information packet received while comparing totals for each variable to the original EDR entry. Each supporting document is assessed for accuracy and depth of support. Estimates are accepted as long as a reasonable explanation and/or calculation are also provided. Handwritten statements are also considered adequate, but only after discussion with the EDR preparer and requests for additional support.

If discrepancies are found between the original EDR submission and the supporting documentation provided, AKT contacts the vessel owner and/or preparer to validate the corrected value. Many times this discussion leads to the receipt of additional documentation and/or further explanation as to the methodology used to report EDR values.

If the initially provided documentation is determined to be incomplete or insufficient, then AKT contacts the vessel or processor to request further documentation. Once this additional documentation is received, it is assessed and validated via the process described above.

AKT worked jointly with PSMFC and NMFS to develop the following classifications to describe audit evaluations and summarize the results of the audited values.

Validation Code - Original Value	Is original value substantiated?	Is audited value substantiated?	Nature of Reporting Error	Correction	Validation Code - Audit Value
1	Yes	Yes (same)	No error; reported value is clearly substantiated by complete records	No	1
1T	Yes	yes (same)	Original value is blank, or N/A	No	1
2	Yes	Yes (same)	Calculation error	Yes	1
2T	Yes	Yes(same)	Typographical Error	Yes	1
3	Yes	Yes (same)	Misinterpretation of question	Yes	1
4	Yes	Yes (same)	Estimate is based on original documentation but flawed assumption/logic	Yes	4
5	Yes	Yes (same)	Data cannot be reported precisely as specified in EDR form and must be estimated; estimate is based on appropriate documentation and sound assumptions/logic and is considered validated	No	5
6	Yes	Yes (updated)	Original value was reported correctly based on original documentation, but corrected based on updated documentation	Yes	1
7	No	No	Reported value is "best guess"; value is not derived from records	No	7
8	No	Yes (new)	Original value is unsubstantiated; correction based on new documentation	Yes	1
9	No	No	No data reported	Yes - "Corrected Value is -9"	9
10	No	No	Item "Not Applicable" to vessel	Yes - "Corrected Value is -7"	10

CATCHER VESSEL- AUDIT CODE ANALYSIS



The records of 24 catcher vessels were requested, and 24 were received. In the current year, 14 vessels selected for random audit did not require follow-up information requests. All other catcher vessels complied with AKT's requests for additional support.

AKT analyzed the audit codes assigned to each of the vessels in order to document consistent errors for each variable, along with the reasoning behind the error.

The total number of audit codes possible was determined by the number of EDR variables requested from selected vessels. 24 catcher vessels submitted information for 4 items, totaling 96 audit codes. The distribution of those audit codes is summarized below. Where significant, a breakdown of the variables receiving the reporting errors is included.

Code - Original Value	Code - Audit Value	Nature of Reporting Error	Number of Occurrences	Percentage
1	1	No error; reported value is clearly substantiated by complete records	59	61.46%
		<i>Table 2 - Pounds Transferred</i>	14	
		<i>Table 2 - Total Cost</i>	16	
		<i>Table 5 - Fuel Gallons</i>	10	
		<i>Table 5 - Fuel Cost</i>	19	
1T	1	Original value is blank, or N/A	4	4.17%
2	1	Calculation error	5	5.21%
2T	1	Typographical Error	0	0.00%
3	1	Misinterpretation of question	10	10.42%
		<i>Table 2 - Pounds Transferred</i>	4	
		<i>Table 2 - Total Cost</i>	3	
		<i>Table 5 - Fuel Gallons</i>	1	
		<i>Table 5 - Fuel Cost</i>	2	
4	4	Estimate is based on original documentation but flawed assumption/logic	0	0.00%
5	5	Data cannot be reported precisely as specified in EDR form and must be estimated; estimate is based on appropriate documentation and sound assumptions/logic and is considered validated	7	7.29%
		<i>Table 5 - Fuel Gallons</i>	6	
		<i>Table 5 - Fuel Cost</i>	1	
6	1	Original value was reported correctly based on original documentation, but corrected based on updated documentation	0	0.00%
7	7	Reported value is "best guess"; value is not derived from records	1	1.04%
8	1	Original value is unsubstantiated; correction based on new documentation	10	10.42%
		<i>Table 2 - Pounds Transferred</i>	2	
		<i>Table 2 - Total Cost</i>	1	
		<i>Table 5 - Fuel Gallons</i>	5	
		<i>Table 5 - Fuel Cost</i>	2	
9	9	No data reported	0	0.00%
10	10	Item "Not Applicable" to vessel	0	0.00%

Non-Error Audit Codes

Of the twelve possible audit codes, four do not represent actual errors. These codes are:

- 1-1
- 1T-1
- 5-5
- 10-10

The four non-error audit codes comprise 72.9% of all catcher vessel audit codes used, with 1-1, 1T-1 and 5-5 claiming 61.46%, 4.17%, and 7.29% respectively.

Audit code 1T-1 was used in EDR *Table 2 –CR Crab Fishing Quota Costs, by CR Fishery and Quota Type: Market-Value and Negotiated Price Transfers Only* when vessels did not lease any quota during the year.

Audit code 5-5 was used in reference to fuel purchases reported in *Table 5 – Vessel Operating Expenses, Annual*. These vessels typically track either fuel cost or fuel gallons, and arrive at the other measure using an average fuel cost per gallon.

Audit code 10-10 was not used.

Error Audit Codes

AKT analyzed the following results for the remaining audit codes, which are used to categorize errors:

- 2-1
- 2T-1
- 3-1
- 4-4
- 6-1
- 7-7
- 8-1
- 9-9

Audit code 3-1 was the error code used most frequently at 10.42%. The most common sources of misunderstanding were related to *Table 2 –CR Crab Fishing Quota Costs, by CR Fishery and Quota Type: Market-Value and Negotiated Price Transfers Only*. Confusion regarding the intent of the table was expressed widely by the vessels selected for audit. Vessels were unsure of the meaning of “pounds transferred”, so in some instances reported nothing despite quota being leased. Additionally, one vessel reported quota transferred to other vessels and the lease fees received rather than quota transferred from other vessels and the lease fees paid.

A smaller portion of misunderstandings were noted in *Table 5 – Vessel Operating Expenses, Annual*, where vessels inappropriately included the cost of lubrication and other fluids, or inappropriately excluded sales taxes and surcharges. AKT notes that these parameters are clearly stated in the EDR instructions, so the misunderstandings are likely the result of oversight by the vessels, not a lack of clarity in the EDR.

Audit code 8-1 was documented 10.42% of the time. This audit code was documented across all variables and indicates that the vessel’s original submission was incorrect, but that adequate documentation was provided to support the revised value. In some instances the vessels acknowledged the original error, and in others AKT determined the existence of the error based upon the audit information provided and conversations with the vessels. Anecdotal evidence suggests that vessels do not always thoroughly review their records to report an accurate EDR number initially, and only revise the figures when forced to look more closely at their own data to produce auditable support for AKT.

Two additional audit codes appeared in a fraction of the catcher vessels: calculation errors (**2-1**) at 5.21% and submissions which could not be supported by records (**7-7**) at 1.04%.

Audit codes 2T-1, 4-4, 6-1, and 9-9 were not used.

PROCESSOR AUDIT CODE ANALYSIS



The records of seven processors were requested, and seven packets were received. In the current year, three processors selected for random audit did not require follow-up information requests. All other processors complied with AKT's requests for additional support.

AKT analyzed the audit codes assigned to each of the processors in order to document consistent errors for each variable, along with the reasoning behind the error.

The total number of audit codes possible was determined by the number of EDR variables requested from selected processors. Six shoreside/floating processors submitted information for six items and one catcher processor submitted information for eight items, totaling 44 audit codes. The distribution of those audit codes is summarized below.

Code - Original Value	Code - Audit Value	Nature of Reporting Error	Number of Occurrences	Percentage
1	1	No error; reported value is clearly substantiated by complete records	20	45.45%
1T	1	Original value is blank, or N/A	18	40.91%
2	1	Calculation error	0	0.00%
2T	1	Typographical Error	0	0.00%
3	1	Misinterpretation of question	2	4.55%
4	4	Estimate is based on original documentation but flawed assumption/logic	0	0.00%
5	5	Data cannot be reported precisely as specified in EDR form and must be estimated; estimate is based on appropriate documentation and sound assumptions/logic and is considered validated	3	6.82%
6	1	Original value was reported correctly based on original documentation, but corrected based on updated documentation	0	0.00%
7	7	Reported value is "best guess"; value is not derived from records	0	0.00%
8	1	Original value is unsubstantiated; correction based on new documentation	1	2.27%
9	9	No data reported	0	0.00%
10	10	Item "Not Applicable" to vessel	0	0.00%

Audit code 1-1 was used most extensively, accounting for 45.45% of variables tested. This high rate attests to the quality of data submitted by the processors and is an indication of the larger operations and more sophisticated record-keeping practices of processors as compared to catcher vessels.

Audit code 1T-1 was also prevalent, appearing in 40.91% of variables, most often for *Table 1a – CR Crab Sales to Affiliated Entities*, as a number of processors did not have any sales to affiliated entities.

Audit code 5-5 appeared 6.82% of the time. This audit code was used in relation to *Table 6 – Crab Processing Labor Cost* when processors track either man-hours or labor payments, and arrive at the other measure using an average hourly wage.

In total, non-error audit codes (1-1, 1T-1, 5-5, and 10-10) comprised 93.2% of processor audit codes used.

OUTLIER AUDIT CODE ANALYSIS



Ten vessels and one processor were selected for outlier audits through the NMFS analysis process described in the Methodology section of the report. AKT received support for the unique variables identified by NMFS for each of the 11 vessels/processors selected. In the current year, two vessels selected for outlier audit did not require additional requests. All other outliers complied with AKT's requests for additional support.

AKT analyzed the audit codes it assigned to each of the outliers in order to document consistent errors for each variable, along with the reasoning behind the error.

The total number of audit codes possible was determined by the number of EDR variables requested from the outliers, totaling 42. The distribution of those audit codes is summarized below.

Code - Original Value	Code - Audit Value	Nature of Reporting Error	Number of Occurrences	Percentage
1	1	No error; reported value is clearly substantiated by complete records	28	66.67%
1T	1	Original value is blank, or N/A	0	0.00%
2	1	Calculation error	0	0.00%
2T	1	Typographical Error	0	0.00%
3	1	Misinterpretation of question	2	4.76%
4	4	Estimate is based on original documentation but flawed assumption/logic	0	0.00%
5	5	Data cannot be reported precisely as specified in EDR form and must be estimated; estimate is based on appropriate documentation and sound assumptions/logic and is considered validated	1	2.38%
6	1	Original value was reported correctly based on original documentation, but corrected based on updated documentation	0	0.00%
7	7	Reported value is "best guess"; value is not derived from records	0	0.00%
8	1	Original value is unsubstantiated; correction based on new documentation	11	26.19%
9	9	No data reported	0	0.00%
10	10	Item "Not Applicable" to vessel	0	0.00%

Audit code 1-1 was used most frequently, at 66.67%, with overall non-error codes (1-1, 1T-1, 5-5, and 10-10) totaling 69.0%. Many outliers were selected for testing because the number of pounds leased exceeded the number of pounds landed. Discussions with vessels revealed that it is common practice for vessels to lease pounds according to the quota allocated by a co-op, though these may not all end up translating to pounds actually landed. Settlements and fish tickets supported this assertion, resulting in a 1-1 audit code.

Audit code 8-1 was used 26.19% of the time, and spans a variety of variables. The audit code indicates that the vessel's original submission was incorrect, but that adequate documentation was provided to support the revised value. In many instances this audit code is indicative of carelessness by the submitters when preparing the initial EDR.

Audit codes 3-1 and 5-5 appeared in a fraction of outliers, at 4.76% and 2.38%, respectively.

In addition to assessing the distribution and use of the various audit codes, AKT analyzed the EDR variables which were most frequently not supported by direct documentary evidence. This lack of support includes both errors and the necessary use of estimates.

Catcher Vessels

AKT identified two variables which received unsupported audit codes in greater than 30% of instances. Vessels were unable to substantiate these variables resulting in either errors or the use of estimates. A summary of those variables is provided below.

EDR Section (Year)	EDR Item Description/Year	# of Vessels		% of Vessels unable to substantiate
		5 - 5	Error	
2.0 Crab Fishing Quota Costs (2012)	Pounds Transferred	0	8	33%
5.0 Vessel Operating Expenses, Annual (2012)	Fuel Gallons	6	8	58%

One-third of vessels received an unsupported audit code for the pounds transferred portion of *Table 2 – CR Crab Fishing Quota Costs, by CR Fishery and Quota Type: Market-Value and Negotiated Price Transfers Only*. This rate of unsubstantiation is in large part due to the general confusion regarding the meaning of “pounds transferred” as discussed in the Catcher Vessel – Audit Code Analysis section of this report. Clarifying the intent of this section in the EDR instructions may be valuable in the reduction of future errors for this variable.

The variable for fuel gallons in *Table 5 – Vessel Operating Expenses, Annual* elicited unsupported audit codes for 58% of vessels. Six of these unsupported codes relate to reasonable estimates. Five vessels estimated the number of gallons used in the fishery by dividing the total fuel cost as recorded in their accounting system by an estimated market price per gallon. This practice suggests that vessels are failing to retain applicable fuel invoices, and are thus forced to rely exclusively on their accounting records, which do not always include detail regarding gallons purchased. The sixth estimate involved the allocation of fuel costs incurred in 2011 to bring the vessel to Seattle for repairs for the 2012 season. The vessel allocated the cost across fishing seasons to better match revenues with expenses, which is appropriate under the accrual method of accounting. Overall, vessels had difficulty determining exactly how much fuel was consumed, leading to the extensive use of estimates and numerous errors.

Catcher/Shoreside/Floating Processors

As noted in the Processor Audit Code Analysis section, the quality of submissions was very high, with 86.36% of variables receiving a 1-1 or 1T-1 audit code. Accordingly, analysis of frequent errors is not material to the processors.

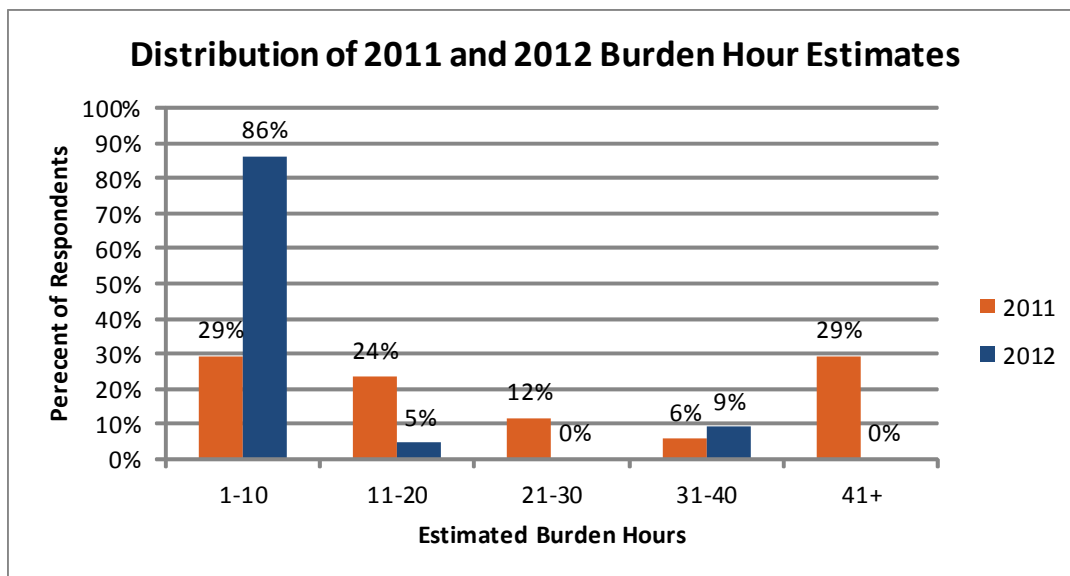
As a result of its analysis and contact with the vessels and processors selected for audit, AKT asked all vessels and processors to provide information regarding the time commitment (burden hours) to prepare original EDR submissions for PSMFC and to prepare submissions for AKT.

Catcher Vessels

A summary of the burden hours estimated by the responsive vessels is included below. Note that 22 vessels provided estimates as to the amount of time taken to prepare the initial EDR, while 26 provided estimates for the time spent preparing supporting materials for validation.

Original EDR Submission to PSMFC			EDR Validation to AKT		
Burden Hour Estimate Range	Number of Vessels	Percentage	Burden Hour Estimate Range	Number of Vessels	Percentage
< 5 hours	10	45.5%	< 3 hours	19	73.1%
6 - 10 hours	9	40.9%	4 - 6 hours	4	15.4%
11 - 15 hours	0	0.0%	7 - 9 hours	2	7.7%
16 - 20 hours	1	4.5%	10 - 12 hours	0	0.0%
> 20 hours	2	9.1%	> 13 hours	1	3.8%

Estimates regarding the time required for catcher vessels to complete the original EDR submission ranged from two hours to one week, with 90.9% placing the burden at or below 20 hours and 9.1% at greater than 20 hours. This is a significant shift from 2011 when nearly half of vessels placed the burden at above 20 hours. This change is reflective of the redesigned EDR which respondents overwhelmingly described as less burdensome. See the chart below for a comparison of 2011 and 2012 burden hour estimates.



Estimates regarding the amount of time needed to compile documentation for AKT after being selected for audit ranged from less than one hour to ten hours, with 96.2% of vessels spending less than ten hours on the process and 3.8% spending more.

Catcher/Shoreside/Floating Processors

A summary of the burden hours estimated by the responsive processors is included below. Note that four processors provided estimates as to the amount of time taken to prepare the initial EDR, while three provided estimates for the time spent preparing supporting materials for validation.

Original EDR Submission to PSMFC			EDR Validation to AKT		
Burden Hour Estimate Range	Number of Processors	Percentage	Burden Hour Estimate Range	Number of Processors	Percentage
< 5 hours	1	25.0%	< 3 hours	1	33.3%
6 - 10 hours	1	25.0%	4 - 6 hours	1	33.3%
11 - 15 hours	1	25.0%	7 - 9 hours	1	33.3%
16 - 20 hours	0	0.0%	10 - 12 hours	0	0.0%
> 20 hours	1	25.0%	> 13 hours	0	0.0%

Estimates regarding the time required for processors to complete the original EDR submission ranged from six hours to 40 hours, with the distribution of processors taking less than and more than 20 hours at 75.0% and 25.0% respectively. As was noted for the vessels, the time burden has improved over the prior year when 44.4% of processors estimated the EDR submission requiring more than 20 hours.

Estimates regarding the amount of time needed to compile documentation for AKT after being selected for audit ranged from two hours to eight hours.

See Appendix B for detailed results of burden hour inquiries.

COMMENDATION



AKT worked collaboratively with members of the PSMFC and NMFS staff and would like to thank them for their commitment and time.

<i>Name</i>	<i>Organization</i>
Dave Colpo	Pacific States Marine Fisheries Commission
Geana Tyler	Pacific States Marine Fisheries Commission
Brian Garber-Yonts	National Marine Fisheries Service
Audit participants	Individual vessels and/or processors

CONCLUSION



The 2012 EDR yielded a high response rate from all catcher vessels and catcher, floating, and shoreside processors. The vessels that contained errors on their submissions were corrected easily by contact with the vessel or by the addition of new information to substantiate the data reported.

AKT appreciates the opportunity to work with PSMFC and NMFS staff. This collaborative relationship is critical to AKT's success in completing this yearly audit.

Statistical Sample

In order to determine an appropriate sample size as the basis of selection for the random audits, the main criteria to consider are the level of precision desired, the level of confidence or risk, and the degree of variability in the attributes being measured. These elements are defined as follows:

- **Level of Precision** – Also referred to as the margin of error, this is the range in which the true point value of the population is estimated to be. This is expressed as a percentage \pm the true value (e.g., $\pm 5\%$). Thus, if it is found from the sample that on average 15% of the fisherman did not submit data then it could be concluded, that for the total population, between 10% and 20% of the fisherman have not submitted data.
- **Confidence Level** – The degree to which we are certain that a result or estimate obtained from the study includes the true population percentage, when the precision is taken into account. In a normal distribution, 95% of the sample values are within two standard deviations of the true population value. If 100 vessels were sampled, 95 would have the true population values within the range specified.
- **Degree of Variability** – This measures the variability within the population (e.g. Catcher Vessels, Catcher/Processor Vessels, Shore/Floating Processors, Large Vessels, Small Vessels). The more heterogeneous a population, the larger the sample size required to obtain a given level of precision. The more homogenous a population, the smaller the sample size required. A variability of 50% signifies the greatest variability.

Due to the variability within the industry and the variability of the data being analyzed, there is not one specific variable that can be used to create a statistical model that would enable AKT to calculate a standard deviation and regression analysis for the project. This fact places the project in a similar category as a questionnaire, political poll, surveys, and extension program impacts.

While there are no statistical analyses that can be applied directly, there are similar projects that derive statistical sampling methods relating to extension program impact. In these projects the samples are used to evaluate a change made to the extension programs.

The following sampling formulas were used to ensure a statistical basis for the samples chosen:

$$n_0 = \frac{Z^2(p)(q)}{(e)^2} \qquad n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

n_0 = Sample size

n = Sample size with finite population correction for proportions

Z = The number of standard deviations a point x is from the mean; is a scaled value

p = Population variability

$q = 1 - p$

e = The desired level of precision

N = Total population

For this project p (variability) equals .5 to account for maximum variability in the population.

This type of sampling methodology takes into account errors and missing information in the data. The precision level quantifies the tolerable level of error based on the sample size. This error level is then projected to the total population.

The samples were stratified based on the proportion of the group versus the total population. The reasoning behind this is that by sampling each individual population there would be no statistical basis for both the Catcher/Processor and Stationary/Floater Processors. The only way to have a statistical basis for this population would be to census the population. Because this is not a reasonable approach, AKT suggested that the population include all groups and then additional random audits be performed for the Catcher/Processor and Stationary/Floater Processor populations.

The sample population was ultimately chosen based upon a 95% confidence level with 15% precision and variability of 50% (due to the variability of the information requested). This method ensures the data are correct (outlier audits) and provides a process to measure the quality of data (random audits). This sampling method provides a statistical basis for future studies and gives the agencies a basis to measure the accuracy of the population data.

Time Burden Estimates

Time burden estimates for each respondent are summarized below:

Type	Original EDR Submission to PSMFC	EDR Validation to AKT
Catcher Vessel	2 - 2.5 hours	1 - 2 hours
Catcher Vessel	2 - 2.5 hours	1 - 2 hours
Catcher Vessel	2 - 2.5 hours	1 - 2 hours
Catcher Vessel	2 - 2.5 hours	1 - 2 hours
Catcher Vessel	2.5 hours	1 hour
Catcher Vessel	3 hours	2 hours
Catcher Vessel	4 - 5 hours	< 1 hour
Catcher Vessel	4 - 6 hours	1 - 2 hours
Catcher Vessel	5 hours	1.5 hours
Catcher Vessel	5 hours	2 hours
Catcher Vessel	6 hours	2 hours
Catcher Vessel	8 hours	1.5 hours
Catcher Vessel	8 hours	2 hours
Catcher Vessel	8 hours	2 hours
Catcher Vessel	8 hours	4 hours
Catcher Vessel	8 - 10 hours	1 hour
Catcher Vessel	8 - 10 hours	8 - 10 hours
Catcher Vessel	10 hours	1 hour
Catcher Vessel	10 hours	2 - 3 hours
Catcher Vessel	20 hours	1 hour
Catcher Vessel	1 week	1 day
Catcher Vessel	1 week	4 days
Catcher Vessel	Not reported	1 - 2 hours
Catcher Vessel	Not reported	6 hours
Catcher Vessel	Not reported	6 hours
Catcher Vessel	Not reported	6 hours
Catcher Processor	6 hours	2 hours
Shoreside Processor	8 hours	Not reported
Shoreside Processor	15 hours	4 - 6 hours
Shoreside Processor	1 week	1 day