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effect of an incentive, 932 (or two-thirds) of the 1,400 initial letters contained \$2 in cash as a token of appreciation for participation in the survey. Based on preliminary analysis of the response to the incentive, all 1,000 anglers in the second wave mailing received the \$2 incentive.

In addition to the sample of 2,400 licensed anglers asked to complete an internet survey, a smaller sample of 300 anglers from the January through July license pool received the same survey in a mail form. The purpose of this sub-sample was to test response rates across survey modes. This sub-sample also received four mail contacts, two of which included a printed survey instrument.

The lodge owner survey was sent to a sample of 46 Bristol Bay lodge owners. These lodges received an initial email notice of the mail survey, the mail survey packet, a reminder email notification, a second survey by mail, and a final email reminder. The lodge survey asked owners to supply detailed information on the operation of their lodges, including rates and occupancy for several years, capital expenditures in recent years, and detailed business expenses and payroll information for 2005 season. The data collected from the lodge owner sample was intended to provide a snapshot of the typical distribution of revenues from lodge operations within the Bristol Bay and Alaska economies.

The 2005 Bristol Bay lodge client survey was a sample of 330 anglers. This was a convenience sample (not a probability sample) in that a limited number of Bristol Bay lodges provided contact information for a sample of their client lists. This sub-sample also received four mail contacts including 1) an initial letter, 2) survey package, 3) reminder postcard, and 4) 2nd survey package. This survey provided additional information primarily on Kvichak River lodge client anglers.

3.1.1 Structure of Bristol Bay Angler Survey

The angler survey instrument was organized into four primary groupings of questions. Section I of the survey asked general questions about the angler's sport fishing level of experience and preferences in types of fishing and locations for fishing. Section II asked specifically about the number and location of 2005 Alaska fishing trips taken to Bristol Bay waters (mail surveys) and Bristol Bay plus other south central Alaska waters (internet survey). Section III narrowed the focus of the survey down to the most recent trip the respondent had taken to fish in south central Alaska. In this section respondents were asked detailed questions on the location, dates, cost and characteristics of this most recent Alaska fishing trip. In Section III anglers were also asked about fish species they targeted and caught on their trip, how they rated several aspects of their experience, and how the trip compared to other destinations they have fished in recent years. Section III also included a series of questions related to current policy issues on road building and development in Bristol Bay. The final section of the survey, Section IV, asked a series of questions on the demographic characteristics of the respondent.

3.1.2 Bristol Bay Angler Survey Sample Allocation Design

As noted above, the 2005 Bristol Bay Angler Survey was designed as a stratified sample of Alaska 2005 sportfish license holders. The strata were based on where anglers had purchased their licenses (specifically, four south central Alaska regions: Anchorage, the Kenai Peninsula, Matanuska/Susitna, and Bristol Bay (RST), and two different purchase periods: January-July and August-September). Some specific vendors within each location were excluded to increase the probability of sampling freshwater (not saltwater) anglers. The following series of tables (Table 14 through Table 19) provide detail on the size and distribution of the license population as well as that of the sample drawn for this survey. Additionally, information on the distribution of survey responses across the sample strata are supplied for both all survey respondents and for sub-samples of respondents supplying information on trips to the Bristol Bay area and the Kenai Peninsula.

Table 14 shows the distribution of the total population of 2005 sportfish licenses as supplied by Alaska Department of Fish and Game. The license pool was separated into two waves. Wave 1 included licenses sold between January 1 and July 31, 2005. Wave 2 included licenses sold between August 1 and September 30, 2005. Two waves were sampled in order to minimize recall bias among those respondents whose most recent trip might have been earlier in the fishing year.

Table 14. 2005 Actual ADF&G Sportfish License Sales

Wave 1 Actual License Pool	2005 ADF&G Sportfish Licenses sold			Distribution of License sales across sample populations		
SampleArea	RESIDENCY			RESIDENCY		
	NON	RES	Total	NON	RES	Total
Anchorage	32,050	54,624	86,674	15.1%	25.7%	40.7%
Kenai Peninsula	38,821	22,031	60,852	18.2%	10.4%	28.6%
MatSu/West Cook	8,851	18,908	27,759	4.2%	8.9%	13.0%
RST (Bristol Bay)	3,116	1,694	4,810	1.5%	0.8%	2.3%
Total	82,838	97,257	180,095	38.9%	45.7%	84.6%
Wave 2 Actual License Pool						
SampleArea	RESIDENCY			RESIDENCY		
	NON	RES	Total	NON	RES	Total
Anchorage	10,087	4,566	14,653	4.7%	2.1%	6.9%
Kenai Peninsula	10,414	1,485	11,899	4.9%	0.7%	5.6%
MatSu/West Cook	2,992	1,632	4,624	1.4%	0.8%	2.2%
RST (Bristol Bay)	1,251	257	1,508	0.6%	0.1%	0.7%
Total	24,744	7,940	32,684	11.6%	3.7%	15.4%

Overall, the license pools contained 180,095 anglers for the Wave 1 sample and 32,684 anglers in Wave 2. Table 14 also shows the proportional distribution of all licenses in the

pool across the 16 sample strata (2 waves x 2 residency classes x 4 sample areas). The sample distribution was designed to increase the probability of sampling Bristol Bay anglers, and to obtain approximately equal samples of nonresident anglers in wave 1 and wave 2.

Table 15 shows the actual distribution of randomly drawn licenses across the 16 sample strata. As in the previous table, this table also shows the proportional distribution of the license sample across the strata.

Table 15. Distribution of Sample of License Holders Drawn from ADF&G License Pool

Wave 1 Sample distribution	Licenses sampled from total pool			Distribution of License sample across sample populations		
	RESIDENCY			RESIDENCY		
SampleArea	NON	RES	Total	NON	RES	Total
Anchorage	83	164	247	3.5%	6.8%	10.3%
Kenai Peninsula	142	105	247	5.9%	4.4%	10.3%
MatSu/West Cook	71	176	247	3.0%	7.3%	10.3%
RST (Bristol Bay)	442	217	659	18.4%	9.0%	27.5%
Total	738	662	1,400	30.8%	27.6%	58.3%

Wave 2 Sample distribution	RESIDENCY			RESIDENCY		
	NON	RES	Total	NON	RES	Total
SampleArea						
Anchorage	116	59	175	4.8%	2.5%	7.3%
Kenai Peninsula	152	23	175	6.3%	1.0%	7.3%
MatSu/West Cook	108	67	175	4.5%	2.8%	7.3%
RST (Bristol Bay)	392	83	475	16.3%	3.5%	19.8%
Total	768	232	1,000	32.0%	9.7%	41.7%

Table 16 presents the ratios of the proportion of the entire sample in each strata to the proportion of the total license pool in each of the 16 strata. For comparison, a ratio of 1.0 in this table would indicate that the proportion of the sample in a stratum was exactly equal to the proportion of the total number of licenses in that stratum. Ratios of less than 1.0 indicate that the strata are under-sampled relative to the share of all licenses in those strata. Conversely, a ratio of over 1.0 indicates that a stratum is over-sampled relative to the entire population.

Table 16. Ratio of Sportfishing License Sample Sizes to Population Sizes

Wave 1	NON	RES
Anchorage	0.23	0.27
Kenai Peninsula	0.32	0.42
MatSu/West Cook	0.71	0.83
RST (Bristol Bay)	12.58	11.36
Wave 2	NON	RES
Anchorage	1.02	1.15
Kenai Peninsula	1.29	1.37
MatSu/West Cook	3.20	3.64
RST (Bristol Bay)	27.78	28.63

Note: a ratio of less than one indicates the sample strata is under-sampled relative to the population size. A sample of over one indicates the strata is over-sampled relative to the population size.

Table 16 shows that for Wave 1 the RST (Bristol Bay) license sales are significantly over-sampled relative to the population of license sales. In this first wave licenses from the remaining three strata were under-sampled relative to the license population. In Wave 2 the Bristol Bay strata are also significantly over-sampled relative to the pool. This over-sampling of the Bristol Bay license sales was included in the sample design in order to maximize the probability that information on 2005 fishing trips to the Bristol Bay area would be included in the survey responses, and to balance the number of nonresident anglers between waves. Within purchase location and time of purchase strata, residents and nonresidents were sampled as the same proportion as the license population for that strata.

Table 17 shows the distribution of internet survey responses across the 16 sample strata. While this table shows a distribution of responses that is relatively representative of the distribution of the sample across the strata, Table 18 shows that the pattern changes dramatically when only responses containing information on trips to the Bristol Bay are included. Table 18 shows that 95% of survey responses in our sample that contained information on a Bristol Bay 2005 fishing trip were from licenses sold in the Bristol Bay area.

While this was expected, and was the basis of the sample design which significantly over-sampled the Bristol Bay license sales, the degree to which Bristol Bay trips would be under-represented in the non-Bristol Bay license strata was unexpected. While 70% of respondents who bought their licenses in the Bristol Bay area reported information on a Bristol Bay fishing trip, only 3.7% of those buying licenses in the other three areas reported on Bristol Bay trips. The response proportions shown in Table 17 and Table 18 suggest that had the sample design been random across all four license areas rather than stratified with over-sampling of the Bristol Bay area, the survey could have expected to only receive information on 30 to 35 Bristol Bay angling trips rather than the 301 trips reported in the final survey responses. The sampling achieved the appropriate balance of

nonresident Bristol Bay respondents between the early summer and late summer license pools.

Table 17. Distribution of all Survey Responses to Internet Survey

<i>Sample Area (License Purchase)</i>	<i>Wave 1 (Jan.-July licenses)</i>		<i>Wave 2 (Aug. - Sept. licenses)</i>	
	Residents	Nonresidents	Residents	Nonresidents
Anchorage	43	25	10	43
Kenai	32	57	8	66
Matanuska/Susitna	35	32	15	44
RST (Bristol Bay)	55	180	13	185
Total	165	294	46	338

The distribution of Bristol Bay trip responses in Table 18 is so completely dominated by licenses sold in the Bristol Bay region that the decision was made to limit analysis of Bristol Bay trip characteristics to responses from this major strata. The small number of observations from other license sales areas were excluded to eliminate the possibility of a grossly disproportional impact associated with one or two observations contained in heavily weighted strata.

Table 18. Distribution of Survey Responses with Information on a Bristol Bay Fishing Trip

<i>Sample Area (License Purchase)</i>	<i>Wave 1 (Jan.-July licenses)</i>		<i>Wave 2 (Aug. - Sept. licenses)</i>		<i>Sum</i>
	Residents	Nonresidents	Residents	Nonresidents	
Anchorage	3	1	1	1	6
Kenai	1	1	1	2	5
Matanuska/Susitna	1	1	0	2	4
RST (Bristol Bay)	45	121	10	125	301
Total	50	124	12	130	316

The only other south-central Alaska fishing destination that was reasonably well represented in the current trip responses was Kenai Peninsula. Table 19 shows the distribution of survey responses including information on trips to Kenai Peninsula waters. Consistent with the pattern shown in Table 18, the large majority of these Kenai area trips were from licenses sold in either the Kenai region or the nearby Anchorage area.

Table 19. Distribution of Survey Responses with Information on a Kenai Area Fishing Trip

<i>Sample Area</i>	<i>Wave 1 (Jan.-July licenses)</i>		<i>Wave 2 (Aug. - Sept. licenses)</i>	
	Residents	Nonresidents	Residents	Nonresidents
Anchorage	11	8	2	16
Kenai	20	31	2	39
Matanuska/Susitna	2	3	3	3
RST (Bristol Bay)	2	2	0	2
Total	35	44	7	60

4.0 Survey Response Rates and Weighting

The response rates detailed in Table 20 are final rates for all populations. Table 20 shows a breakout of response rates by survey type. All survey results specific to Bristol Bay fishing were derived from the sample responses associated with licenses bought in the Bristol Bay area. Therefore, individual responses from each of 4 strata (2 waves x 2 residency classes) were weighted to reflect the actual distribution of licenses sold among these 4 strata.

Table 20: Bristol Bay Survey Response Rates

<i>Population</i>	<i>Sample Size</i>	<i>Un-deliverables</i>	<i>Completed surveys</i>	<i>Response Rate</i>
Angler (License Holder) Internet Survey	2,400	143	843	37.4%
Resident	886	62	211	25.6%
Nonresident	1,514	81	632	44.1%
License holders (mail)	300	14	103	36%
Lodge owners	46	2	14	32%
Lodge clients	330	13	126	39.7%

Note: an additional 6 mail survey responses were received from the internet survey sample.

The response rates shown in Table 20, while somewhat lower than those generally experienced by the authors in survey research conducted in other states, are consistent with response rates from previous economic surveys of ADF&G fishing license holders (Duffield, Merritt and Neher, 2002). The overall internet response rate for this survey of about 37% (excluding undeliverable surveys) is nearly identical to overall response rates from an ADF&G-sponsored survey of grayling fishing (37%) and an ADF&G-sponsored survey of salmon fishing (39%). Additionally, the difference between resident and non-resident response rates in the current internet survey is consistent with response rates from a third ADF&G-sponsored survey of attitudes related to Alaska Rod and Reel fishing. This survey had a response rate for Alaska residents of 25% to 31% (depending on Alaska region sampled). The nonresident response rate for the rod and reel survey was 46%.

4.1 Results of Survey Incentive Experiment

As noted above, the anglers invited to participate in the internet-based survey were randomly placed into either a group receiving a \$2 cash incentive for participating, or a group receiving no incentive. These two treatments were included to 1) encourage increased participation by the 80% of anglers in our sample who received the incentive, and 2) to test the impact of the incentive on response rates. Table 21 shows the comparison of response rates between those anglers receiving the incentive and those not

receiving the incentive. For both the resident and non-resident samples the \$2 incentive had a positive impact on final response rates. Given the response rates shown in Table 21 and associated sample sizes, the difference between the two treatments (incentive and no incentive) is statistically significant at the 99% level of confidence for both the resident and non-resident samples.

Table 21. Comparison of Response Rates between those Respondents Receiving an Incentive Payment, and those receiving No Incentive

<i>Population</i>	<i>Received no incentive</i>	<i>Received \$2 incentive</i>	<i>Absolute change in Response Rate</i>
Residents	15.7% n=223	26.23% n=671	+10.53%
Non Residents	35.1% n=245	43.3% n=1,261	+8.2%

4.2 Sample Population and Non-response Weighting

One consequence of a stratified sampling plan with unequal sampling rates across strata is that it necessitates the weighting of individual responses to correct for over or under-sampling.

In addition to weighting so the sample reflected the actual population, responses were also weighted to correct for possible non-response bias. While the response rates to the survey were representative of rates from similar Alaska angling surveys, it is possible that non-respondents are significantly different in some characteristics from survey respondents. In order to test for and correct for any such non-response bias a comparison of respondents and the total sample of potential respondents was conducted using three variables available in the ADF&G database for all license holders: age, type of fishing license, and gender.

The differences between the survey respondents and the entire sample drawn are not large for the three variables examined. Respondents to the survey tended to be slightly older and more heavily dominated by males than did the entire license sample. However, only one of six comparisons of mean values for the three variables and 2 residency classes showed a statistically significant difference. Nonetheless, an analysis was undertaken to develop a respondent sample that was weighted to represent the same age, gender, and license type characteristics as the overall license sample. The approach used is based on methods developed by Kanninan, Chapman and Hanemann (1992).

As noted, information was available on three characteristics of the entire license sample: age, gender, and type of license purchased (length of license period). These three variables were transformed into dichotomous variables based on the individual

distributions of each variable for the entire sample. These three dichotomous variables were, in turn, combined into one variable with 8 levels (one for each of the 8 possible combinations of the three dichotomous variables). The number of observations at each of these levels was then compared between the survey respondents and the total license sample, and a set of 8 weights were computed to equalize the two. This process was undertaken for each population strata.

Table 22 details the impact of the non-response weighting procedure on each population strata. Comparison of the un-weighted respondents and the entire pool of 2,400 possible respondents showed only small differences. The only cells with differences between the entire pool and the survey respondents were the age variable for nonresident anglers. Nonresident respondents were significantly older on average than were the entire pool of nonresident anglers. Following the non-response weighting process, there were no statistically significant differences among the analysis variables.

Table 22. Nonresponse weighting results, by population strata

	<i>Un-weighted respondents</i>	<i>Entire sample</i>	<i>Weighted respondents</i>
Wave 1 - Nonresidents			
License type dummy	70.7%	66.7%	67.1%
Gender dummy	84.0%	82.8%	83.8%
Age	50.39	47.88	49.43
Sample size	294	738	294
Wave 1 - Residents			
License type dummy	97.6%	98.0%	99.0%
Gender dummy	67.9%	68.4%	66.7%
Age	40.88	39.40	39.30
Sample size	165	662	165
Wave 2 - Nonresidents			
License type dummy	69.2%	66.7%	67.7%
Gender dummy	81.1%	79.4%	80.5%
Age	50.85	48.96	49.44
Sample size	338	768	338
Wave 2 - Residents			
License type dummy	87.0%	90.1%	92.3%
Gender dummy	63.0%	62.5%	63.2%
Age	38.57	37.62	36.61
Sample size	46	232	46
Total sample size	843	2,400	843

Note: bolded entries indicate means are significantly different at the 95% level of confidence

5.0 Bristol Bay Sport Fishing

Section 5 of this report details the results from two surveys of Bristol Bay anglers: 1) results from the 843 anglers who responded to the Bristol Bay Region – 2005 angler internet survey administered by the University of Montana, Bureau of Business and Economic Research, and 2) the 126 responses from Bristol Bay remote lodge clients sampled using a repeat contact mail survey.

As noted in Section 4, these two surveys had overall 37% to 40% response rates. In general, nonresident anglers participated in the internet survey in higher proportions than did Alaska resident anglers (44% as compared to 26% response rates, respectively).

The following discussion of sport-fishing angler survey results is divided into two general sections. First is a detailed discussion of responses to the internet survey of a random sample of all licensed Alaska anglers. The second part contains a discussion of the results from the mail survey of 2005 Bristol Bay remote lodge clients. This survey sample provides an expanded view of angler and trip characteristics specific to trips to the Kvichak River, which for nonresident anglers is a primarily rainbow trout fishery destination.

The following discussion of the results from the 2005 Bristol Bay angler survey generally reflects the responses of those internet survey respondents who reported taking a fishing trip to the Bristol Bay Region in 2005, and answered questions about that trip to the Bristol Bay area. The exception to this presentation is in the case of estimation of the mean contribution to a Bristol Bay protection fund. In this case, all responses to the survey were included.

The results in this section are presented using several sub-sample breakouts. Comparisons of sub-samples are presented to highlight similarities as well as differences between sample groups. Primary sub-samples examined include nonresident anglers and Alaska residents, and non-local Alaska resident anglers. In some cases, nonresident anglers who reported staying at a remote Bristol Bay fishing lodge are highlighted for comparisons to other sub-samples. Some comparisons are also provided for fishing destinations, primarily the Kenai and Russian Rivers, on the Kenai Peninsula.

The analysis examines angler responses to a wide range of questions on their opinions, preferences, and experiences relating to fishing in the Bristol Bay area. While the pool of respondents for this survey was drawn from a large share of all south-central Alaska licensed anglers, only those anglers who reported taking a trip to fish the Bristol Bay area in 2005 were utilized in analysis of many questions relating specifically to Bristol Bay fishing. Because of this, the sample of Alaska resident responses is heavily dominated by responses from Alaskans living within the Bristol Bay region. A limitation of this study is that the sample under represents out-of-Bristol Bay Alaska residents.

5.1 Fishing Experience and Attitudes for Alaska Resident and Non-resident Anglers

The first section of the 2005 Bristol Bay angler survey asked respondents a series of questions pertaining to their fishing habits and preferences. Additionally, respondents were asked to rate the importance of certain fishing and site attributes in selecting where they sport-fished in Alaska. Table 23 shows results both for resident and nonresident Bristol Bay anglers (e.g. anglers whose "recent trip" was to Bristol Bay waters). Overall, about 85% of resident and non-resident respondents reported that they had been fishing for 10 years or more. Nonresidents were more likely to prefer fly fishing compared to residents (65% vs. 47%). About 28% of non-residents but only 5% of residents said that fishing was their favorite outdoor activity. Table 23 also shows a clear preference for stream fishing over lake fishing for nonresident anglers while local residents are more evenly divided in their preferences.

Table 23: Bristol Bay Angler Experience and Preferences

Question/statistic	Population	
	Non-residents	Alaska Residents
Percent who have fished for 10 years or more	85.0%	84.4%
Percent who prefer fly fishing	65.0%	46.5%
Percent who prefer stream fishing from bank or w/waders	64.7%	58.3%
Percent who prefer lake fishing	26.1%	59.4%
Percent who rate fishing as their favorite outdoor activity	28.0%	4.5%
Percent who rate their expertise as an angler as "advanced"	40.6%	34.0%
Sample Size	246	55

Table 24 reports summary results for residents and non-residents on the importance of different factors in their decisions of where to fish. Specifically, the questions asked:

"What factors are important to you in selecting where to sport fish in Alaska. For each characteristic below, please rate its importance from least important (1) to most important (5)."

Both resident and non-resident anglers rated the same five attributes as their top five in selecting an angling area. These attributes are "natural beauty of the area", "being in an area with few other anglers", "being in a wilderness setting", "chance to catch wild fish", and "opportunities to view wildlife." Both resident and non-resident anglers rated being in an area with few other anglers as a very important site attribute (85% and 87% respectively). Consistent with this, strong majorities of both resident and nonresident anglers also said fishing in remote, off-the-road locations was an important fishing location attribute (64% and 70%, respectively).

Table 24: Bristol Bay Angler Ratings of Importance of Selected Angling and Area Attributes.

Fishing experience attribute	Percent rating as "most important" (4 or 5)			
	Bristol Bay Anglers		Kenai Peninsula Anglers	
	Non-residents	Residents	Non-residents	Residents
Fishing easily accessible site near a road	4.5%	9.4%	36.6%	45.7%
Fishing in remote, off-the-road locations	70.2%	64.2%	29.9%	26.0%
Harvesting fish	21.4%	41.3%	29.7%	38.8%
Catching and releasing large numbers of fish	63.0%	28.7%	40.1%	9.4%
Chance to catch large or trophy-sized fish	72.2%	40.6%	60.9%	32.8%
Natural beauty of the area	89.6%	82.8%	84.4%	89.5%
Catching wild stock rainbows	55.5%	48.3%	20.7%	22.1%
Being in an area with few other anglers	87.0%	85.4%	71.7%	50.5%
Being in a wilderness setting	84.4%	89.5%	70.1%	61.1%
Chance to catch wild fish	85.3%	83.2%	69.7%	80.8%
Opportunities to view wildlife	87.5%	75.2%	76.8%	66.5%
Sample size	238	54	101	41

Table 24 also shows a comparison of responses from anglers fishing both Bristol Bay and those whose most recent trip was to fish the Kenai Peninsula. Generally those anglers fishing the Kenai were less concerned with issues of angler crowding and fishing remote roadless areas than were Bristol Bay anglers. These findings are consistent with the general finding from Romberg (1999), that there are different market segments of Alaskan sportfishing, and that different types of waters attract different types of anglers.

5.2 Bristol Bay Area Trip Characteristics and Angler Attitudes

Those survey respondents who reported taking a fishing trip to the Bristol Bay area in 2005 were asked a series of questions about that trip. Table 265 and Figure 7 show how survey respondents described the type of Bristol Bay angling trip they took. For non-resident anglers the most common trip type was staying at a remote lodge and flying or boating with a guide (35.2%). For resident anglers, the most common types of Bristol Bay fishing trips were accessing the area with their own plane or boat (49.9%), driving to area by motor vehicle (11.3%), and "other" type of trips (24%). Those who reported driving to access Bristol Bay fisheries were primarily residents and nonresidents staying in the King Salmon and Dillingham area, where a few local roads exist and provide some access to nearby fisheries.

Table 25. Bristol Bay Angler Distribution across Trip Types, by Residency

<i>Trip Type</i>	<i>Non-residents (%)</i>	<i>Alaska Residents (%)</i>
Stayed at a remote lodge and flew or boated with a guide to fishing sites most days	35.2	-
Stayed at a tent or cabin camp and fished waters accessible from this base camp	23.7	7.8
Hired other lodging in an area community and either fished on own or contracted for travel on a daily basis	6.4	4.2
Floated a section of river with a guided party	3.9	2.8
Hired a drop-off service and fished and camped on our own	4.3	2.2
Accessed the area with my own airplane or boat	8.3	49.9
Drove to the area by motor vehicle	4.3	11.3
Other	14.0	24.0
Sample Size	246	55

Note: sample size for resident sample is not large enough to divide into local and non-local sub-samples

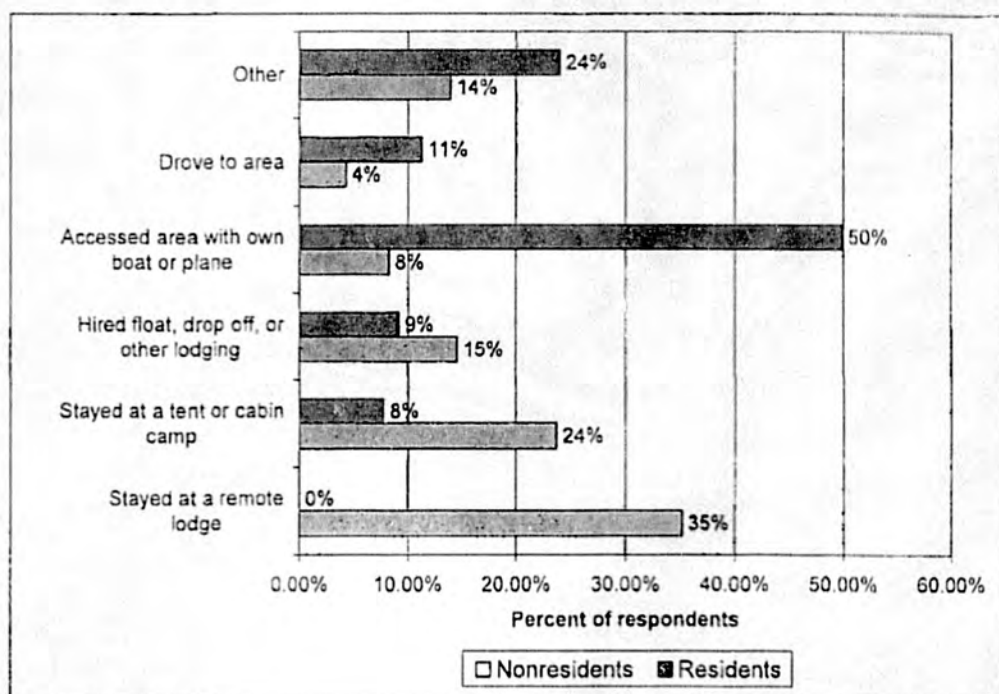


Figure 7. Comparison of Resident and Nonresident Bristol Bay Angler Trip Types

Respondents to the Bristol Bay survey were asked what the primary purpose of their trip to the Bristol Bay area was. While a majority of nonresidents (73%) reported fishing as their major purpose, only 30% of resident anglers reported fishing as the main purpose of their most recent Bristol Bay trip. Table 26 also shows that a much larger proportion of

non-residents (45%) than residents (11.4%) were on their first trip to their primary fishing destination.

Table 26: Bristol Bay Angler Trip Characteristics.

<i>Statistic</i>	<i>Nonresidents (sample size)</i>	<i>Residents</i>
Major purpose of trip was for fishing	72.7% (246)	29.5% (54)
Trip was first trip to primary destination	45.2% (245)	11.4% (48)

Survey respondents were asked what fish species they targeted on their most recent trip to Bristol Bay. Table 27 reports these results. Overall, king salmon and rainbow trout were the most frequently targeted species for both residents and non-residents. Among the two sub-populations, residents were most likely to say they would have taken their trip even if their primarily targeted species had not been available (67%). Conversely, 45% of non-resident anglers said they would have still made the trip absent their primarily targeted species. Overall, 28% of non-residents and 32% of residents reported catching a rainbow trout larger than 26 inches on their most recent Bristol Bay trip.

Anglers fishing the Kenai Peninsula more often targeted Sockeye, and were less likely to target, or catch large, rainbows.

Table 27: Bristol Bay Angler Survey, Targeted Species and Associated Trip Characteristics.

<i>Primary species targeted on trip / statistic</i>	<i>Bristol Bay Anglers</i>		<i>Kenai Anglers</i>	
	<i>Residents</i>	<i>Nonresidents</i>	<i>Residents</i>	<i>Nonresidents</i>
Rainbow Trout	31.3%	30.6%	12.2%	9.9%
King Salmon	29.8%	35.2%	14.6%	36.1%
Silver Salmon	16.5%	16.3%	25.3%	15.8%
Sockeye Salmon	0%	9.1%	45.4%	28.1%
Other Species	22.4%	8.8%	2.6%	10.1%
Would have still taken trip if primary species not available	66.9%	45.0%	55.6%	68.1%
% catching a rainbow larger than 26 inches	31.8%	28.4%	5.4%	10.6%
Sample size	48	235	38	94

Table 28 shows the same statistics presented in Table 27 for the subset of non-resident anglers who reported taking a trip to a remote fishing lodge in Bristol Bay. The primary difference between this subset of non-residents and all non-resident anglers is that remote

lodge clients are more likely to target rainbow trout and to have caught a rainbow over 26 inches.

Table 28. Bristol Bay Angler Survey, Targeted Species and Associated Trip Characteristics : Remote Lodge Sub-sample

<i>Primary species targeted on trip / statistic</i>	<i>Nonresident Remote Lodge Clients</i>
Rainbow Trout	38.9%
King Salmon	29.0%
Silver Salmon	22.6%
Sockeye Salmon	4.9%
Other Species	4.4%
Would have still taken trip if primary species not available	45.5%
% catching a rainbow larger than 26 inches	43.0%
Sample Size	103

Respondents to the Bristol Bay angler survey were presented with a series of statements regarding fishing conditions on their Bristol Bay area trip. They were asked to indicate their level of agreement or disagreement with each statement. *Table 29* shows the percent of residents and non-residents who either "agreed" or "strongly agreed" with each statement. Across all of the statements presented in the survey, majorities of both resident and non-resident respondents agreed with the positive statements about their fishing experience. The highest levels of agreement for both nonresidents and Alaska resident anglers were with the statements "there was a reasonable opportunity to catch fish", "there was minimal conflict with other anglers", and "fishing was in a wilderness setting."

Table 29: Bristol Bay Angler Rating of Selected Attributes of Fishing Trip

<i>Statement</i>	<i>% of respondents who either "agree" or "strongly agree"</i>	
	<i>Nonresidents</i>	<i>Local Residents</i>
Fishing conditions were un-crowded	87.2%	75.4%
There was a reasonable opportunity to catch fish	96.5%	93.0%
There was minimal conflict with other anglers	93.3%	90.7%
Fishing was in a wilderness setting	92.4%	95.0%
There was opportunity to catch trophy sized fish	81.4%	70.0%
There was opportunity to catch and release large # of fish	87.3%	76.6%
Sample Size	235	47

Table 30 and Figure 12 show the survey question results from Table 29 for three specific subgroups: 1) non-resident Bristol Bay lodge clients, 2) all non-resident Bristol Bay anglers, and 3) all non-resident anglers whose most recent trip was to a Kenai Peninsula destination. This comparison shows a clear trend across several statements. In general Bristol Bay lodge client anglers felt their fishing experience was less crowded, in a more wilderness setting, and more productive in terms of number and size of fish caught than did both the sample of all Bristol Bay non-residents, and the Kenai Peninsula non-resident anglers.

Table 30. Angler Rating of Selected Attributes of Fishing Trip: Selected Subsamples.

Statement	% of Nonresident respondents who either "agree" or "strongly agree"		
	Bristol Bay Lodge clients	All Bristol Bay Non-Res.	Kenai Non-Residents
Fishing conditions were un-crowded	92.8%	87.2%	59.9%
There was a reasonable opportunity to catch fish	98.6%	96.5%	89.0%
There was minimal conflict with other anglers	97.4%	93.3%	89.7%
Fishing was in a wilderness setting	98.6%	92.4%	57.8%
There was opportunity to catch trophy sized fish	89.5%	81.4%	55.6%
There was opportunity to catch and release large # of fish	94.0%	87.3%	51.0%
Sample Size	102	235	93

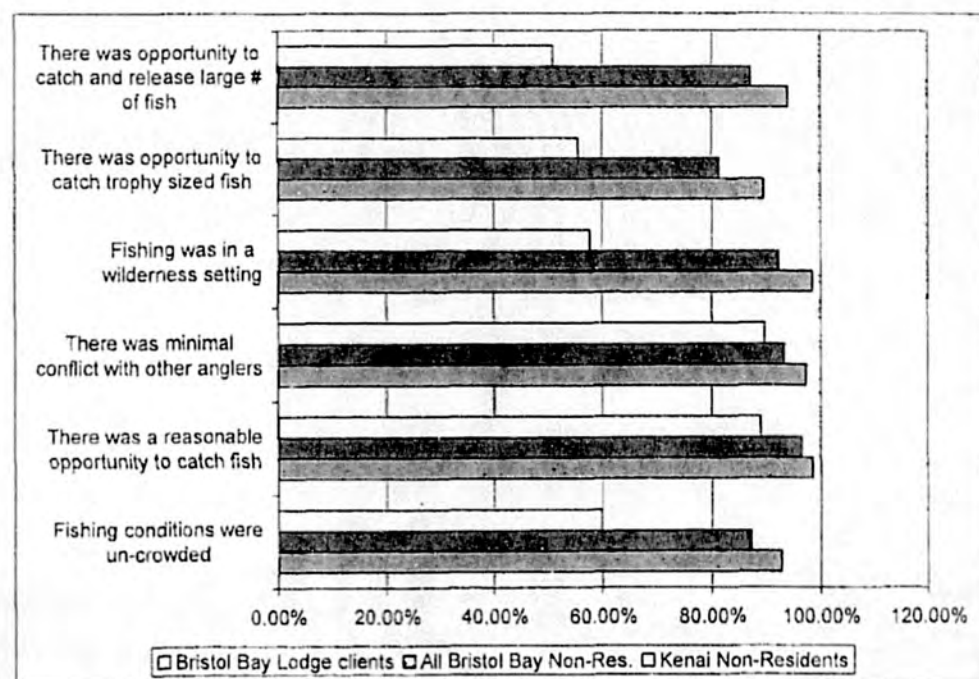


Figure 8. Bristol Bay and Kenai angler rating of selected fishing trip attributes.

The percent of Bristol Bay anglers who reported minimal conflict with other anglers shown in *Table 29* (between 91% and 93%) is confirmed by responses to a follow-up survey question that asked anglers to rate the level of crowding they experienced on their trip from 0 (not at all crowded) to 10 (extremely crowded). *Table 31* shows that a significant percentage of both resident and non-resident anglers rated crowding conditions on their trip as very low. This table also shows the survey crowding rating for the sample of trips taken to the Kenai Peninsula by nonresident anglers. This group showed a lower percentage of respondents who rated the level of crowding on their Kenai fishing trip as between 0 and 2 on the 10-point scale.

Table 31: Bristol Bay Angler Rating of Angler Crowding on Trip.

Most recent trip crowding rating	Bristol Bay Anglers		Kenai Anglers	
	Nonresidents	Residents	Nonresidents	Residents
0 – not at all crowded	34.4%	30.9%	15.3%	9.7%
1	12.5%	16.5%	8.7%	0
2	16.5%	8.6%	7.9%	4.8%
3	10.5%	14.6%	9.4%	6.9%
4	8.7%	3.0%	9.4%	3.0%
5 – moderately crowded	10.8%	16.2%	27.3%	38.1%
6	2.7%	3.8%	2.9%	3.0%
7	2.5%	3.8%	14.9%	13.9%
8	0.9%	2.8%	2.5%	8.8%
9	0.7%	0	1.7%	11.9%
10 – extremely crowded	0	0	0	0
Sample Size	235	44	89	36

5.3 Bristol Bay Angler Expenditures and Trip Value

Respondents to the 2005 Bristol Bay angler survey were asked a series of questions relating to the amount of money they spent on their fishing trips. They were also asked a question designed to measure the net economic value (or willingness to pay) for their trip over and above what they actually spent. The following three tables detail average spending by resident and non-resident anglers associated with their Bristol Bay area trips.

Table 32 shows the average total expenditures per trip for resident and nonresident and resident angler trips to Bristol Bay. As a point of comparison, estimates are also shown for trips to Kenai Peninsula freshwater sites. As would generally be expected, Alaska resident anglers spend much less than non-resident anglers on their trips to Bristol Bay fisheries. The table also shows average total expenditures for fishing trips to Kenai Peninsula waters. These trips follow a similar pattern to the Bristol Bay trips--residents spend much less than nonresidents on their trips. Among nonresident anglers, almost twice as much is spent on average to trips to the Bristol Bay region (\$3,969) compared to trips taken to the Kenai area (\$2,243).

Table 32. Comparison of Reported Average Trip Spending across Populations and Area

<i>Area</i>	<i>Nonresidents (sample size)</i>	<i>Alaska residents</i>
Bristol Bay	\$3,969 (203)	\$393 (27)
Kenai	\$2,243 (75)	\$457 (20)

Table 33 breaks out average expenditures by impact region and type of fishing trip for the nonresident angler sample. Where money is spent on a trip determines local economic impacts. For instance, a given amount of money spent within the very small Bristol Bay economy has a much greater relative impact on this area than the same amount of money spent in, for instance, Anchorage. Table 33 shows that the largest per-trip spending is made by nonresident anglers who stay at a remote lodge with daily guiding services (\$6,327/trip). This compares to the lowest spending levels per trip of about \$1,300 for driving to the fishing site, accessing the area with own plane or boat, and hiring a drop-off service and fishing or camping on own.

The first two rows of Table 33 show that a large portion of Alaska trip costs for remote lodge or tent or cabin camp trips is associated with the cost of a sport-fishing package or tour.

Table 33. Nonresident trips to Bristol Bay waters, mean expenditure per trip estimates by trip type

<i>Trip type</i>	<i>Total spending</i>	<i>Bristol Bay spending^a</i>	<i>Package sport- fishing trip spending</i>	<i>Sample size</i>
Stayed at a remote lodge and flew or boated with a guide to fishing sites most days	\$6,327	\$1,730	\$5,543	92
Stayed at a tent or cabin camp and fished waters accessible from this base camp	\$3,785	\$1,235	\$3,202	43
Hired other lodging in an area community and either fished on own or contracted for travel on a daily basis	\$2,406	\$1,655	\$2,345	18
Floated a section of river with a guided party	\$1,991	--	--	6
Hired a drop-off service and fished and camped on our own	\$1,379	\$1,042	--	10
Accessed the area with my own airplane or boat	\$1,308	\$1,175	0	9
Drove to the area by motor vehicle	\$1,323	\$967	--	5
Other	\$2,033	\$953	\$2,205	23

^a all spending in Bristol Bay except package sportfishing trip expenditures.

Note: cells with less than 5 observations are left blank. Category values are the average values for those respondents reporting an expense in that category. Bristol Bay spending and Package sport-fishing tour spending will not necessarily sum to Total spending due to varying sample sizes.

Table 34 details the distribution of Bristol Bay trip spending across expenditure categories. For non-residents visitors, the largest three spending categories within the Bristol Bay area were for commercial and air taxi service and for lodging or camping fees (totaling about 66% of all spending in Bristol Bay). For non-local Alaska residents the three largest categories of spending were "gas and other Alaska travel costs," camping fees, and commercial air travel (totaling about 58% of all Bristol Bay spending).

Table 34: Distribution of Trip Expenditures across Spending Categories, by Residency and Area

Expenditure category	<i>Nonresidents</i>		<i>non-local AK residents</i>
	In Bristol Bay	In rest of AK	In Bristol Bay
Commercial air travel	31.1%	51.9%	18.1%
Air taxi service	20.5%	1.3%	11.1%
Transportation by boat	0.0%	0.0%	0.0%
Boat or vehicle rental	5.3%	4.8%	7.5%
Gas or other travel costs in AK	4.1%	1.4%	16.3%
Lodging or camping fees	13.9%	11.9%	23.6%
Food or beverages	9.2%	19.3%	16.7%
Guide fees	6.2%	0.6%	0.0%
Fishing supplies	4.1%	5.2%	6.7%
Other non-fish package tours	0.1%	0.7%	0.0%
Other	5.4%	2.9%	0.0%
Total	100.0%	100.0%	100.0%

5.3.1 Aggregate Direct Sport fishing Expenditures in Bristol Bay

One of the major goals of this study was to estimate annual levels of spending in the Bristol Bay area that are attributable to freshwater sport fishing. In order to derive this estimate two primary pieces of information were needed: 1) the number of angler trips per year to the region by Alaska residents and nonresidents, and 2) the average spending per trip by resident and nonresident anglers. A trip is defined here as a roundtrip visit from home, and return. Estimates of the number of anglers who fished in the Bristol Bay region in 2005 were derived by ADF&G staff (Table 35). The average number of trips per angler, estimated from responses to the Bristol Bay angler survey, are also shown in Table 35. In total an estimated 37,000 fishing trips are taken annually to Bristol Bay freshwater fisheries. These trips are split between 13,000 nonresident trips, 19,000 Bristol Bay resident trips, and 4,500 trips by Alaskans living outside of the Bristol Bay area.

Table 35. Estimated 2005 Bristol Bay area angler trips, by Angler Residency

<i>Statistic</i>	<i>Nonresidents</i>	<i>Out-of-area AK residents</i>	<i>BB Residents</i>
Annual Anglers fishing Bristol Bay waters	10,044	3,017	1,614
Average trips per angler for 2005 (std.err.)	1.29 (0.71)	1.47 (0.40)	12.07 (12.98)
Estimated total trips (std.err.)	12,966 (7,121)	4,450 (1,211)	19,488 (20,950)

Table 36 presents the aggregation of total angler expenditures within the Bristol Bay region. This table shows average and aggregate estimated expenditures for three angler groups: 1) nonresident anglers, 2) local-area resident anglers (those who live in the Bristol Bay area), and 3) non-local resident anglers (those Alaska residents living outside of the Bristol Bay region). This table also shows average and total annual spending by nonresident anglers for package sportfishing trips in the Bristol Bay region.

Overall, the large majority of angler spending in the region is attributable to nonresident anglers. Additionally, the majority of nonresident spending is due to the purchase of sportfishing packages such as accommodation and angling at one of the areas remote fishing lodges. Estimates of variability in the estimates were derived for average expenditure levels, and total visitation estimates. It is estimated that annually Bristol Bay anglers spend approximately \$58 million within the Bristol Bay economy. Given the variability in the components of this estimate, the 95% confidence interval for Bristol Bay area spending by anglers from outside the area ranges from \$0 to \$123 million annually. The vast majority of this spending (approximately \$45 million annually) is spent by nonresident anglers.

Table 36. Estimated Aggregate Spending Associated with Sportfishing in the Bristol Bay Region

	<i>Nonresidents</i>		<i>out-of-area AK residents</i>	<i>BB Residents</i>	<i>Total</i>
	All Non Residents	Remote Lodge Increment			
Mean expenditures in Bristol Bay region	\$ 1,339	\$4,277	\$ 1,440	\$ 339	
Estimated trips 2004	12,966	6,431	4,450	19,488	36,904
Total Bristol Bay direct expenditures	\$ 17,360,898	\$ 27,526,683	\$ 6,407,597	\$ 6,611,878	\$ 57,907,057

Table 37 presents total estimated direct angler expenditures by residency, and location of spending. Again, among all direct spending related to Bristol Bay angling, the large majority is associated with nonresidents traveling to Alaska. Additionally, the large majority of this spending is reported to have occurred within the Bristol Bay economy.

Table 37. Bristol Bay Sportfishing: Aggregate in and out of Region and State Spending

<i>Population</i>	<i>In Bristol Bay Spending</i>		<i>In Alaska Spending</i>	
	Total spending in Bristol Bay	Total spending from outside Bristol Bay	Total in-state spending	Spending from outside Alaska
NONRESIDENT Base trip spending	\$ 17,360,898	\$ 17,360,898	\$ 12,628,058	\$ 19,628,058
NONRESIDENT Sportfish package spending	\$ 27,526,683	\$ 27,526,683	\$ 27,526,683	\$ 27,526,683
NONRESIDENT TOTAL	\$ 44,887,582	\$ 44,887,582	\$ 47,154,741	\$ 47,154,741
RESIDENTS				
OUT-OF-BB RESIDENT base trip spending	\$ 6,407,597	\$ 6,407,597	\$ 6,407,597	\$ -
BB RESIDENT base trip spending	\$ 6,611,878	\$ -	\$ 6,611,878	\$ -
ALASKA RESIDENT TOTAL	\$ 13,019,475	\$ 6,407,597	\$ 13,019,475	\$ -
TOTAL	\$ 57,907,057	\$ 51,295,178	\$ 60,174,216	\$ 47,154,741

5.3.2 Estimation of Net Willingness to Pay for Bristol Bay Fishing Trips

A measure of the net economic value of sport fishing trips is the amount anglers are willing to pay over and above the costs of their trips. This willingness to pay is also referred to as net economic benefit. There is a large economics literature on estimating sport fishing net economic benefits (Rosenberger and Loomis 2001). The method for estimating these benefits here is contingent valuation using the so called "payment card" question format.

Following questions on their trip expenditures, survey respondents were asked whether they felt their trip was worth more than the amount they actually spent. Those who answered "yes" were then asked, "What is the largest increase over and above your actual costs that you would have paid to be able to fish your primary destination?" Respondents were presented with a series of dollar amounts ranging from \$10 to \$2,000. Table 38

shows the percentage of both resident and nonresident Bristol Bay anglers who responded that they would have paid the various additional amounts to take their Bristol Bay fishing trip.

Table 38. Responses to Current Trip Net Economic Value Question

	<i>NONRESIDENTS</i>	<i>RESIDENTS</i>
	Percent	Percent
Willing to Pay More	63.0%	73.3%
\$ 10	1.1%	0%
\$ 25	0.3%	2.1%
\$ 50	0.2%	3.6%
\$ 100	6.2%	16.5%
\$ 250	16.2%	20.5%
\$ 500	15.9%	7.5%
\$ 750	2.5%	3.6%
\$ 1,000	9.1%	0%
\$ 1,500	3.7%	0%
\$ 2,000	2.3%	3.6%
Other amount	4.3%	15.7%
Sample Size	204	38

The estimates of willingness to pay models based on the Table 38 data were developed using a maximum likelihood interval approach (Welsh and Poe 1998). As noted, respondents were asked to choose the highest amount he or she was willing to pay from a list of possible amounts. It was inferred that the respondent's true willingness to pay was some amount located in the interval between the amount the respondent chose and the next highest amount presented. The SAS statistical procedure LIFEREG was used to estimate the parametric model of willingness to pay based on the underlying payment card responses.

Table 39 shows the estimated parametric willingness to pay for trips to Bristol Bay fisheries. Nonresident anglers state their trip was worth approximately \$450 more, on average, than they actually paid. Resident Bristol Bay anglers stated they were willing on average to pay an additional \$320 for their most recent trip. These estimates are similar to other estimates for Alaska sport fishing (Duffield et al. 2002; Jones and Stokes 1987).

Table 39: Estimated Mean Willingness to Pay for Anglers' Recent Trip to Bristol Bay

<i>Statistic</i>	<i>Non-residents</i>	<i>Residents</i>
Estimated mean willingness to pay in addition to trip costs for those willing to pay more	\$722.18	\$437.05
Percent of respondents willing to pay more for their trip	63.0%	73.3%
Net willingness to pay for Bristol Bay fishing trips for all anglers	\$454.90	\$320.45
Sample Size	204	38

The net economic value per trip estimates shown in Table 39 were calculated from the results of a bivariate statistical model of the payment card response data using a variant of survival analysis to examine censored interval data. The chi-square test of significance for the key parameters from these models show the estimated coefficients to be statistically significant.

As a check on the bivariate willingness to pay modeling results shown above, a multivariate model of the payment card data was also done. This model included a number of explanatory variables in addition to the different payment levels. Table 40 shows the results of a multivariate model of current trip willingness to pay for nonresidents fishing in the Bristol Bay area. The model's explanatory variables are all statistically significant at least at the 90% level of confidence, and most variables are significant at the 99% level. The model was specified with a normal distribution.

The signs of the explanatory variables in the following multivariate model of willingness to pay are generally consistent with *a priori* expectations. The sign on the income variable is positive, indicating that as income rises, so does willingness to pay. Other variables with positive coefficients are variables indicating 1) the angler caught a rainbow trout over 26 inches on their trip, 2) the angler's trip was un-crowded, 3) the angler rates fishing as their favorite outdoor activity, 4) the angler prefers fly-fishing when fishing in Alaska, and 5) the main purpose of the respondent's most recent trip was for fishing. The remaining variables had negative coefficients, indicating that a "yes" response for those bivariate variables is associated with a decrease in willingness to pay for the angler's most recent Alaska fishing trip. These results indicate the pattern of responses is consistent with what would be predicted by economic theory.

Table 40. Multivariate explanatory model of willingness to pay for nonresident Bristol Bay fishing trips

<i>Parameter</i>	<i>Estimate</i>	<i>Chi-Square</i>
Intercept	-297.6	21.34***
Income (\$1,000)	0.47	3.09*
Lodge client (1=yes, 0=no)	-404.7	62.62***
Caught large rainbow (1=yes, 0=no)	220.3	19.97***
Targeted rainbows (1=yes, 0=no)	-254.4	28.14***
Fishing uncrowded (1=yes, 0=no)	412.8	78.53***
Advanced angler (1=yes, 0=no)	-90.7	4.83**
Fishing favorite activity (1=yes, 0=no)	190.5	17.82***
Prefers flyfishing (1=yes, 0=no)	249.1	28.39***
First trip to area (1=yes, 0=no)	-235.4	30.98***
Main purpose of trip fishing (1=yes, 0=no)	349.2	44.43***
Scale parameter	791.9	--
Sample size	167	

Note: * = significant at 90% level of confidence; ** = 95%; *** = 99%.

5.4 Package Fishing Trip Characteristics

Section 4 detailed estimated total annual angler spending associated with Bristol Bay angling. A large majority of this estimated spending is made by nonresident anglers (approximately 80%). Additionally, nearly half of all estimated annual Bristol Bay freshwater angler expenditures is spent on nonresident purchases of sportfishing package trips. Because of the relative importance of this sector, this section focuses on that substantial market segment of the Bristol Bay sport fishing sector.

Figure 9 presents information on the sub-sample of non-resident trips to Bristol Bay that include a stay at a remote lodge that provided guided fly-out or boat fishing services. Figure 9 shows the distribution of nights spent at the lodge. The most common trip length was seven nights (37%), followed by six nights (24%) and greater than seven nights (14%). A total of 75% of nonresident lodge stays were at least six nights long.

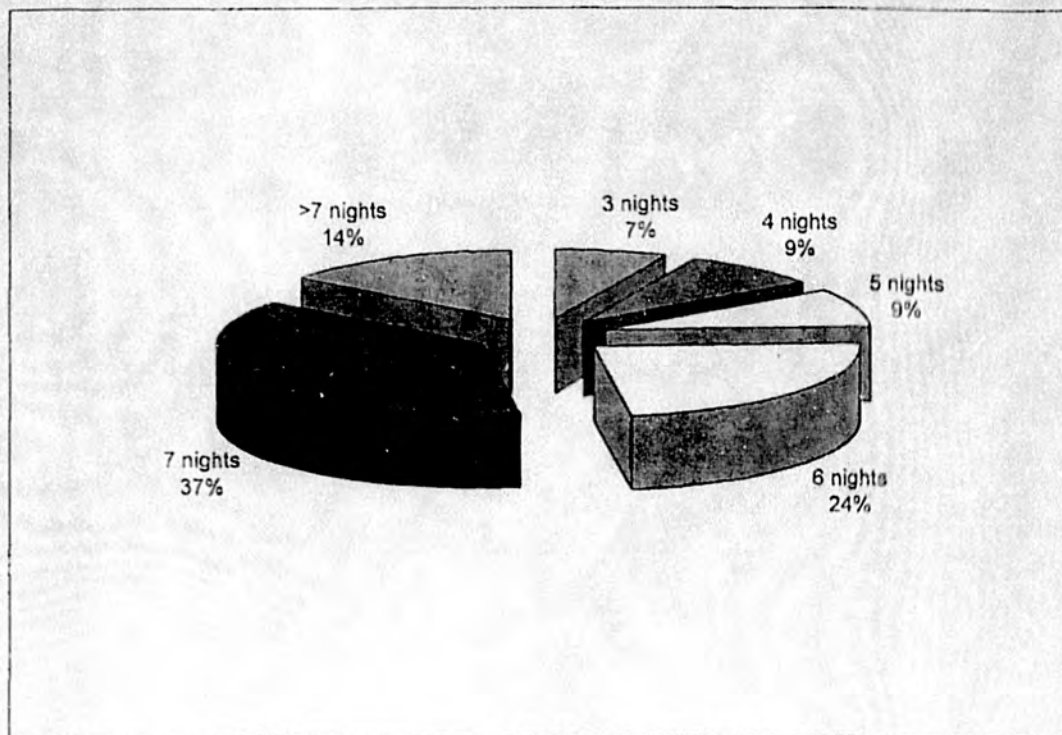


Figure 9. Distribution of Trip Length, Bristol Bay Package Fishing Trips

Respondents who had purchased a "package" sportfishing trip to Bristol Bay were asked what services were included in their package price. Figure 10 details the percentage of respondents who indicated each type of service that was included in their package price.

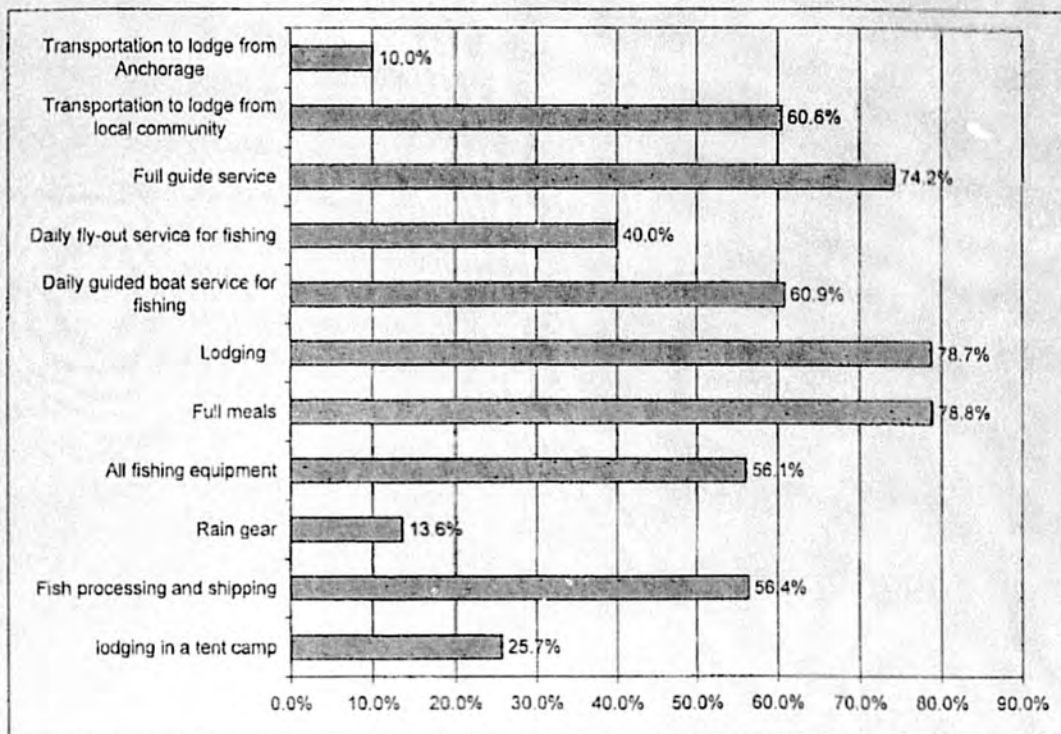


Figure 10. Bristol Bay Package Fishing Trips, Services Provided

5.4.1 Estimated Explanatory Model of Sportfishing Package Expenditures

In order to further examine which of the sportfishing package services listed by survey respondents were most important in determining the price of the fishing package, a multivariate model regressing price on a series of services offered was constructed. The estimated model (linear specification) is shown in Table 41. Consistent with expectations, the most significant variable in the model was the use of daily fly-out service from the lodge for fishing. Package tours including daily fly-out service on average cost \$3,005 more than those not offering this service. Additionally, those packages supplying all fishing equipment were significantly more expensive than those not supplying this equipment. Finally, the model predicts that the package price increases by \$465 dollars for every additional night's stay included in the package.

Table 41. Explanatory model of reported sportfishing package trip prices: nonresident Bristol Bay anglers

<i>Parameter / Statistic</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>T-statistic</i>
Intercept	-228	1,612	-0.14
Daily fly-out services	3,005	721	4.17***
All fishing equipment	1,221	725	1.68*
Number of nights	465	258	1.80**
Adjusted R-square		0.357	
Sample Size		75	

Note: * = significant at 90% level of confidence; ** = 95%; *** = 99%.

5.5 Bristol Bay Development Issues and Resource Values

Table 29 and Table 30, above, indicate that anglers experience the Bristol Bay area as an uncrowded, wilderness setting, with seasonally good fishing for large rainbows. Questions in the survey on crowding were followed by a set of policy questions directly addressing potential development within the area that could impact access (and thus crowding and size and abundance of rainbows) and the pristine, undeveloped nature of the region.

Respondents were first asked the following question:

Fishing in the Bristol Bay region is currently generally characterized by a wilderness setting, relatively un-crowded fishing, and good opportunities to catch large rainbow trout. Suppose that good road access was developed from Anchorage to Bristol Bay by ferry from Homer across Cook Inlet and then along a corridor including the Newhalen River, Lake Illiamna, the Kvichak River, and the lower Nushagak River to Dillingham, King Salmon, and Aleknagik. How do you anticipate this would affect your future sportfishing, if at all?

Figure 11 shows responses to this question about the impact of hypothetical Bristol Bay road access for survey respondents who reported fishing a Bristol Bay water. The largest category of respondents (both resident and non-resident) indicated a road would not impact their sport fishing. Conversely, the smallest category of responses for both samples indicated they would fish more often in the Bristol Bay area, given road access. However, the final 2 categories of responses combined indicate that 45.4% of non-residents and 30.5% of residents feel that the road access would cause them to either stop fishing in the Bristol Bay area (and fish other areas of Alaska) or stop fishing in Alaska entirely.

In contrast to these responses of anglers who had recently fished Bristol Bay waters, those survey respondents who reported taking their most recent trip to a Southcentral Alaska water outside of Bristol Bay (for example, the Kenai R.) seemed more favorable

to fishing Bristol Bay waters were road access improved. While nonresident anglers in this group were still on balance less likely to fish in Bristol Bay with improved road access (12% would take more trips and 29.4% would take fewer trips), Alaska resident anglers were much more favorable to improved access. Among this group of resident anglers who reported fishing streams outside of Bristol Bay, 50.4% said they would take more trips to Bristol Bay with improved road access while 13.5% said they would take fewer trips.

Interpretation of the long run implications of possible Bristol Bay road development for use and demand is complex. Improved access would tend to increase congestion on Bristol Bay waters and impact the current high quality of the fishing experience. Determining the net impact of any such changes on angler use and expenditures would require further research.

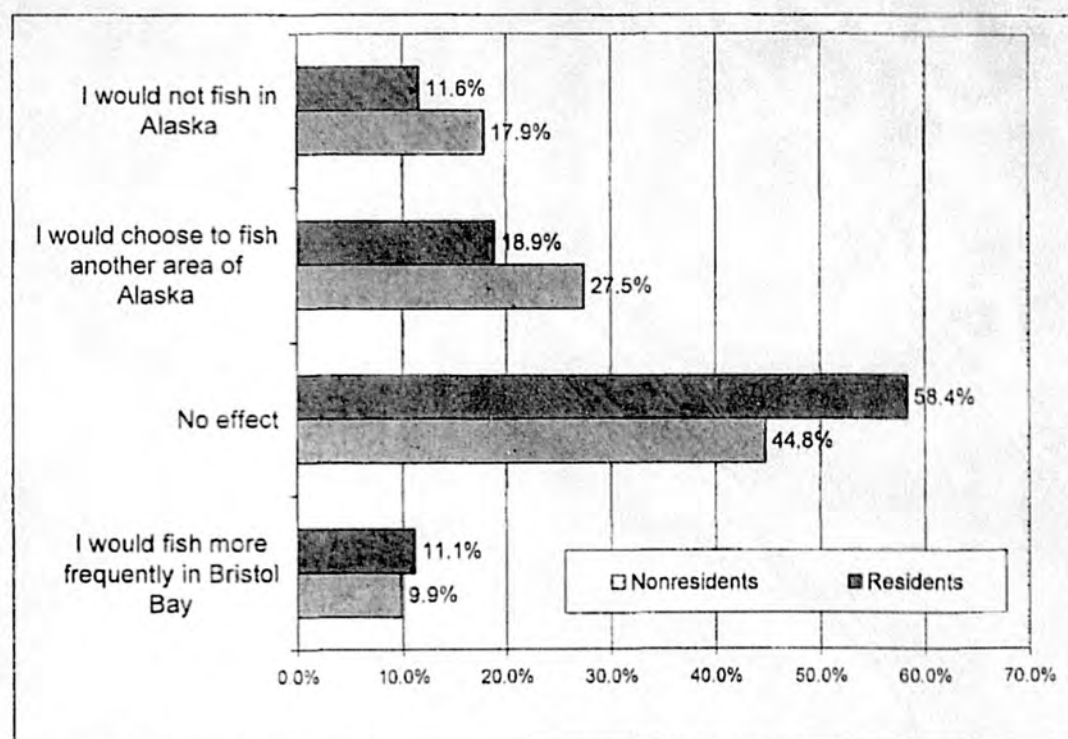


Figure 11. Bristol Bay Angler Responses to Impact of Bristol Bay Road Access on Sportfishing.

Figure 12 shows the percentage of resident and non-resident anglers who reported fishing Bristol Bay waters who favor, oppose, or were not sure of their position on the development of future possible road access to Bristol Bay (as outlined in the question above). Non-resident anglers show a very strong opposition to road access with 68.6% opposing, 14.8% favoring, and 16.5% not sure. Alaska resident anglers are more divided, but still primarily in opposition to road access with 57.2% opposing, 34.8% favoring, and 8.0% not sure.

Again, those anglers who reported fishing waters outside of Bristol Bay were more supportive of road development than those anglers who most recently fished Bristol Bay waters. Among nonresident anglers who reported fishing a South-central Alaska water outside of Bristol Bay, a plurality still opposed the road (24.3% favor, 43.4% oppose, 32.3% not sure). Among residents, however, a majority (52.3%) favored road development while 26.9% opposed it and 20.2% were not sure.

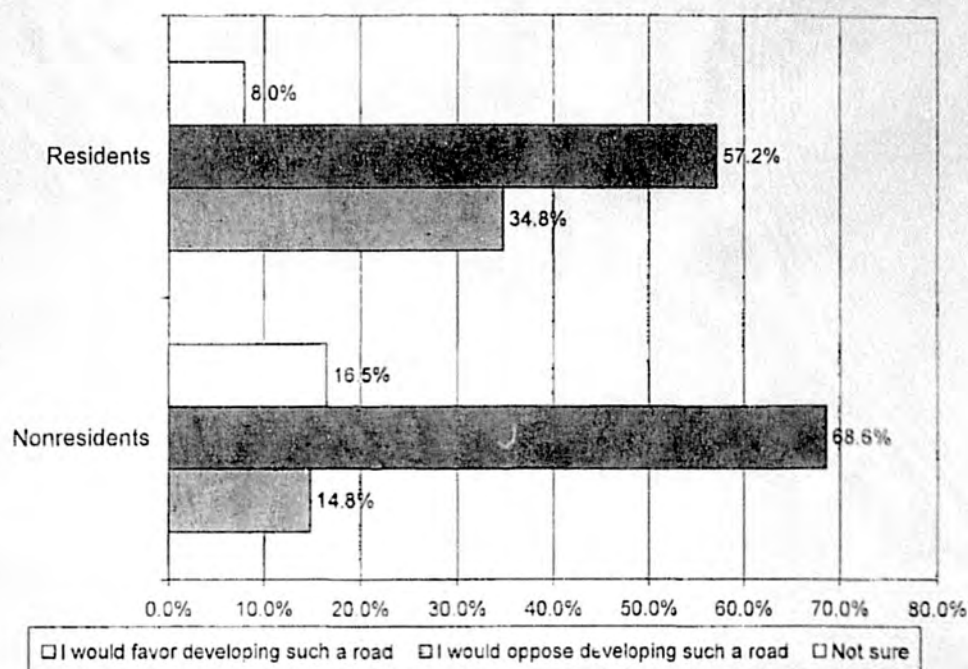


Figure 12. Bristol Bay Angler Support and Opposition to Bristol Bay Road Access

Table 42 presents the information contained in the preceding figures and adds the results for the sub-sample of nonresident Bristol Bay anglers who stayed at remote lodges on their recent trip. This last group of lodge clients is more likely than the entire group of nonresident anglers to both oppose road development in the region, and to say they would fish other areas in the event of the proposed development. Table 42 also includes sample sizes and estimated 95% confidence intervals for the estimates. The sample of Alaska residents who fished Bristol Bay is relatively small, and this is reflected in the relatively larger confidence interval around the estimates.

Table 42. Comparison of responses to Bristol Bay road development policy questions: Bristol Bay angler residents, non-residents, and non-resident lodge clients

<i>Question/statistic</i>	<i>Alaska Residents (95% C.I.)</i>	<i>Nonresidents (95% C.I.)</i>	<i>Nonresident lodge clients (95% C.I.)</i>
% who would not fish Bristol Bay area if good road access were developed in the area	30.5% (+/- 13.0%)	45.4% (+/- 6.4%)	58.8% (+/- 9.6%)
% who oppose developing road access in Bristol Bay area	57.2% (+/- 14.0%)	68.6% (+/- 5.9%)	76.8% (+/- 8.2%)
Sample Size	48	234	101

5.6 Bristol Bay Angler Survey Demographic Characteristics

A final section of the 2005 Bristol Bay angler survey asked respondents a series of demographic questions. Table 43 and Table 44 show selected statistics from this section of the survey. The survey indicates that most Bristol Bay anglers are males, at 90% for non-residents and 71% for residents. Survey responses indicated that nonresidents on average had higher incomes and were more likely to be college graduates, compared to residents. Overall, 20% of non-residents but only 4% of residents reported incomes over \$200,000. Differences between resident and non-resident anglers were also seen in level of respondent education. Proportionally, twice as many non-residents as residents reported they had at least a college degree (66.4% v. 32.7%).

Table 43: Socioeconomic Characteristics of Bristol Bay Anglers, by Residency.

<i>Statistic</i>	<i>Non-residents</i>	<i>Residents</i>
Median Age	49	42
Percent Male	89.5%	70.6%
Percent college graduates	66.4%	32.7%
Percent employed full time	63.1%	77.3%

Table 44. Bristol Bay Angler Household Income Levels, by Residency

<i>Household Income</i>	<i>Non-residents</i>	<i>Residents</i>
Less than \$24,999	9.5%	4.5%
\$25,000 to \$49,999	17.2%	19.6%
\$50,000 to \$74,999	15.9%	24.6%
\$75,000 to \$99,999	12.1%	22.3%
\$100,000 to \$124,999	10.6%	10.5%
\$125,000 to \$149,999	6.6%	12.5%
\$150,000 to \$199,000	8.3%	2.1%
\$200,000 to \$299,999	7.4%	1.2%
Over \$300,000	12.5%	2.7%

5.7 Results of Mail Survey of Bristol Bay Remote Lodge Clients.

As noted in Section 3, above, one population surveyed for this study was 2005 clients of remote Bristol Bay lodges. This sample was largely a convenience sample, rather than a probability sample. Bristol Bay lodges were asked to randomly sample their 2005 client lists and provide that sample to the survey researchers. In actuality, the sample drawn consisted of a census of clients from one area lodge and random samples from 3 others. The resulting sample primarily included responses from anglers who had fished the Kvichak River, a largely rainbow trout fishery located downstream of the proposed area of mine development. As such, these survey responses highlight both similarities and some key differences between angling on the Kvichak and in other areas of Bristol Bay.

Table 45 presents a comparison of responses from two groups of 2005 Bristol Bay anglers who stayed at remote area lodges on their trips. The first group in the table is the sub-sample of internet survey respondents who reported both fishing Bristol Bay waters on their most recent trip, and reported staying at a remote area fishing lodge on that trip. The second is respondents to the mail survey of 2005 remote lodge clients.

A comparison of the responses from the two independent lodge client samples shows a significant degree of agreement across a wide range of survey question responses. Lodge clients from the two samples spent similar amounts of money on their trips and were demographically similar. The largest differences between the 2 groups shown in Table 45 are in regard to the percentage of respondents targeting rainbow trout on their recent trip, the percent who reported catching a rainbow 26 inches long or longer, and the percentage saying they would still have made their trip if their primarily targeted species had not been available. Additionally, smaller differences were also seen in the percent of respondents who said they would reduce their trips to Bristol Bay if road access to the area were improved, and the percent who oppose development of road access in the region.

Table 45. Comparison of Lodge Mail and Lodge Internet Sample Responses for Selected Survey Questions

<i>Survey question/statistic</i>	<i>Internet responses from sample of licensed anglers who visited remote lodges</i>	<i>Mail responses from Bristol Bay Remote Lodge Clients</i>
<u>(A) Demographic Comparisons</u>		
Median age	55	57
% employed full time	60.4%	60.0%
% male	86.7%	98.4%
% with over \$200,000 household income	38.4%	47.0%
<u>(B) Expenditure Comparisons</u>		
Average amount spent on package fishing tour	\$5,543	\$6,134
Average amount spent in Bristol Bay (besides package tour cost)	\$1,729	\$1,550
Average amount spent in rest of Alaska (besides package tour cost)	\$529	\$917
% saying that the trip was worth more than they had to pay for it	54.8%	54.5%
<u>(C) Trip Characteristic Comparisons</u>		
% agreeing that fishing conditions were uncrowded	92.8%	91.6%
% who primarily targeted rainbow trout	38.9%	72.3%
% who caught a rainbow over 26 inches	43.0%	75.4%
% who would have still made the trip if their primarily targeted species had not been available	45.5%	29.7%
<u>(D) Response to Policy Questions Comparisons</u>		
% who would reduce trips to Bristol Bay if improved road access were to be built	58.2%	66.1%
% who oppose development of road access	76.4%	88.0%

These specific differences across the two samples are consistent with what might be expected due to the composition of trips in the samples. Table 46 shows that while the responses from Bristol Bay lodge clients taken from the pool of 2005 fishing license holders show a distribution of trips across a number of major Bristol Bay drainages, the remote lodge client sample supplied by lodge owners is heavily dominated by anglers who took their trip to the Kvichak River drainage. This river is a renowned rainbow trout fishery (Gunn 2006), and the Kvichak is also located downstream of potential mine and road development in the region. It is logical, then that respondents within this heavily Kvichak River sample would be more likely to both target rainbows and catch large rainbows, and to have strong opinions on future development in the region.

Table 46. Comparison of Drainages/waters Fished: Internet vs. Mail Lodge Client Samples

<i>Drainage/water</i>	<i>Internet Lodge Client Sample</i>	<i>Mail Lodge Client Sample</i>
Naknek River Drainage	16.6%	0.9%
Nushagak-Mulchatna Drainage	23.3%	7.4%
Kvichak-Lake Iliamna	37.6%	90.7%
Other Bristol Bay	22.5%	0.9%
Kvichak River (specifically)	12.0%	88.0%

5.7.1 Bristol Bay Conservation Trust Fund Contribution Responses

The mail and web surveys of Bristol Bay lodge clients included a series of questions asking respondents how much they would be willing to contribute to a conservation trust fund designed to protect the area in its current pristine, primarily unroaded condition. The text of this question is as follows:

There is the potential for significant future extractive resource development and roading in the Bristol Bay area. For example, a large mine has been proposed in the headwaters of the Nushagak and Kvichak Rivers near Lake Iliamna, and a road has been proposed linking Anchorage and Bristol Bay.

Suppose that you had an opportunity to support a fund whose aim was to keep the main Bristol Bay drainages in their current relatively pristine and un-roaded condition. Assume that the successful development of such a fund would actually result in the protection of Bristol Bay from roading and extractive resource development.

As this survey is part of a research project, we are not asking you to make a donation. Nonetheless, we would like you to answer the following question as you would a solicitation for an actual donation. If you were asked today, how much would you be willing to donate, if anything, to keep the Bristol Bay region in its current relatively pristine and unroaded condition? (Please check one)

☐ \$25 ☐ \$50 ☐ \$100 ☐ \$250 ☐ \$500 ☐ \$1000 ☐ \$2000 ☐ \$____ other

☐ I would choose to not make a donation at this time

A cash and contingent valuation experiment was undertaken to measure willingness to pay into this trust fund. The "payment card" format used in the question tends to be conservative and understates the true referendum values recommended by Arrow et al. (1993). Web survey participants in response to the contingent valuation question indicated an average willingness to pay of \$19.62 for Alaska residents and \$37.04 for nonresidents. For a sub-sample of nonresident Bristol Bay anglers who stayed at remote lodges, the average willingness to pay was \$156.50 per respondent. In general

the literature indicates these willingness to pay estimates are likely conservative for not mentioning a referendum, and for use of the "payment card" rather than a dichotomous choice format.

A small cash experiment was also conducted using just the nonresident lodge client anglers. This subsample was asked to make an actual contribution to the trust fund for protection of the Bristol Bay area. Average contributions to this survey were \$20.63. These results are not consistent with the literature in that the average cash donation is a small fraction of the contingent valuation response (Champ and Bishop 2006). This result may be due to "free riding" or the respondent unfamiliarity with the trust fund and its sponsors.

6.0 Commercial Fisheries

6.1 Introduction

This chapter provides an overview of the commercial fisheries sector in Bristol Bay. The focus is on identifying total earnings in the harvesting and processing sectors, and on providing the historical context for these estimates. Since commercial fishing is the largest commercial sector in the Bristol Bay economy, this data is an essential input for the regional economic modeling reported below. Information is also summarized on costs, and on the residence of commercial fishing permit holders and others employed in this sector.

This chapter draws on a number of recent studies including: the most recent annual fishery management report for Bristol Bay (Alaska Department of Fish and Game, 2005), the Bristol Bay Salmon Drift Gillnet Fishery Optimum Number Report (Commercial Fisheries Entry Commission, 2004), Projections of Future Bristol Bay Salmon Prices (Knapp 2004), and data available on the websites of the management agencies.

6.2 Overview of the Bristol Bay Fishery

The Bristol Bay commercial fisheries management area encompasses all coastal and inland waters east of a line from Cape Menshikof to Cape Newhenham (Figure 1). This area includes eight major river systems: Naknek, Kvichak, Egegik, Ugashik, Wood, Nushagak, Igushik and Togiak. Collectively these rivers support the largest commercial sockeye salmon fishery in the world (ADF&G, 2005). This is an interesting and unique fishery, both because of its scale and significance to the local economy, but also because it is one of the very few major commercial fisheries in the world that has been managed on a sustainable basis.

The five species of pacific salmon found in Bristol Bay are the focus of the major commercial fisheries. Sockeye salmon are the primary species harvested both in terms of pounds of fish and value. Annual commercial catches between 1984 and 2003 averaged nearly 24 million sockeye salmon, 69,000 Chinook, 971,000 chum, 133,000 coho, and 593,000 (even year only) pink salmon (ADF&G, 2005). Prices for sockeye salmon are typically higher than for other salmon species, making the Bristol Bay fishery the most valuable of Alaska's salmon fisheries (CFEC, 2004). This is also the largest Alaska fishery in terms of the number of permit holders. In 2004, there were 1,857 potentially active entry permits in the drift gillnet fishery and 992 in the set gillnet fishery (CFEC, 2004). There is also a herring roe on kelp fishery. The focus in this chapter is on the salmon fishery, particularly sockeye, since this fishery is dependent on the same freshwater ecosystems as the sport and subsistence fisheries.

The fishery is organized into five major districts (Figure 13) including Togiak, Nushagak, Naknek-Kvichak, Eggevik, and Ugashik. Management is focused on discrete stocks with harvests directed at terminal areas at the mouths of the major river systems (ADF&G, 2005). The stocks are managed to achieve an escapement goal based on maximum sustained yield. The returning salmon are closely monitored and counted and the openings are adjusted on a daily basis to achieve desired escapement. Having the fisheries near the mouths of the rivers controls the harvest on each stock, which is a good strategy for protection of the discrete stocks and their genetic resources. The trade-off is that the fishery is more congested and less orderly, and the harvest is necessarily more of a short pulse fishery, with most activity in June and early July. This has implications for the economic value of the fish harvested, both through effects on the timing of supply, but also on the quality of the fish.

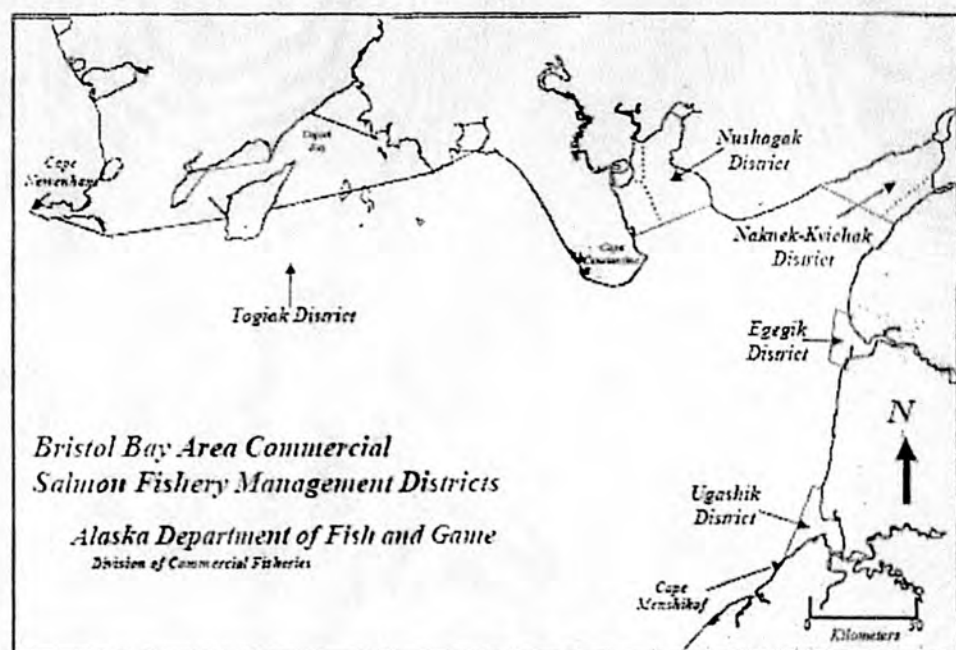


Figure 13. Bristol Bay Area Commercial Salmon Fishery Management Districts (ADF&G 2005)

The most lucrative market for salmon is as high quality fresh fillets or whole fish. For example, Copper River kings and sockeye are available early in the season and are relatively close to the U.S. domestic market. These fish can go for up to \$10 per pound wholesale in recent years. The Bristol Bay harvest comes on when there is already a glut in the market and prices may only average 50 cents a pound. Most Bristol Bay salmon are canned or frozen, as detailed below.

An interesting aspect of this fishery is that the compressed timing of the harvesting activity makes commercial fishing a good fit with subsistence in the overall Bristol Bay cash-subsistence economy. As detailed below, many commercial fishing permit holders and crew members, as well as some employees in the processing sector, are residents of

Bristol Bay's dominantly-native Alaskan villages. In 2004, there were 952 resident commercial fishing permit holders in the Bristol Bay study area, as well as 920 crew members. This is a significant share of the area's total adult population. An ADF&G summary of subsistence activity in Bristol Bay (Wright, Morris, and Schroeder 1985) noted that as of the mid-1980's traditional patterns of hunting, fishing, and gathering activities had for the most part been retained, along with accommodations to participate in the commercial fishery and other cash-generating activities. In the abstract to this 1985 paper, the authors characterize the commercial salmon fishery as "a preferred source of cash income because of its many similarities to traditional hunting and fishing, and because it is a short, intense venture that causes little disruption in the traditional round of seasonal activities while offering the potential for earning sufficient income for an entire year." Commercial fishing is a form of self employment requiring many of the same skills, and allowing nearly the same freedom of choice as traditional subsistence hunting and fishing. (Wright, Morris, Schroeder 1985; p. 89).

In 2002, Bristol Bay commercial salmon fishing accounted for about 19% of all Alaska salmon harvest, by weight, and nearly 32% of all Alaska salmon harvest by earnings (Table 47). Harvest by set gillnet accounts for approximately 18% of Bristol Bay commercial harvest while drift gillnet harvest accounts for 82% of salmon harvest. Among all 5 species of salmon, sockeye account for over 98% of the *ex vessel* value of salmon harvests in the Bristol Bay region (Table 48).

Table 47. Bristol Bay and Alaska Commercial Fishery Permits, Harvest, and Gross Earnings (2002)

<i>Sector</i>	<i># permit holders</i>	<i># permits</i>	<i>Pounds</i>	<i>Gross earnings</i>
Bristol Bay Salmon				
Drift gillnet	1,862	1,447	135,549,944	\$77,243,936
Set gillnet	988	829	30,032,259	\$17,327,819
All Bristol Salmon	2,850	2,276	165,582,203	\$94,571,755
All Alaska Salmon	10,594	7,508	872,577,336	\$293,147,368
All Alaska fisheries	14,318	13,463	3,842,853,863	\$990,099,365

Source: derived from ADFG (2005)

Table 48. Bristol Bay Salmon Harvest and Ex Vessel Value

<i>Species</i>	<i>Total Catch (lbs)</i>	<i>Mean Weight (lbs)</i>	<i>Mean Price (\$/lb)</i>	<i>Ex-vessel Value (\$)</i>
Sockeye	148,394,331	5.77	\$0.50	\$ 74,197,166
Chinook	1,707,696	15.35	\$0.38	\$ 648,924
Chum	4,932,731	6.57	\$0.09	\$ 443,946
Pink	212,527	4.07	\$0.05	\$ 10,626
Coho	473,380	6.84	\$0.34	\$ 160,949
Total	155,720,665			\$ 75,461,611

Source: derived from CFEC website data

In the following pages, Figure 14 through Figure 21 and Table 49 present time series data on harvest and *ex vessel* values for Bristol Bay salmon fishing. These graphs and tables illustrate the extreme variability in both harvest levels and prices paid to commercial fishermen over several decades.

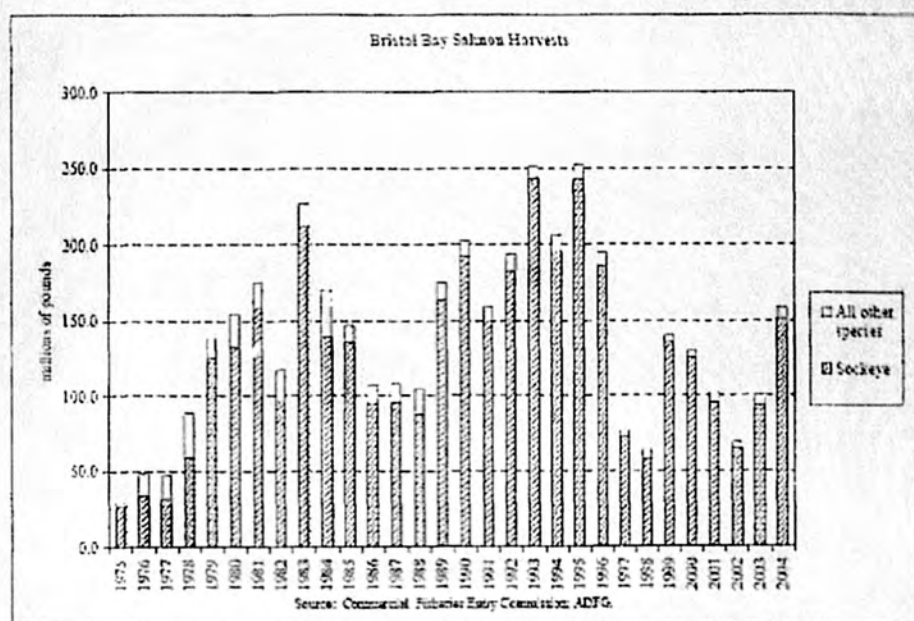


Figure 14. Time Series of Bristol Bay Salmon Harvest, pounds (Source: Knapp 2004).

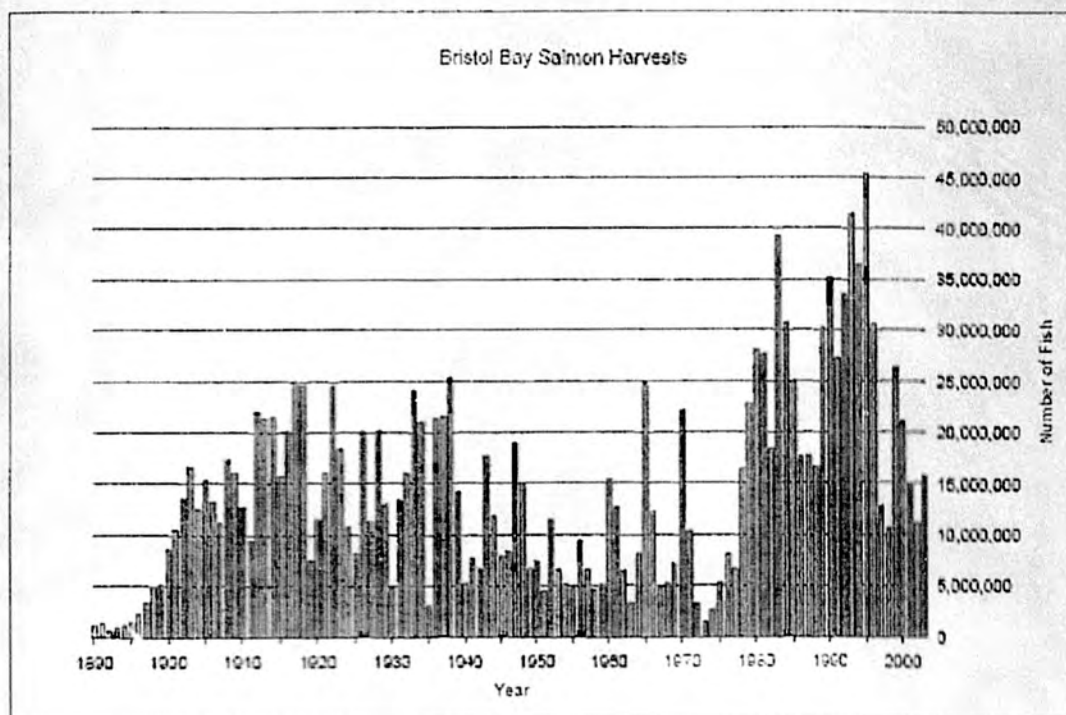


Figure 15. Time Series of Bristol Bay Salmon Harvest, Number of Fish (Source: Knapp 2004).

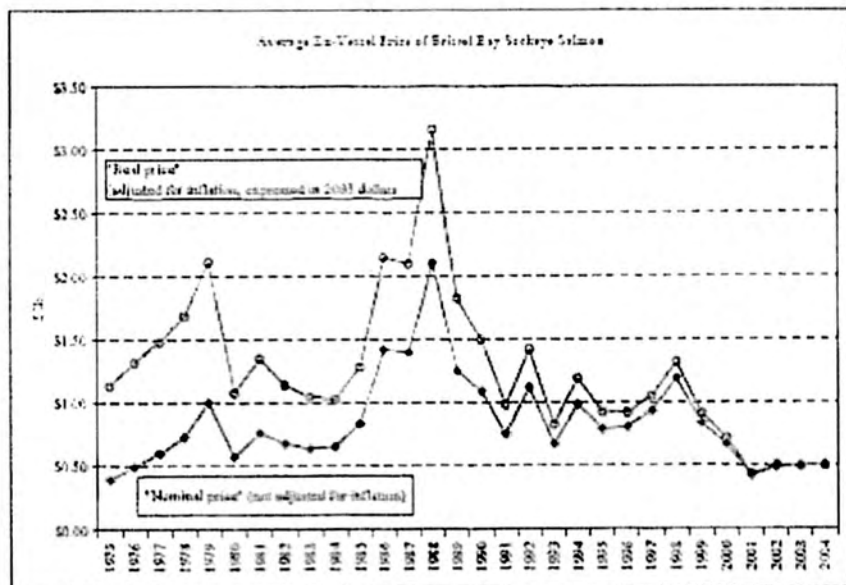


Figure 16. Time Series, Ex Vessel Price of Bristol Bay Sockeye Salmon (Source: Knapp 2004).

Table 49. Time Series Average Annual Ex Vessel Prices for Bristol Bay Salmon: Real and Nominal

Year	Sockeye		Chum		Coho		Chinook		Pink	
	Nominal Price	Real Price	Nominal Price	Real Price	Nominal Price	Real Price	Nominal Price	Real Price	Nominal Price	Real Price
1975	0.40	1.14	0.30	0.85	0.38	1.09	0.40	1.14	0.28	0.80
1976	0.50	1.32	0.32	0.85	0.42	1.11	0.49	1.30	0.31	0.82
1977	0.60	1.49	0.40	0.99	0.60	1.48	0.75	1.66	0.36	0.89
1978	0.73	1.69	0.40	0.93	0.77	1.79	0.72	1.67	0.33	0.76
1979	1.01	2.12	0.51	1.06	0.98	2.06	1.02	2.14	0.36	0.75
1980	0.57	1.08	0.34	0.65	0.56	1.06	1.01	1.92	0.25	0.48
1981	0.77	1.35	0.41	0.71	0.70	1.23	1.21	2.12	0.30	0.52
1982	0.69	1.14	0.35	0.59	0.75	1.25	1.22	2.04	0.22	0.37
1983	0.64	1.05	0.32	0.52	0.45	0.74	0.70	1.15	0.20	0.32
1984	0.66	1.04	0.30	0.48	0.76	1.20	1.03	1.63	0.23	0.36
1985	0.63	1.26	0.32	0.48	0.73	1.12	0.96	1.49	0.22	0.33
1986	1.42	2.15	0.31	0.47	0.68	1.02	1.00	1.51	0.15	0.22
1987	1.40	2.10	0.30	0.45	0.84	1.26	1.17	1.76	0.40	0.59
1988	2.10	3.15	0.47	0.70	1.38	2.06	1.11	1.66	0.35	0.53
1989	1.25	1.82	0.26	0.37	0.72	1.05	0.84	1.22	0.22	0.31
1990	1.09	1.50	0.27	0.37	0.78	1.06	0.93	1.28	0.32	0.44
1991	0.75	0.99	0.23	0.29	0.57	0.75	0.68	0.90	0.16	0.21
1992	1.12	1.42	0.27	0.34	0.60	0.76	0.94	1.19	0.14	0.18
1993	0.68	0.83	0.22	0.27	0.51	0.63	0.76	0.94	0.13	0.16
1994	0.99	1.20	0.22	0.26	0.66	0.80	0.64	0.77	0.12	0.15
1995	0.50	0.93	0.20	0.24	0.42	0.49	0.68	0.77	0.14	0.16
1996	0.61	0.92	0.11	0.12	0.31	0.35	0.51	0.58	0.05	0.06
1997	0.64	1.05	0.10	0.11	0.49	0.55	0.51	0.57	0.07	0.07
1998	1.21	1.34	0.09	0.10	0.44	0.48	0.62	0.69	0.08	0.09
1999	0.54	0.92	0.10	0.11	0.35	0.38	0.53	0.59	0.09	0.10
2000	0.67	0.72	0.09	0.09	0.35	0.37	0.46	0.49	0.08	0.08
2001	0.42	0.44	0.11	0.12	0.32	0.34	0.31	0.32	0.09	0.09
2002	0.49	0.50	0.09	0.09	0.31	0.32	0.33	0.34	0.06	0.06
2003	0.50	0.50	0.09	0.09	0.29	0.29	0.29	0.29	0.03	0.03

Note: Real prices were calculated using the Anchorage consumer price index.

Source: Knapp (2004).

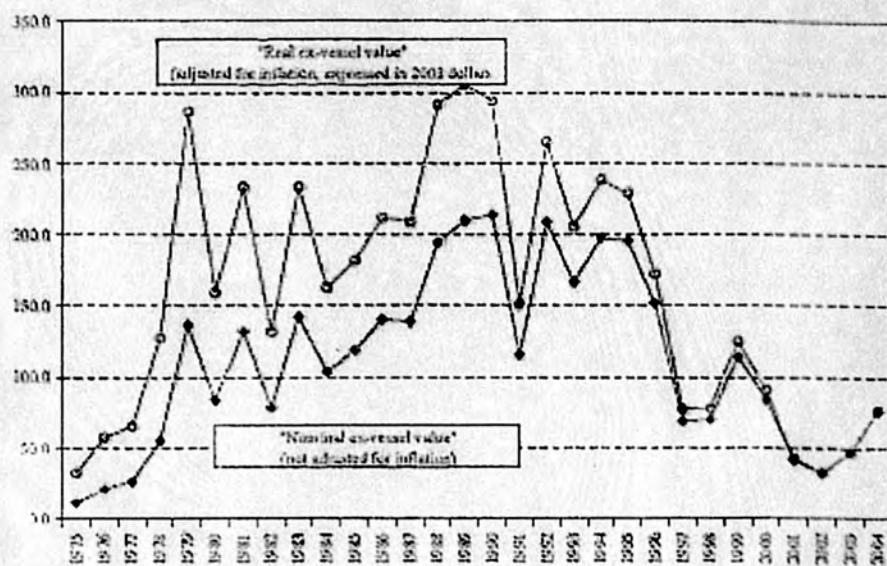


Figure 17. Time Series, Real and Nominal Ex Vessel Value. (Source: Knapp 2004)

Table 50. 2004 and 2005 Bristol Bay Harvest and Earnings

	# Permits fished	Pounds	Gross earnings	Derived \$/lb.
2004				
Drift gillnet	1,411	131,219,518	\$ 65,669,641	
Set gillnet	795	23,995,687	\$ 11,663,522	
Total	2,206	155,215,205	\$ 77,333,163	\$ 0.50
2005				
Drift gillnet	1,447	135,549,944	\$ 77,243,936	
Set gillnet	829	30,032,259	\$ 17,327,819	
Total	2,276	165,582,203	\$ 94,571,755	\$ 0.57

Derived from CFEC Website data.

Table 51. 1999-2003 Bristol Bay Drift Gillnet Earnings, Costs, and Net Returns.

Year	1999	2000	2001	2002	2003
Number of Permits Fished	1,847	1,823	1,566	1,184	1,424
Average lbs. per permit	\$1,430	\$7,405	\$1,491	\$5,751	\$5,089
Dockage ex vessel price \$/lb	\$0.84	\$0.67	\$0.42	\$0.49	\$0.50
Average permit value	\$69,700	\$50,500	\$14,700	\$19,700	\$29,300
Avg. gross earnings per permit	\$59,256	\$37,627	\$20,559	\$21,482	\$25,999
Minus Average Expenses					
Food	\$1,434	\$1,531	\$1,200	\$584	\$1,214
Fuel, oil, & lubricants	\$1,718	\$1,837	\$1,360	\$1,495	\$1,670
Crew shares (including skipper)	\$10,692	\$7,867	\$4,144	\$4,328	\$5,317
Maintenance (routine & unexpected)	\$2,392	\$5,895	\$2,130	\$1,876	\$2,549
Nets (changing, repair, and wear)	\$1,409	\$1,695	\$1,349	\$1,332	\$1,629
Miscellaneous gear & supplies	\$1,209	\$1,103	\$541	\$583	\$580
Rewatching	\$1,771	\$1,217	\$617	\$692	\$745
Transportation	\$1,690	\$2,143	\$1,572	\$1,706	\$1,932
Morage, storage, and haul-out	\$1,515	\$1,501	\$1,254	\$1,275	\$1,520
Insurance (P&I, hull, lay-up)	\$2,065	\$2,165	\$2,016	\$2,076	\$2,161
Administrative services	\$605	\$744	\$519	\$575	\$665
Annual permit fee	\$480	\$490	\$397	\$295	\$120
Annual vessel license fee	\$46	\$43	\$47	\$47	\$47
Property Tax	\$822	\$471	\$451	\$275	\$485
Depreciation	\$1,694	\$1,603	\$1,346	\$1,355	\$1,336
Avg. Returns to Labor, Management, and Investment	\$28,466	\$19,765	\$229	\$2,492	\$4,107
Minus Average Opportunity Costs					
Skipper Opportunity Cost	\$5,674	\$5,728	\$6,043	\$5,480	\$6,018
Vessel Opportunity Cost	\$5,152	\$5,657	\$5,719	\$1,426	\$5,987
Average Profits per permit	\$8,680	\$-1,687	\$-5,532	\$-4,415	\$-3,819

Source: CFEC (2004).

Table 52 through Table 54 present the composition and trends of Bristol Bay salmon fishing permit ownership and harvest. The trend in Bristol Bay commercial salmon permit ownership between 1995 and 2004 is a slight movement from Alaska resident ownership of permits to nonresident ownership. The trend toward nonresident ownership is consistent for both drift and set gillnet permits.

Table 52. Bristol Bay Region Fishing Permits and Crew Members, 2005

	<i>Permit Holders</i>	<i>Crew Members</i>	<i>Permits fished</i>
(A) Census Area			
Bristol Bay Borough	187	175	
Dillingham Census Area	650	608	
<u>Lake & Penn. Borough</u>	<u>115</u>	<u>137</u>	
Total for Bristol Bay Residents	952	920	
(B) Total Permits by Alaskan Residency			
Drift gill net			
Alaska Residents	900		700
Nonresidents	959		747
Set gill net			
Alaska Residents	697		571
Nonresidents	291		258
Total Alaska Residents	1,597		1,271
Total Nonresidents	1,250		1,005

Source: Derived from CFEC website data

Table 53. Distribution of Commercial Fishing Permit Holders by Residency and 2005 Harvest and Earnings

<i>Residence</i>	<i>Permits</i>	<i>Permits fished</i>	<i>Total pounds</i>	<i>Estimated gross earnings</i>
(1) Bristol Bay Borough				
Drift gill net	60	52	4,833,791	\$ 2,814,821
Set gill net	116	112	4,413,494	\$ 2,566,112
Subtotal	176	164	9,247,285	\$ 5,380,933
(2) Dillingham C.A.				
Drift gill net	283	233	14,582,744	\$ 7,638,519
Set gill net	205	155	4,678,691	\$ 2,523,764
Subtotal	488	388	19,261,435	\$ 10,162,283
(3) Lake & Penn. Borough				
Drift gill net	68	56	3,740,545	\$ 1,912,675
Set gill net	48	34	777,362	\$ 387,096
Subtotal	116	90	4,517,907	\$ 2,299,771
(4) Total Bristol Bay	780	642	33,026,627	\$ 17,842,987
(5) Alaska Total				
Drift gill net	902	700	55,209,565	\$ 30,872,061
Set gill net	697	571	20,072,497	\$ 11,487,014
Subtotal	1,599	1,271	75,282,062	\$ 42,359,075
(6) Non-Bristol Bay resident	819	629	42,255,435	\$ 24,516,088
(7) Nonresident				
Drift gill net	960	747	80,234,379	\$ 46,371,874
Set gill net	291	258	9,959,762	\$ 5,840,805
Subtotal	1,251	1,005	90,194,141	\$ 52,212,679
(8) Total				
Drift gill net	1,862	1,447	135,443,944	\$ 77,243,935
Set gill net	988	829	30,032,259	\$ 17,327,819
Subtotal	2,850	2,276	165,476,203	\$ 94,571,754

Source: Derived from CFEC website data

Table 54. Comparison of 1995 and 2004 Permit Ownership

<i>Method/Residency</i>	<i>1995</i>		<i>2004</i>	
	Number	Percent	Number	Percent
Drift Gillnet				
Resident	910	50.2%	900	48.4%
Nonresident	903	49.8%	959	51.6%
	1813		1859	
Set Gillnet				
Resident	758	75.0%	697	70.5%
Nonresident	253	25.0%	291	29.5%
	1011		988	
Total				
Resident	1668	59.1%	1597	56.1%
Nonresident	1156	40.9%	1250	43.9%
	2824		2847	
Source: Derived from CFEC website data				

Table 55 and Table 56 (from the Commercial Fish Entry Commission website www.cfec.state.ak.us), detail recent trends in Bristol Bay salmon fishing permits, harvest, earnings, and average permit price. These tables show that market permit prices have dropped significantly in recent years off of highs seen in the early 1990's for both drift and set gillnet permits.

Table 55. Time Series, Bristol Bay Drift Gillnet Basic Information Table

UWBIIP-A State of Alaska 2006-04-21
Commercial Fisheries Entry Commission
Basic Information Table
S 03T SALMON, DRIFT GILLNET, BRISTOL BAY

Year	Residency	Permanent Permits Renewed	Interim Permits Issued	Total Permits Issued/ Renewed	Total Permits Fished	Total Pounds	Average Pounds	Total Gross Earnings	Average Gross Earnings	Average Permit Price
2005	Resident	900	2	902	700	55,209,555	78,871	\$30,372,061	\$44,103	
	Nonresident	959	1	960	747	80,340,379	107,551	\$45,371,874	\$62,077	
	Year Totals	1,859	3	1,862	1,447	135,549,934	93,677	\$77,243,935	\$53,382	\$51,200
2004	Resident	903	3	911	678	53,693,514	79,194	\$24,402,335	\$38,941	
	Nonresident	949	0	949	733	77,526,004	105,765	\$39,267,316	\$53,571	
	Year Totals	1,857	3	1,860	1,411	131,219,518	92,998	\$65,669,641	\$46,541	\$37,000
2003	Resident	923	6	929	687	34,749,009	49,855	\$16,613,775	\$23,836	
	Nonresident	933	1	939	727	43,712,491	60,127	\$21,385,643	\$29,416	
	Year Totals	1,861	7	1,868	1,424	78,461,500	55,099	\$37,999,418	\$26,685	\$39,300
2002	Resident	945	13	958	587	21,222,451	36,154	\$9,722,293	\$16,563	
	Nonresident	920	1	923	597	32,941,557	55,179	\$15,710,124	\$26,315	
	Year Totals	1,865	14	1,879	1,184	54,164,008	45,747	\$25,432,417	\$21,480	\$19,700
2001	Resident	935	19	954	791	34,352,452	44,108	\$13,672,961	\$17,266	
	Nonresident	926	3	931	775	45,692,324	58,945	\$18,741,854	\$24,183	
	Year Totals	1,861	24	1,885	1,566	79,044,776	51,491	\$32,414,815	\$20,999	\$34,700
2000	Resident	916	30	946	886	47,755,257	53,298	\$30,304,317	\$34,380	
	Nonresident	942	3	950	927	56,900,121	61,381	\$37,607,531	\$40,569	
	Year Totals	1,858	33	1,896	1,813	104,655,378	57,408	\$68,412,338	\$37,527	\$80,500
1999	Resident	901	41	942	907	52,023,153	57,557	\$42,292,171	\$46,629	
	Nonresident	949	12	961	940	61,530,424	65,458	\$50,508,777	\$53,824	
	Year Totals	1,850	53	1,903	1,847	113,553,577	61,480	\$92,800,948	\$50,296	\$89,700
1998	Resident	913	49	967	933	24,793,504	26,574	\$26,834,600	\$28,751	
	Nonresident	926	12	938	925	36,174,001	39,296	\$30,373,343	\$32,341	
	Year Totals	1,844	61	1,905	1,858	60,967,505	27,431	\$57,207,945	\$30,787	\$89,500
1997	Resident	912	56	968	943	26,172,310	30,936	\$25,937,929	\$27,506	
	Nonresident	920	13	933	932	33,414,606	35,853	\$30,753,137	\$32,997	
	Year Totals	1,832	71	1,903	1,875	62,586,916	33,380	\$56,691,067	\$30,235	\$153,800
1996	Resident	907	53	965	956	78,855,535	79,357	\$58,297,093	\$60,980	
	Nonresident	914	14	928	928	90,755,937	97,797	\$72,315,102	\$77,926	
	Year Totals	1,821	72	1,893	1,884	166,621,575	86,440	\$130,612,195	\$69,327	\$171,800
1995	Resident	910	62	972	966	96,920,656	100,332	\$74,515,323	\$77,138	
	Nonresident	903	13	916	916	121,081,051	132,185	\$95,514,076	\$104,273	
	Year Totals	1,813	75	1,888	1,882	218,001,707	115,535	\$170,029,398	\$90,345	\$195,000
1994	Resident	918	54	982	963	80,655,405	83,757	\$76,096,992	\$79,021	
	Nonresident	892	14	906	901	100,582,552	111,511	\$68,472,908	\$109,172	
	Year Totals	1,810	78	1,888	1,865	181,240,957	97,180	\$144,569,899	\$93,603	\$165,700
1993	Resident	913	69	987	975	103,711,446	106,371	\$68,437,365	\$70,193	
	Nonresident	857	16	903	900	114,425,840	127,144	\$75,938,013	\$85,487	
	Year Totals	1,805	85	1,890	1,875	218,141,286	116,342	\$144,375,378	\$77,524	\$199,600
1992	Resident	935	73	1,008	1,002	78,496,295	78,340	\$63,336,175	\$83,170	
	Nonresident	862	15	877	877	89,415,053	101,556	\$98,880,837	\$112,749	
	Year Totals	1,797	88	1,885	1,879	167,911,352	89,962	\$162,217,012	\$96,976	\$193,500
1991	Resident	951	73	1,028	1,019	67,230,487	65,977	\$48,048,820	\$47,153	
	Nonresident	842	14	856	854	69,547,736	81,438	\$51,161,568	\$59,932	

Source: CFEC website

Table 56. Time Series, Bristol Bay Set Gillnet Basic Information Table

WWWBIFP-A State of Alaska 2006-04-21
Commercial Fisheries Entry Commission
Basic Information Table
S 04T SALMON, SET GILLNET, BRISTOL BAY

Year	Residency	Permanent Permits Renewed	Interim Permits Issued	Total Permits Issued/ Renewed	Total Permits Fished	Total Pounds	Average Pounds	Total Gross Earnings	Average Gross Earnings	Average Permit Price
2005	Resident	697	0	697	571	36,073,497	35.153	\$11,467,014	\$20,117	
	Nonresident	291	0	291	258	9,959,762	38.604	\$5,840,805	\$22,639	
	Year Totals	988	0	988	829	46,033,259	36.227	\$17,327,819	\$20,602	\$15,160
2004	Resident	701	1	702	541	14,978,530	27.687	\$7,233,045	\$13,370	
	Nonresident	237	0	237	254	9,017,157	35.501	\$4,430,477	\$17,443	
	Year Totals	938	1	939	795	23,995,687	30.183	\$11,663,522	\$14,671	\$14,700
2003	Resident	713	1	714	531	15,097,184	28.432	\$7,418,731	\$13,971	
	Nonresident	287	0	287	230	6,078,944	26.430	\$1,997,778	\$13,034	
	Year Totals	999	1	1,000	761	21,176,128	27.827	\$10,416,508	\$13,688	\$12,500
2002	Resident	725	3	728	477	8,194,739	19.280	\$4,329,654	\$9,077	
	Nonresident	279	0	279	203	4,712,904	23.216	\$2,366,945	\$11,167	
	Year Totals	1,004	3	1,006	680	12,907,643	20.435	\$6,696,599	\$9,701	\$11,900
2001	Resident	726	2	728	596	15,434,265	26.316	\$6,373,300	\$10,693	
	Nonresident	280	0	280	235	5,117,859	21.804	\$2,117,802	\$9,363	
	Year Totals	1,006	2	1,010	831	20,552,124	24.943	\$8,491,102	\$10,181	\$35,300
2000	Resident	755	5	760	570	17,456,584	26.354	\$11,354,654	\$16,692	
	Nonresident	272	0	272	231	6,563,598	27.823	\$4,595,436	\$18,309	
	Year Totals	1,027	5	1,032	801	24,020,182	26.754	\$15,950,140	\$17,351	\$32,400
1999	Resident	749	3	752	584	18,443,524	27.257	\$15,134,273	\$22,112	
	Nonresident	255	1	256	241	7,758,043	32.183	\$6,396,839	\$26,543	
	Year Totals	1,004	4	1,014	825	26,201,567	26.540	\$21,521,112	\$23,266	\$31,350
1998	Resident	748	6	754	660	8,733,418	13.233	\$9,734,294	\$14,749	
	Nonresident	241	0	241	241	3,708,727	15.472	\$4,378,426	\$18,168	
	Year Totals	1,009	6	1,015	901	12,442,145	13.832	\$14,112,720	\$15,663	\$30,400
1997	Resident	750	7	757	685	9,159,469	13.371	\$8,218,755	\$11,998	
	Nonresident	262	0	262	216	4,469,856	18.940	\$4,093,604	\$17,346	
	Year Totals	1,012	7	1,019	901	13,629,325	14.798	\$12,312,359	\$13,348	\$39,000
1996	Resident	753	6	759	706	20,364,600	26.764	\$15,693,869	\$22,166	
	Nonresident	256	0	256	233	7,147,327	30.675	\$5,679,538	\$24,376	
	Year Totals	1,011	6	1,017	941	27,511,927	29.237	\$21,373,407	\$22,714	\$41,100
1995	Resident	758	5	763	726	24,343,741	33.435	\$18,773,038	\$25,787	
	Nonresident	253	0	253	219	8,126,351	36.184	\$7,170,146	\$30,001	
	Year Totals	1,011	5	1,019	945	32,470,092	34.412	\$25,943,184	\$26,829	\$42,200
1994	Resident	757	7	764	700	17,901,793	25.574	\$15,454,186	\$22,363	
	Nonresident	255	0	255	239	4,817,516	28.525	\$6,494,975	\$27,176	
	Year Totals	1,012	7	1,019	939	22,719,309	26.525	\$21,949,161	\$24,483	\$37,800
1993	Resident	750	5	755	722	21,695,472	31.711	\$15,234,434	\$21,100	
	Nonresident	254	0	254	243	9,721,434	40.048	\$6,513,826	\$26,806	
	Year Totals	1,014	5	1,023	965	31,416,906	33.812	\$21,748,260	\$22,557	\$49,100
1992	Resident	767	8	775	727	17,858,082	24.578	\$13,567,037	\$25,539	
	Nonresident	250	3	253	241	7,363,788	30.555	\$7,871,830	\$32,663	
	Year Totals	1,017	11	1,027	968	25,221,870	26.566	\$21,438,867	\$22,313	\$49,800
1991	Resident	757	6	763	715	16,532,201	23.122	\$11,971,954	\$16,744	
	Nonresident	245	4	249	215	5,381,825	25.029	\$4,337,474	\$18,457	

Source: CFEC website

Table 57 shows a listing of commercial salmon processors and buyers operating in the Bristol Bay region in 2004 (ADFG 2004). Production of salmon (processing, freezing, and canning) is a value added industry in the area. This production value is highly dependent on the harvest levels and associated harvest value (Figure 18). The composition of the salmon processing industry in the Bristol Bay region is also dependent on end-buyer demand for salmon.

Table 57. Commercial Salmon Processors and Buyers Operating in Bristol Bay, 2004

	Name of Operator/Buyer ^a	Base of Operations	District ^b	Method ^c	Export
1	Alaska Family Seafoods	Dillingham, AK	N	EF,F	AIR
2	Alaska General Seafoods	Kennore, WA	GD,K,E,U	C,E,F,F	AIR
3	Aleutian Maid Processors, LLC	Egegik, AK	E	F	SEA,AIR
4	Alpine Cove, LLC	Kodiak, AK	E,N,U	F	SEA
5	Alyce C. Tedd	Montello, WI	N,O	F	SEA,AIR
6	Anthony Wood	King Salmon, AK	K	F	SEA
7	Banacore Inc.	Dillingham, AK	N	EF	AIR
8	Barbara J Hill	Naknek, AK	K	EF	N/A
9	Baywatch Seafoods, LLC	Woodinville, WA	K,E,U,N,T	EF,F	SEA,AIR
10	Coffee Point Seafoods of WA, LLC	S. Seattle, WA	E	F	SEA
11	CSP Seafoods	Wasilla, AK	T	F	
12	Dancing Salmon Company, LLC	Dillingham, AK	N	F,S	AIR
13	Diamond Lodge	King Salmon, AK	K	EF,F,S	AIR
14	Fisherman's Express, LLC	Anchorage, AK	N	F	AIR
15	Friedman Family Fisheries, Inc.	Baltimore, MD	N	F	SEA,AIR
16	Great Ruby Fish Company	Anchorage, AK	K	EF,F	AIR
17	Icicle Seafoods, Inc.	Seattle, WA	GD,K,E,U,N	C,F	SEA
18	Interior Alaska Fish Processors, Inc.	Fairbanks, AK	N	EF	AIR
19	Kim J. Hubert	Eagle River, AK	T	EF	N/A
20	Lady Marion Seafoods	Anchorage, AK	GD,E	EF,F	AIR
21	Libby Bro. Wild Alaskan Harvest	Anchorage, AK	N	EF,F	AIR
22	Leader Creek Fisheries, LLC	Seattle, WA	GD,K,E,U,N	EF,F	SEA,AIR
23	NorQuest Seafoods, Inc.	Seattle, WA	GD,K,E,U,N	F	SEA
24	Ocean Beauty Seafoods, Inc.	Seattle, WA	GD,K,E,U,N	C,E,F,F	SEA,AIR
25	Pacman Fisheries/Bristol Gold, LLC	Naknek, AK	K	S,F	AIR
26	Pederson Point	Seattle, WA	K,E,U	F	SEA
27	Peter Pan Seafoods, Inc.	Seattle, WA	GD,K,E,U,N	C,E,F,F	SEA,AIR
28	Snapac Products, Inc.	Seattle, WA	GD,K,E,U	F	SEA
29	Togiak Fisheries	Seattle, WA	T	F	SEA
30	Trident Seafoods	Seattle, WA	GD,K,E,U,N	C,F	SEA,AIR
31	Ugashik Wild Salmon	Ugashik, AK	U	C,EF	AIR
32	Westward Seafoods, LLC	Seattle, WA	N,T	F	SEA
33	Wild Alaskan Seafood Co., LLC	Spokane, WA	N	F	SEA
34	Woodbine Alaska Fish Company	Rio Vista, CA	E,U,T	C,F	AIR
35	Yard Arm Knot Fisheries, LLC	Seattle, WA	GD,K,E,U	C,F	SEA

Canning=8; Freezing=29; Fresh=15; Curing=3; Air Export=21; Sea Export=19
^a Indicates operators with a processing facility in a district or operators from other areas buying fish and/or providing support service for fishers in districts away from the facility.
^b GD=General District; K=Naknek-Ketchikan; E=Egegik; U=Ugashik; N=Nashagak; T=Togiak
^c Type of processing: C=canned; EF=export fresh; F=frozen; S=salmon
^d Registered but did not operate.

Source: ADF&G (2005)

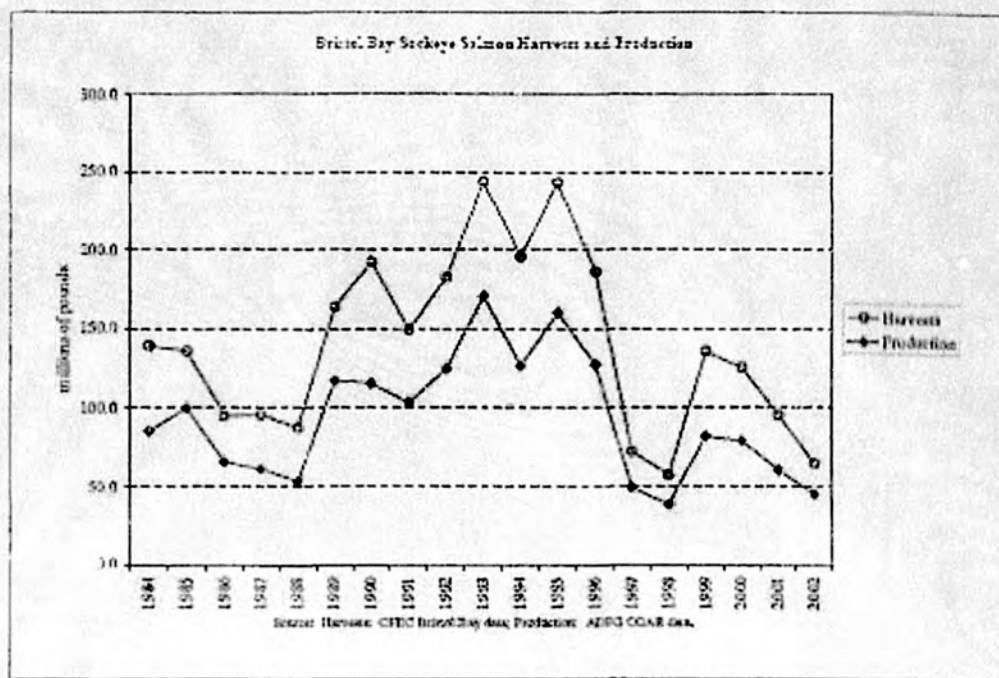


Figure 18. Time Series, Bristol Bay Sockeye Salmon Harvest and Production. (Source: Knapp 2004)

Table 58 shows that over the past 15 years the demand for U.S. sockeye salmon has changed dramatically. During the 1989-1994 period 80% of demand was for frozen sockeye for the Japanese market. By 2002 this market segment had dropped to 44% of demand for U.S. sockeye production. Between 1994 and 2002 other markets including markets for canned salmon, and other markets for frozen fish had replaced the Japanese frozen sockeye market.

Table 58. Changes in Estimated End-markets for United States Sockeye Salmon
(Source: Knapp 2004)

Estimated End-Markets for United States Sockeye Salmon			
Market	1984-94	1995-99	2000-03
U.S. canned market	9.5%	14.5%	26.5%
Other canned markets	3.7%	9.2%	13.1%
Japanese frozen market	50.1%	61.0%	43.7%
Other frozen markets	0.5%	11.2%	16.4%
Fresh markets	3.2%	4.2%	3.9%
Total	100.0%	100.0%	100.0%

Note: Percentages are those of estimated total production for the period.

Table 59 through Table 61 detail the final accounting of current and recent total Bristol Bay salmon processing output. Table 60 shows that in 2005 the total earnings from Bristol Bay salmon processing was \$225 million. The total earnings from salmon harvest in 2005 were approximately \$95 million. Table 61 shows the net weight, price, and wholesale value by end product for 2002-2005. Figure 19 shows the historical distribution for 1984-2002 by end product (frozen vs. canned). Clearly, both harvest and processing play important roles in the Bristol Bay economy, with one industry closely tied to and dependent on the other for economic success.

Table 59. 2005 Bristol Bay Salmon Fishery Processing and Gross Earnings

	Count	Price per unit	Gross Earnings (2005\$)
Sockeye			
Tall Cans (cases)	237,369	\$ 90.06	\$ 21,377,452
Halves (cases)	906,843	\$ 59.25	\$ 53,730,448
Fresh Headed & Gutted (lbs)	2,342,212	\$ 2.65	\$ 6,206,862
Frozen Headed & Gutted (lbs)	57,132,488	\$ 2.05	\$ 117,121,600
Frozen and fresh Fillet (lbs)	2,239,781	\$ 3.90	\$ 8,735,146
Roe (lbs)	3,609,918	\$ 3.55	\$ 12,815,209
Subtotal	66,468,611		219,986,717
Chinook			
Fresh Headed & Gutted (lbs)	315,414	\$ 4.36	\$ 1,375,205
Frozen Headed & Gutted (lbs)	493,726	\$ 2.57	\$ 1,268,876
Roe (lbs)	35,243	\$ 3.86	\$ 136,038
Subtotal	844,383		2,780,119
Chum			
Frozen Headed & Gutted (lbs)	4087138	\$ 0.72	\$ 2,942,739
Total			\$ 225,709,575

Source: Personal Communication, Alaska Department of Revenue, 2006.

Table 60. Comparison of Bristol Bay Harvest and Processing Total Earnings (2005)

<i>sector</i>	<i>Pounds</i>	<i>Earnings</i>
Harvest	165,582,203	\$ 94,571,755
Processing	114,665,676	\$ 225,709,575

Table 61. 2003-2005 Total Bristol Bay Fishery Salmon Production Value, by End-product Type

<i>Year</i>	<i>Type</i>	<i>Net Weight</i>	<i>Wholesale Value</i>	<i>\$/pound</i>
2002	Canned	22,097,595	55,275,886	\$2.50
2002	Fresh	212,571	327,357	\$1.54
2002	Frozen	22,686,595	39,698,079	\$1.75
2002	Other	Confidential	Confidential	Confidential
2003	Canned	21,936,035	51,488,596	\$2.35
2003	Fresh	1,129,280	1,531,488	\$1.36
2003	Frozen	34,296,062	55,823,648	\$1.63
2003	Other	1,575,092	7,086,321	\$4.50
2004	Canned	31,080,841	68,610,956	\$2.21
2004	Fresh	6,404,391	8,054,856	\$1.26
2004	Frozen	54,471,049	95,680,315	\$1.76
2004	Other	1,451,444	4,815,510	\$3.32
2005	Canned	30,567,479	75,107,900	\$2.46
2005	Fresh	2,342,212	6,206,862	\$2.65
2005	Frozen ¹	59,372,269	125,856,746	\$2.12
2005	Other	3,609,918	12,815,209	\$3.55

¹ indicates "frozen and fresh fillets". Fresh excludes "fresh filets" for 2005 data from Alaska Department of Revenue.

Source: Knapp (2004) and Alaska Department Of Revenue.

Figure 20 shows historical real prices per round pound for 1984 to 2004 for three different related markets for sockeye salmon: Bristol Bay ex vessel, Bristol Bay frozen production price, and Japan August wholesale price. The price differences are indicative of markups, and show how the relative shares of total value received by harvesters and processors has changed over time, and in response to rising or falling market price conditions.

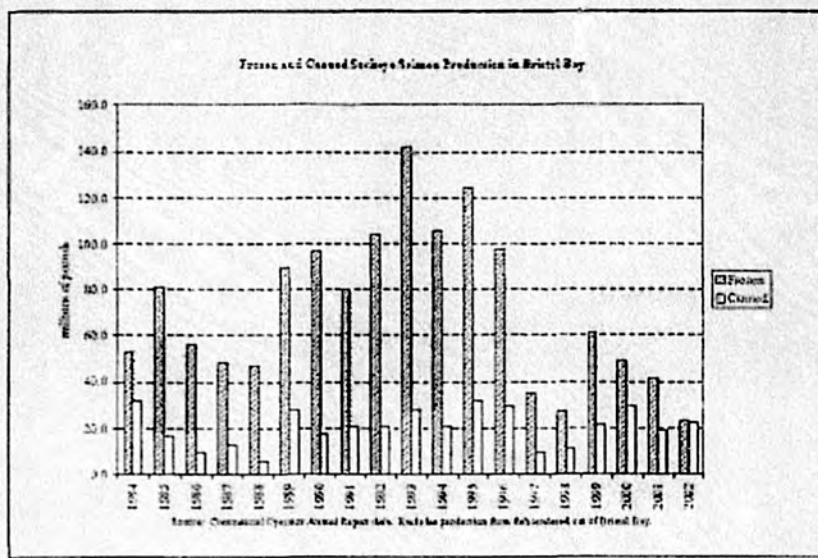


Figure 19. Time Series, Frozen and Canned Production of Bristol Bay Sockeye Salmon (Source: Knapp 2004)

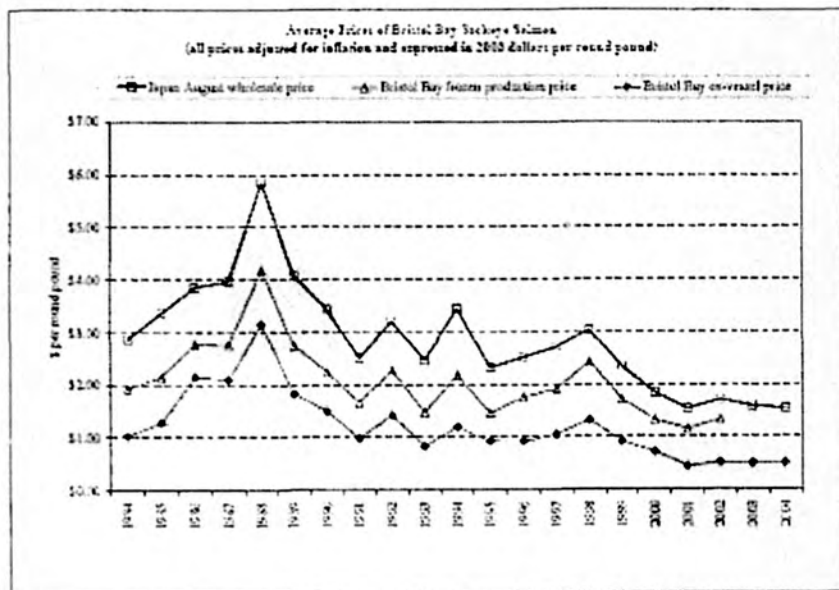


Figure 20. Time Series, Average Prices of Bristol Bay Sockeye Salmon. (Source: Knapp 2004)

7.0 Subsistence Harvest

The subsistence harvest within the Bristol Bay region generates regional economic impacts when Alaskan households spend money on subsistence-related supplies. Goldsmith (1998) estimated that Alaskan Native households that use Bristol Bay wildlife refuges for subsistence harvesting spend an average of \$2,300 per year on subsistence-related equipment to aid in their harvesting activities. Additionally, Goldsmith estimated that Non-Native households spend \$600 annually for this purpose. Correcting for inflation from 1998 to 2005 implies annual spending for subsistence harvest of about \$2,780 for Native households and \$725 for Non-Native households.

Figure 21 shows the general distribution of subsistence harvest by Bristol Bay residents. Overall, salmon make up the largest share of all harvest (on a basis of usable pounds), and accounts for over one-half of all harvest. Another nearly one third of harvest come from land mammals (31%), and non-salmon fish comprise another 10% of harvest.

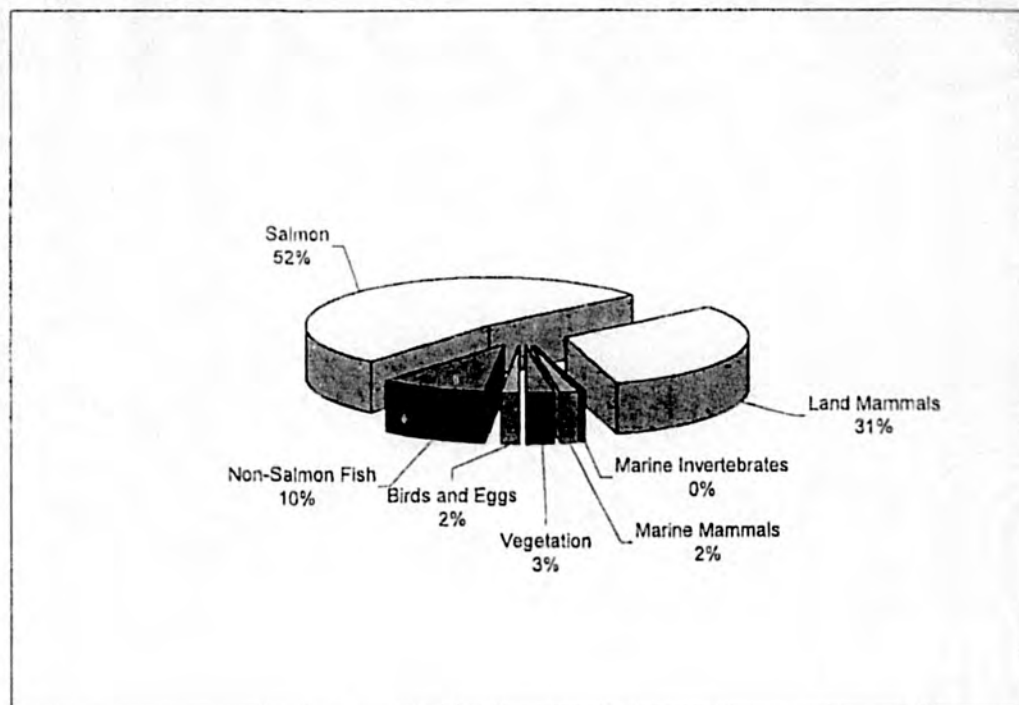


Figure 21. Distribution of Bristol Bay Subsistence Harvest

Table 62 shows average per capita and total estimated community subsistence harvest for the Bristol Bay communities. In total, individuals in these Bristol Bay communities harvest about 2.4 million pounds of subsistence harvest per year for an average of 315 pounds per person annually. Table 63 and Table 64 detail Bristol Bay area subsistence harvest by salmon species and location.

Table 62. ADF&G Division of Subsistence Average Per Capita Subsistence Harvest for Bristol Bay Communities

Bristol Bay Area Community /year of harvest data	Population (2000 census)	Per Capita Harvest	Total Annual Harvest	% Native Population
Aleknagik 1989	221	379	54,079	81.9%
Clark's Point 1989	75	363	20,325	90.7%
Dillingham 1984	2,466	242	494,486	52.6%
Egegik 1984	116	384	37,450	57.8%
Ekwok 1987	130	797	85,260	91.5%
Igiugig 1992	53	725	33,915	71.7%
Iliamna 2004	102	508	51,816	50.0%
King Salmon 1983	442	220	81,261	29.0%
Kokhanok 1992	174	1,013	175,639	86.8%
Koliganek 1987	182	830	154,705	87.4%
Levelock 1992	122	884	97,677	89.3%
Manokotak 1985	399	384	118,337	94.7%
Naknek 1983	678	188	72,110	45.3%
New Stuyahok 1987	471	700	247,494	92.8%
Newhalen 2004	160	692	110,720	85.0%
Nondalton 2004	221	358	79,118	89.1%
Pedro Bay 2004	50	306	15,300	40.0%
Pilot Point 1987	100	384	24,783	86.0%
Port Alsworth 2004	104	133	13,832	4.8%
Port Heiden 1987	119	408	41,985	65.6%
South Naknek 1992	137	297	39,893	83.9%
Ugashik 1987	11	814	8,144	72.7%
Togiak City	809	--	--	86.3%
Portage Creek	36	--	--	86.1%
Twin Hills	69	--	--	84.1%
Total communities	7,447	--	--	--
Unincorporated areas	164	--	--	--
Total (interpolated to include unincorporated areas)	7,611	315	2,397,970	69.6%

Table 63. Historical Subsistence Harvest for Bristol Bay, Alaska. (Knapp et al. 2004)

YEAR	PERMITS		ESTIMATED SALMON HARVEST					TOTAL
	ISSUED	RETURNED	CHINOOK	SOCKEYE	COHO	CHUM	PINK	
1983	829	674	13,268	143,630	7,477	11,646	1,073	177,104
1984	882	698	11,537	168,803	16,035	13,009	8,228	217,612
1985	1,015	808	9,737	142,755	8,122	5,776	825	167,216
1986	930	723	14,893	129,487	11,005	11,268	7,458	174,112
1987	896	886	14,424	135,782	8,854	5,161	673	167,894
1988	938	835	11,848	125,558	7,333	9,575	7,341	161,652
1989	955	831	9,678	125,243	12,069	7,283	801	155,074
1990	1,042	870	13,462	128,343	8,389	9,224	4,455	163,874
1991	1,194	1,045	15,245	137,837	14,024	6,574	572	174,261
1992	1,203	1,028	16,425	133,605	10,722	10,661	5,325	176,739
1993	1,206	1,005	20,527	134,050	8,915	6,539	1,051	171,082
1994	1,193	1,019	18,873	120,782	9,279	6,144	2,708	157,787
1995	1,119	990	15,921	107,717	7,423	4,566	691	136,319
1996	1,110	928	18,072	107,737	7,519	5,813	2,434	141,575
1997	1,166	1,051	19,074	118,250	6,196	2,962	674	147,156
1998	1,234	1,155	15,621	113,289	8,126	3,869	2,424	143,330
1999	1,219	1,157	13,009	122,281	6,143	3,653	420	145,503
2000	1,219	1,109	11,547	92,050	7,991	4,837	2,599	118,824
2001	1,226	1,137	14,412	92,041	8,406	4,158	830	119,856
2002	1,093	994	12,936	81,088	6,565	6,658	2,341	109,587
2003	1,182	1,058	21,231	95,690	7,816	5,868	1,062	131,667
1999-2003								
Average	1,188	1,091	14,627	96,630	7,384	4,995	1,452	125,088
1994-2003								
Average	1,176	1,060	16,070	105,093	7,546	4,833	1,619	135,161
All Years								
Average	1,093	951	14,845	121,715	8,972	7,050	2,571	155,153

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Alaska Subsistence Fisheries Database, Version 3.4

Table 64. Bristol Bay Subsistence Salmon Harvests by Location, 2003. (Knapp et al. 2004)

Area and River System	Permits Issued ¹	Estimated Number of Salmon Harvested ²					Total
		Sockeye	Chinook	Chum	Pink	Coho	
NAKNEK-KIVICHAK DISTRICT	489	61,443	1,221	259	198	812	63,934
Naknek River ³	318	22,948	1,080	233	195	672	25,129
Kivichak River/Wlamna Lake:	175	33,495	142	26	3	140	33,806
Agniak (Branch) River	1	48	0	0	0	0	48
Igugig	5	1,053	1	0	0	1	1,055
Wlamna Lake	38	7,049	0	0	0	0	7,049
Kijk	1	80	0	0	0	0	80
Kokhanok	29	9,990	69	16	3	73	10,170
Kivichak River	7	755	0	0	0	0	755
Lake Clark: General	33	2,949	0	0	0	0	2,949
Levickok	7	629	52	10	0	68	757
Newhakun River	27	7,934	0	0	0	0	7,934
Nondalton Village	6	1,938	0	0	0	0	1,938
Pedro Bay	10	2,144	0	0	0	0	2,144
Port Alsworth	4	464	0	0	0	0	464
Six Mile Lake	15	3,483	0	0	0	0	3,483
Naknek or Kivichak Unspecified	0	0	0	0	0	0	0
EGEGIK DISTRICT⁴	62	3,240	84	32	10	297	3,663
UGASHIK DISTRICT⁵	23	1,113	31	20	0	392	1,567
NUSHAGAK DISTRICT	527	25,491	18,686	5,064	403	5,432	55,076
Wood River ⁶	128	3,979	3,311	268	5	403	8,026
Lower Nushagak River ⁷	36	975	2,120	343	5	120	3,568
Upper Nushagak River ⁸	80	6,363	4,448	3,210	232	1,310	15,563
Dillingham Beaches ⁹	244	8,451	7,778	987	54	2,956	20,255
Nushagak Bay Commercial ¹⁰	59	1,665	672	210	68	539	3,155
Igushik/Snake River	30	3,882	357	45	9	44	4,337
Nushagak, Site Unspecified	2	176	0	0	0	0	176
TOGIAK DISTRICT¹¹	92	4,403	1,208	483	451	883	7,428
TOTAL BRISTOL BAY	1,182	85,690	21,231	5,868	1,062	7,816	131,667

¹ Sum of sites may exceed district totals, and sum of districts may exceed area total, because permittees may use more than one site.

² Harvests are extrapolated for all permits issued, based on those returned and on the area fished as recorded on the permit. Due to rounding, the sum of columns and rows may not equal the estimated total. Of 1,182 permits issued for the management area, 1,058 were returned (89.5%).

³ Includes Mile 5 North, Naknek River General, Powerline-North, North and South Savonoski, South Naknek Beach, and Telephone Point-North.

⁴ Includes Egegik river and beach.

⁵ Includes Pilot Point and Ugashik.

⁶ Includes Dragat, Aleknagik, Muklung River, Red Bluff, and Upper and Lower Wood River General.

⁷ Includes Black Point, Grassy Island, and Lewis Point.

⁸ Includes Ekwok, Kokwak River, New Sluyahok, Kofiganek, Mulchatna River, and Portage Creek.

⁹ Includes Bradford Point, City Dock, Kanakanak, Scandinavia, Skinner, Snag Point, and Squaw Creek.

¹⁰ Includes Clark's Point, Eku, Etolin Point, Nushagak Point, Protection Point, and Queen's Slough.

¹¹ Includes Togiak village and Togiak River.

In 2000 the US Census reported an estimated 2,290 Native and 1,129 non-native households in the Bristol Bay Region (Bristol Bay Borough, Lake and Peninsula Borough, and Dillingham). Based on the Goldsmith (1998) estimate of direct expenditures related to subsistence harvest, this implies an annual direct subsistence-related expenditure of approximately \$7.2 million in the Bristol Bay region (Table 65).

Table 65. Estimated Total Annual Bristol Bay Area Subsistence-Related Expenditures

<i>Area</i>	<i>Population 2004</i>	<i>Percent Alaska native</i>	<i>Number of households</i>	<i>Number of Native Households</i>	<i>Number of non-native Households</i>
Bristol Bay Borough	1,103	43.7%	490	214	276
Dillingham Census Area	4,924	70.1%	2,341	1,641	700
Lake & Penninsula Borough	1,584	73.5%	588	432	156
Total Bristol Bay Region	7,611	67.0%	3,419	2,290	1,129
Annual Spending/ household				\$2,780	\$725
Total Estimated Subsistence Spending				\$6,366,487	\$ 818,450
Total				\$	7,184,937

8.0 Sport Hunting

In addition to sport fishing, sport hunting also plays a significant (but smaller) role in the local economy of the Bristol Bay region. While not a large share of the economy, sport hunting in the Bristol Bay area offers high quality hunting opportunities for highly valued species. Bristol Bay sport hunting provides hunting opportunities for caribou, moose, and brown bear, among other species. Table 66 shows reported hunter numbers for the most recently reported representative years for several species hunted in the region.

Table 66. ADF&G Reported Big Game Hunting in Bristol Bay and Alaska Peninsula Game Management Units

Most recent Big Game Hunting Estimates from ADF&G Wildlife Management Reports (Number of hunters)					
	Alaska Peninsula (GMU 9)		Bristol Bay (GMU 17)		
	Non-local Residents	NR	Non-local Residents	NR	
Moose	146	184	140	294	All hunters 2002
Caribou	23	0	1115	1439	All hunters 2003-04
Brown bear	90	319	24	74	most recent available 5-year average
	259	503	1279	1807	

The caribou estimate for GMU 17 is for the Mulchatna herd and extends beyond the GMU 17 borders

Shaded cells include both non-local residents and local residents

Sources: Alaska Wildlife Harvest Summary (2003-04); ASDF&G Species-specific Wildlife Management Reports

Table 67 outlines the estimation of total annual expenditures for big game hunting within the Bristol Bay region. These estimates are based on an assumption of one trip per hunter per year for a species, and utilizes estimates of hunter expenditures per trip developed by Miller and McCollum (1994) adjusted to 2005 price levels.

Table 67. Estimated annual big game hunting expenditures for Bristol Bay region

Statistic	Nonresidents	Non-local residents
Estimated trips	2,310	1,538
Expenditure per trip	\$4,706	\$972
Total estimated direct expenditure	\$10,870,860	\$1,494,936
Total	\$12,365,796	

In total, it is estimated that Bristol Bay area big game hunters living outside of the area spend about \$12.4 million per year in direct hunting-related expenditures. The expenditure estimate

above may include some caribou hunting of the Mulchatna herd outside of the closely defined Bristol Bay region game management units.

9.0 Wildlife Viewing / Tourism

Many of the sport fishing and sport hunting visitors to the Bristol Bay region also engage in other activities while there such as kayaking, canoeing, wildlife viewing or bird watching. However an estimated 10,000 visitors to the region come expressly to view wildlife or engage in other non-consumptive outdoor recreation activities.

The Bristol Bay region has a number of nationally recognized special management areas for wildlife. These include Katmai and Lake Clark National Parks, the Togiak and Becherof National Wildlife Refuges, and Wood-Tikchick State Park. The most accessible and popular destination for visitors interested in non-consumptive recreation activities is Katmai National Park, and in particular Brooks Camp on Naknek Lake which is world famous as a site for bear viewing. The camp accommodates both day and overnite visitors who are there to view the bears, as well as sport fishermen.

Information on the number of non-consumptive use visitors, their itineraries and activities while in the region, and their expenditures is extremely limited. Unlike sport fishing and sport hunting, no license is required for these other activities so there is no consistent and comprehensive record documenting these trips.

In particular, the visitation numbers collected by the park service in Katmai cannot be used as a guide to the number of non-consumptive recreational visitors to the region because they include sport fishermen as well as large numbers of visitors to the eastern portion of the park where the waters flow into Shelikof Strait and Cook Inlet.

Our estimate of non-consumptive recreational visitation is based on adjusted visitation data collected for Brooks Camp (available through 1999). Our estimate assumes that Brooks Camp receives most of the non-consumptive visits to the region and that about 1/3 of total visitors to Brooks Camp engage in sport fishing while in the region. Based on these assumptions, there are approximately 1,000 non-local Alaska residents and 9,000 nonresidents who visit the Bristol Bay region for wildlife viewing/tourism (and not to fish). Total expenditure for this group is estimated to be \$17,138,290, using expenditure data from McCollum and Miller (1994). This is an approximate estimate based on limited and outdated information, and is an area for further research.