

Bristol Bay Set Gillnet Permit Stacking



CFEC Report No. 12-02-N
November 2012

Alaska Commercial Fisheries Entry Commission
8800 Glacier Highway, Suite 109
P.O. Box 110302
Juneau, Alaska 99811-0302

OEO/ADA Compliance Statement

The Commission is administratively attached to the Alaska Department of Fish and Game (ADF&G).

ADF&G administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

- ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK 99811-5526
- U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA 22203
- Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW, MS 5230, Washington, DC 20240

The department's ADA Coordinator can be reached via phone at the following numbers:

- (VOICE) 907-465-6077
- (Statewide Telecommunication Device for the Deaf) 1-800-478-3648
- (Juneau TDD) 907-465-3646
- (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact the following:

Commercial Fisheries Entry Commission (CFEC)

Research Section

8800 Glacier Highway, Suite 109

P.O. Box 110302

Juneau, Alaska 99811-0302

(907) 789-6160 *phone*

(907) 789-6170 *fax*

Abstract

In December of 2009, the Alaska Board of Fisheries met for the Bristol Bay Finfish meeting. Proposal 17 in this meeting included provisions for the stacking of limited entry permits in the Bristol Bay set gillnet fishery. As written, the proposal sought to allow a permit holder the opportunity to use a second permit to double the maximum amount of net he or she can deploy when fishing. The stacking proposal passed and a new regulation went into effect in 2010, but it contained a sunset clause which would cause the regulation to expire at the end of 2012. Multiple proposals were submitted for the December 2012 Board of Fisheries Bristol Bay Finfish meeting to remove the sunset clause, thereby allowing permit stacking to remain. In this paper, I quantitatively explore the effects of permit stacking in the Bristol Bay set gillnet fishery by observing participation, real earnings, permit prices, and landings. Discussed are topics such as changes in permit distribution, the use of emergency transfer permits, changes in the permit price, and how this regulation affects the proportion of landings among resident classes.

Cover photos courtesy of Marcus Gho and Tim Sands

Prepared by Marcus J. Gho

Special thanks to: Kurt Iverson, Christine Gho, Jen Shriver, Craig Farrington, Jen Wilson, Tim Sands, Mike Davis, and Tom O'Conner for contributing to this report.

The opinions and any errors in this paper are the responsibility of the author.

Table of Contents

Abstract	i
Table of Contents.....	ii
Introduction	1
Methods	3
Number and Distribution of Permit Holdings	5
Background on the Second Permit in Two Permit Operations	7
Fishery Performance	9
New Entrants into the S04T Fishery.....	13
Permit Value.....	15
Conclusion	17
Appendix A. Derivation of 2012 Fishing Activity	18
Appendix B. S04T Participation by Residency, Showing Stacked versus Single Permit Operations.....	19
Appendix C. Regression on Permit Prices for Bristol Bay Set Gillnet permits	21
References.....	23

Introduction

In 2002, the Alaska Legislature passed House Bill 286, amending Alaska Statute 16.43.140 (c). This new law allows individuals the ability to concurrently hold two salmon limited entry permits in the same permit fishery. The law specifies that individuals who hold two salmon limited entry permits are allowed to fish only one of the two permits. This prohibition, however, was supplanted under specific circumstances by House Bill 251, which was passed in 2006. HB 251 provided the Alaska Board of Fisheries the authority to grant fishing privileges to the second permit held by an individual, otherwise known as permit stacking. Although much of the initial interest in presenting the bill was centered on fishing activity in Bristol Bay, the bill was introduced as applicable to all CFEC limited entry permits. By the time the bill was signed into law the same year, it was modified to apply to salmon permits only.

The Board of Fisheries (Board) allowed for permit stacking in the Kodiak salmon set gillnet fishery starting in 2008. The 2008 Kodiak regulations included a 2010 sunset provision; when the Board met on the subsequent cycle, in December of 2010, they chose to allow the sunset regulation to prevail removing the stacking option. Regulations for the Cook Inlet salmon set gillnet fishery allow for permit stacking; however, no sunset provision was included in the Cook Inlet regulations.

In December of 2006, the Board met to discuss regulations relating to Bristol Bay. Among the topics discussed was Proposal 15 which requested that individuals who hold either two Bristol Bay set (S04T) or drift gillnet (S03T) permits the option to permit stack. The Alaska Department of Fish & Game (ADF&G) indicated a neutral stance; however, they expressed concerns in written comments regarding adjacent S04T permit holders being affected by an additional compliment of gear, quality of catch for those stacking permits, and restrictions regarding the maximum distance that set gillnet gear may be fished relative to shore. The proposal was tabled to the Board restructuring committee with possible action for the next cycle.

In December of 2009, the Board again met to discuss Bristol Bay regulations. This time, there were four proposals in favor of permit stacking in the set gillnet fishery. ADF&G took a neutral stance for each of these proposals.

There were 33 written comments submitted for Proposal 17 from the public; two-thirds of the comments were in favor of the new regulations. Some of these comments included petitions signed by multiple individuals. Comments in favor of permit stacking generally indicated a desire to allow permit holders the ability to 'make a living wage.' With the exception of the Kvichak Setnetters Association, all of the comments in favor of permit stacking were made by individuals. Proponents for Proposal 17 suggested that no

harm would occur as the permits that would be used to add the complement of gear were already being fished. Many comments, whether they were in favor or opposed to permit stacking, indicated a desire to keep permits local to the Bristol Bay watershed and to help fishing families. Generally, those against permit stacking were opposed to restructuring the fishery. Opponents included individuals but also included other organizations such as the Aleknagik Traditional Council, Choggiung Limited, and the Bristol Bay Economic Development Council (BBEDC). There were also concerns that allowing for permit stacking would drive up the value of the permit price and therefore make it more difficult for locals to buy permits. BBEDC expressed concerns that permit stacking will disfavor locals, their argument being that locals have less access to capital.

Record copies submitted during the meeting included strong opposition to the permit stacking proposals. All of the Advisory committees were opposed to permit stacking due to concerns with how it would negatively affect local watershed residents. Other concerns that were raised in committees include: stacked permits limiting adjacent set gillnetters ability to catch fish, lower quality of fish due to higher volume of harvest and less access to capital by locals.

Based on a review of comments and testimony, permit stacking was indeed a contentious issue. No action was taken on Proposals 16, 18, or 19; however, proposal 17 passed but was amended to include a three-year sunset clause.

In 2012, 11 proposals were submitted to repeal the sunset clause of set gillnet permit stacking. Two of the proposals came from set net associations, and the other nine proposals came from fishermen.

Methods

Data was selected from the CFEC permit file, ADF&G fish tickets, and the CFEC census file. Both the CFEC permit file and ADF&G fish ticket files are organized by year. Residency was determined from merging the CFEC permit file and CFEC census file. Information on declaration of residency, address fields, and how fees were paid were used to determine Alaska residency. The first priority utilized to determine Alaska residency was the residency declaration, the second priority considered was the mailing address, and third was the fee payment. For this paper, three residency classes were defined:

- **Local** – permit holders who reside within the Bristol Bay ADF&G management area;
- **Nonlocal** – permit holders who live in Alaska but are not local to Bristol Bay; and
- **Nonresident** – permit holders who do not reside in Alaska.

Permit ownership was tracked by creating a unique row of data for each permit and each day of the year. An owner was defined by the unique CFEC person identifier. Permit ownership included holders of permanent permits or holders of permits received by emergency transfer, as both types of permit holdings are allowed in permit stacking. ADF&G fish ticket landings were aggregated by landing day for each individual using the CFEC person identifier. The fish ticket and permit files were merged by the person identifier, date, and permit number. The resulting table was limited to individuals who made landings. On days in which landings were made, the CFEC permit file was queried to determine if a second permit was owned by the same person. If a second permit was identified, then the individual was considered to have stacked his/her permits that year.

For the redistribution due to permit stacking section, all individuals who made landings in both 2008 and 2011 were considered. The stacking year of 2011 was selected as it has the most recent cohort of stacked permit operations for which there is landing data. 2008 was selected as the pre-regulation year to compare fishing activity. Permit operation type (stacked/single permit operation) was further classed based on residency for the 2011 year. Counts of fish landed were considered for each class in both years.

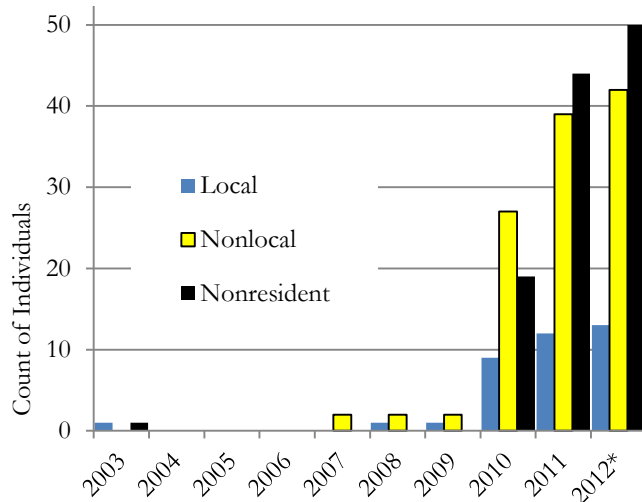
Permit price modeling used regression results of real (adjusted for inflation) permit prices from the quantity of pounds caught using S04T permits along with the world production of farmed Atlantic salmon, and a binary variable used to indicate the presence of permit stacking or not. Information on permit values for this report included only arm-length transactions from the CFEC transfer survey file. The S04T permit values were adjusted for inflation using the U.S. Bureau of Labor Statistics CPI data by month, with the month of sale used to adjust for inflation with a base price of January 2012. Values of the transactions are depicted in Appendix C in a boxplot so as to maintain confidentiality. Total harvest pounds caught by the S04T fishery are an aggregate of all commercially-caught pounds of fish as documented in the ADF&G fish tickets. Production of Atlantic

farmed salmon is aggregated from the Food and Agriculture Organization of the United Nations (FAO) FishStat. At the time of this publication, FAO data extends only through 2010. For 2011, several sources indicate an excess of 1,600 kiloton production of farmed Atlantic salmon; the North Atlantic salmon Conservation Organization level was selected as a more conservative figure, and also due to the fact that other year's counts of Atlantic salmon are comparable to that of FAO FishStat data. Additional variables were considered such as the Japanese yen exchange rate and the world production of farmed salmonids including: Chinook, chum, coho, rainbow trout, and sockeye from the FAO FishStat dataset. The following variables measuring harvest were considered: the total harvest pounds from fish tickets; average ex-vessel value; the aggregate ex-vessel value; the number of fish landed; and the number of permit sales. The additional and substitute variables were eliminated using the Akaike information criterion to derive the most parsimonious and robust model possible given the data used. Please note that S04T permit price for this paper was modeled but the price of sockeye was not analyzed. The model was tested for homoscedasticity using the White test, and for autocorrelations with a Durbin-Watson parameter. Due to the presence of autocorrelation, the model was adjusted with a lag of 4. When the presence of autocorrelations is ignored, the biased stacked value is higher. Several reasons might explain a lag of four, such as memory of previous harvests which would influence expectation for return on investment, costs due to capitalization, memory of recent catch history, and so forth.

Number and Distribution of Permit Holdings

Year-end distribution of Bristol Bay salmon set gillnet (S04T) permit holders across years provides annual snapshots to help identify trends. Starting in 2010, when permit

Figure 1. Year-end Distribution of Individuals With Two S04T Permits



*Year-end 2012 as of October 10, 2012

stacking regulations came into effect, the count of individuals who held two permits at year-end rose substantially, especially among nonresidents and nonlocals. It should be noted that these figures do not include emergency transfer (ET) permits, as these permits revert back to the permanent permit holder at the end of each year. As it is a year-end snapshot, mid-year permit holdings are not reflected.

Table 1 provides counts of year-end permit holdings. For example, in 2011, 95 of 886 individuals (10.7%) held two S04T permits at year end. Among the Alaska nonlocals, 39, or 27.8% of all Alaska nonlocals, held two S04T permits.

Table 1. Number of S04T Permit Holders with Two Permits at Year-end

Year	Total Permit Holders	Permit Holders with Two Permits		Local		Nonlocal		Nonresident	
		Count	Percent	Count	Percent	Count	Percent	Count	Percent
2003	993	2	0.2%	1	0.3%	0	0.0%	1	0.3%
2004	983	0	0.0%	0	0.0%	0	0.0%	0	0.0%
2005	983	0	0.0%	0	0.0%	0	0.0%	0	0.0%
2006	982	0	0.0%	0	0.0%	0	0.0%	0	0.0%
2007	980	2	0.2%	0	0.0%	2	1.9%	0	0.0%
2008	976	3	0.3%	1	0.3%	2	0.8%	0	0.0%
2009	979	3	0.3%	1	0.3%	2	2.1%	0	0.0%
2010	927	55	5.9%	9	2.6%	27	18.5%	19	6.4%
2011	886	95	10.7%	12	3.6%	39	27.8%	44	15.8%
2012*	874	105	12.0%	13	3.9%	42	16.0%	50	18.2%

Percent is a percentage of holdings for all permit holdings of the residency class.

Permits held by DCCED/CFAB are not considered in this table.

** 2012 year-end data is as of October 10, 2012*

Rather than looking at year-end counts, Figure 2 depicts counts of individuals who held two permits and made a landing at some point during the year. Due to the ease of transferability of CFEC permits, permits change hands throughout the year which contributes to the higher counts in Figure 2. The difference between permit holdings, as reflected in Figure 1 and Figure 2, ranges between 70% and 80%. Table 2 includes both permanent and ET permits. An important aspect of permit stacking is the number of individuals whose second permit is an ET permit, which reverts to the original owner at year-end. As with Figure 1, Figure 2 clearly indicates substantial increases in the number of individuals who held two permits. In 2010, the first year of permit stacking, approximately the same number was held among all resident classes; however, in the two years following counts of multiple permit holders decreased among locals while there was substantial growth among nonlocals and nonresidents.

Figure 2. Permit Stacking In-season

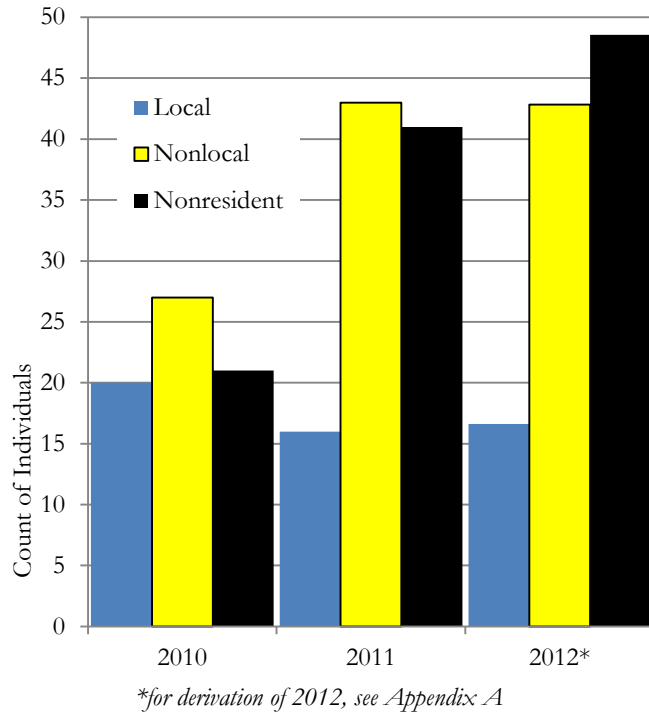


Table 2. S04T Permit Stacking In-season Counts

	<i>Local</i>	<i>Nonlocal</i>	<i>Nonresident</i>	<i>Total</i>
<i>2010</i>	20	27	21	68
<i>2011</i>	16	43	41	100
<i>2012*</i>	17	43	49	109

Only fished permits are included in this table
**for derivation of 2012 values, see Appendix A*

While this report may provide comprehensive data for the years 2010 and 2011, it should be noted that future trends are not projected. Likewise, had there been no sunset provision in the permit stacking regulation, the amount of participation in permit stacking may have been significantly different.

Background on the Second Permit in Two Permit Operations

There are two ways in which a set gillnetter can transition to a stacked permit operation: either by using an additional permanent permit or an ET permit. While comments submitted to the Board did not discuss the use of ET permits as part of permit stacking, this provision found inclusion into the regulation. CFEC collects data from a survey each time a permanent transfer occurs. While less information on ET's is gathered, other information such as address and name data from the permanent permit owner and ET recipient can shed insight as to who is benefiting from ET permits.

The use of ET permits is an important aspect of permit stacking. In 2010, 29 of the 68 (42.6%) permit stacking operations used at least one ET permit, and in 2011, 19% of stacked operations utilized ET permits. Before permit stacking was allowed, if an individual had to ET their permit they had to find an able bodied, willing individual who did not already have a permit. By allowing the use of ET permits in permit stacking, rather than finding an individual without a permit one simply had to identify one of the many individuals who were fishing that wished to use an additional complement of gear.

Figure 3. Use of Emergency Transfer Permits in Stacked Operations

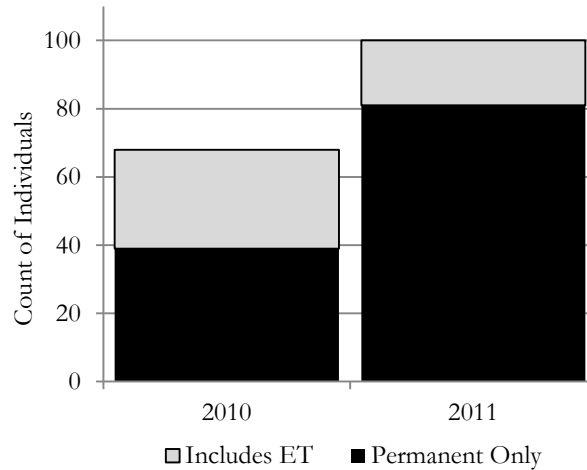


Table 3. Use of Emergency Transfer Permits in S04T Stacked Permit Operations

Year	Total Stacked Permit Operations	Permanent Only	Includes ET
2010	68	39	29
2011	100	81	19

Appendix B provides substantial detail as to the utilization of ET and Permanent permits by year and resident class.

During discussions about implementing stacked permit operations, there was a substantial amount of discussion on both sides of the issue regarding the importance of

serving fishing families. Table 4 describes the source of the second permit for year-end permit holdings, regardless of when they acquired the second permit. Almost half of the second permits held by year-end permit holders came from immediate family members. Among locals, a smaller percentage (between 11.1% and 16.7%) of permits came from individuals without association, whereas for nonlocals and nonresidents a higher proportion of the permits were sourced from persons other than family members or friends (between 29.6% and 36.4%).

Table 5 describes all permanent S04T permit transfers for the year and indicates the relationship between the transferor and transfer recipient. This includes permits used in both stacked and single permit operations. While it differs by showing transfers rather than holdings as Table 4 designates, it does provide information as to the rates of transfer among all permits.

Table 4. Source of Second Permanent Permit for Individuals with Two Permits at Year-end

Year	Residency	Total No. of Persons with Stacked Permits		Friend/ Partner		Immediate Family		Other Relative		Other	
2010	Local	9	16.4%	2	22.2%	4	44.4%	2	22.2%	1	11.1%
	Nonlocal	27	49.1%	4	14.8%	13	48.1%	2	7.4%	8	29.6%
	Nonresident	19	34.5%	3	15.8%	10	52.6%	0	0.0%	6	31.6%
	Total 2010	55		9	16.4%	27	49.1%	4	7.3%	15	27.3%
2011	Local	12	12.6%	2	16.7%	5	41.7%	3	25.0%	2	16.7%
	Nonlocal	39	41.1%	5	12.8%	20	51.3%	2	5.1%	12	30.8%
	Nonresident	44	46.3%	9	20.5%	19	43.2%	0	0.0%	16	36.4%
	Total 2011	95		16	16.8%	44	46.3%	5	5.3%	30	31.6%

Table 5. Relationship of Transferors to Transfer Recipients by Year for All S04T Transfers

Year	Total	Friend/ Partner		Immediate Family		Other Relative		Other	
2010	125	18	14.4%	61	48.8%	11	8.8%	35	28.0%
2011	107	21	19.6%	47	43.9%	8	7.5%	31	29.0%
1980-2011	2,945	605	20.5%	1,170	39.7%	208	7.1%	962	32.7%

* Transfer survey information is not included for permit foreclosures. However, subsequent transfers of these permits are included in the "other" category.

From Table 5-1 Changes in the Distribution of Alaska's Commercial Fisheries Entry Permits, 1975-2011 for S04T permits

Fishery Performance

Table 6 reports on the amount of nominal ex-vessel value from various classes of fishing operations. At first glance, it appears that ex-vessel values for each residency class are somewhat proportional from 2008 to 2011. In 2008, locals earned 35.9% of total ex-vessel value, in 2009 it was 35.2%, 36.4% in 2010 and 37.7% in 2011. Similar aggregate earnings are realized for nonlocals and nonresidents.

Table 6. Nominal Ex-vessel Value for Individuals by Residency and Single/Stacked Operations, 2008-2011

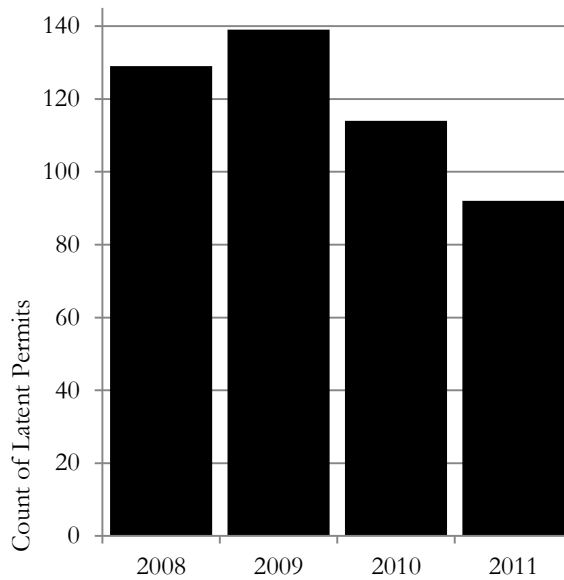
<i>Year</i>	<i>Residency</i>	<i>Operation Type</i>	<i>Individuals</i>	<i>Ex-Vessel Value</i>	<i>Average Ex-vessel Value</i>	<i>Individuals</i>	<i>Ex-Vessel Value</i>
2008	<i>Local</i>	Single	307	\$7,555,755	\$24,612	35.9%	36.1%
	<i>Nonlocal</i>	Single	267	\$6,267,329	\$23,473	31.3%	29.9%
	<i>Nonresident</i>	Single	280	\$7,132,610	\$25,474	32.8%	34.0%
	Total	Single	854	\$20,955,694	\$24,538	100%	100%
2009	<i>Local</i>	Single	302	\$8,268,507	\$27,379	35.2%	31.5%
	<i>Nonlocal</i>	Single	273	\$8,177,398	\$29,954	31.8%	31.2%
	<i>Nonresident</i>	Single	283	\$9,765,994	\$34,509	33.0%	37.3%
	Total	Single	858	\$26,211,898	\$30,550	100%	100%
2010	<i>Local</i>	Single	277	\$9,281,011	\$33,505	33.9%	29.9%
		Stacked	20	\$1,388,736	\$69,437	2.5%	4.5%
		<i>Combined</i>	297	\$10,669,747	\$35,925	36.4%	34.4%
	<i>Nonlocal</i>	Single	216	\$6,642,671	\$30,753	26.5%	21.4%
		Stacked	27	\$2,368,459	\$87,721	3.3%	7.6%
		<i>Combined</i>	243	\$9,011,130	\$37,083	29.8%	29.0%
	<i>Nonresident</i>	Single	255	\$9,500,259	\$37,256	31.3%	30.6%
		Stacked	21	\$1,840,943	\$87,664	2.6%	5.9%
		<i>Combined</i>	276	\$11,341,203	\$41,091	33.8%	36.6%
	Total	Single	748	\$25,423,941	\$33,989	91.7%	82.0%
Stacked		68	\$5,598,139	\$82,326	8.3%	18.0%	
Combined		816	\$31,022,079	\$38,017	100%	100%	
2011	<i>Local</i>	Single	284	\$8,987,217	\$31,645	35.7%	32.8%
		Stacked	16	\$1,070,626	\$66,914	2.0%	3.9%
		<i>Combined</i>	300	\$10,057,843	\$33,526	37.7%	36.8%
	<i>Nonlocal</i>	Single	192	\$5,279,503	\$27,497	24.2%	19.3%
		Stacked	43	\$2,852,534	\$66,338	5.4%	10.4%
		<i>Combined</i>	235	\$8,132,037	\$34,604	29.6%	29.7%
	<i>Nonresident</i>	Single	219	\$6,675,071	\$30,480	27.5%	24.4%
		Stacked	41	\$2,499,719	\$60,969	5.2%	9.1%
		<i>Combined</i>	260	\$9,174,790	\$35,288	32.7%	33.5%
	Total	Single	695	\$20,941,791	\$30,132	87.4%	76.5%
Stacked		100	\$6,422,879	\$64,229	12.6%	23.5%	
Combined		795	\$27,364,670	\$34,421	100%	100%	

Note, however, the number of locals participating in the fishery remains relatively constant while the overall number of nonlocals and nonresidents has declined. Table 7 and Figure 4 depict the reduction in latent permits as they are pulled into the fishery to create stacked permit operations.

Table 7. Counts of Permits used in Fishing Operations

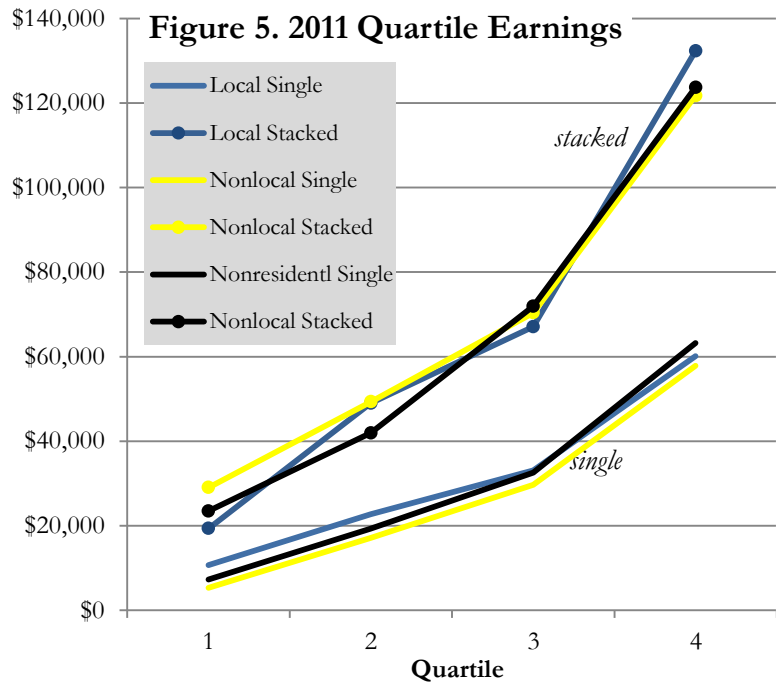
Year	Total Permits Fished	Year End Permits	% Permits Fished
2008	850	979	86.8%
2009	843	982	85.8%
2010	868	982	88.4%
2011	889	981	90.6%

Figure 4. S04T Latent Permits



It should also be noted that the average income for individuals with permit stacking operations is more than twice that of single permit operations.

It would seem logical that overall, individuals who are more capable of making landings would be in a better position to invest some of their earnings into making their operations more profitable by purchasing a second permit, as they would be more likely to have additional capital from their earnings. While average ex-vessel value is one metric of performance, there still exists a wide range of earnings across individuals. Figure 5 shows data from Table 8, which outlines average ex-vessel earnings by quartile. Quartile 1 is the bottom 25% of earners, while quartile 4 shows the top 25% of individuals. The higher sets of lines are average earnings among stacked permit holders, and the lower set of lines are from individuals who only made landings with a single permit. While one would expect a varying array of both skill and luck in landing fish, it is interesting that the earnings across quartiles among each of the residency classes



are evenly distributed. This suggests that individuals from each of the residency classes are fairly comparable in their ability to make landings. While earnings for each quartile may be fairly consistent across residency class, there still remain substantial differences in the counts of individuals stacking permits by residency classes. Given the same opportunity, the distribution of locals, nonlocals, and nonresidents in terms of ability to make landings appears equal.

Table 8. Quartile Earnings

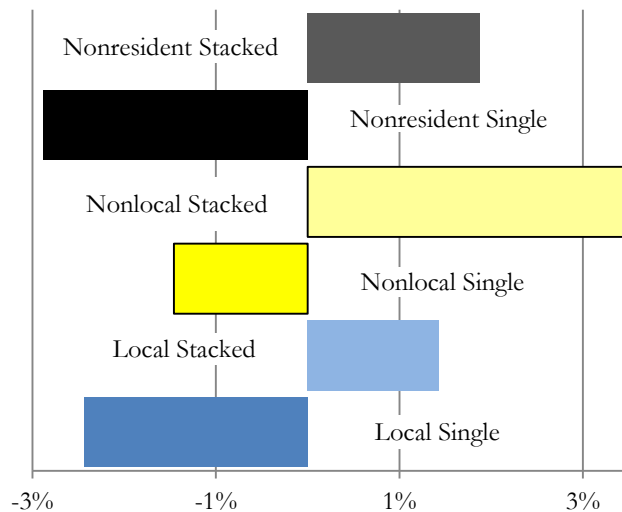
2010 Quartile	Local				Nonlocal				Nonresident			
	Single		Stacked		Single		Stacked		Single		Stacked	
	Value	Count	Value	Count	Value	Count	Value	Count	Value	Count	Value	Count
1	\$9,389	70	\$19,995	5	\$6,754	54	\$29,638	7	\$7,509	64	\$48,274	5
2	\$23,855	70	\$42,917	5	\$18,226	54	\$54,087	7	\$21,850	64	\$66,699	5
3	\$36,174	70	\$54,711	5	\$32,297	54	\$103,972	7	\$37,740	64	\$86,700	5
4	\$65,986	67	\$160,124	5	\$65,734	54	\$175,763	6	\$82,626	63	\$138,763	6

2011 Quartile	Local				Nonlocal				Nonresident			
	Single		Stacked		Single		Stacked		Single		Stacked	
	Value	Count	Value	Count	Value	Count	Value	Count	Value	Count	Value	Count
1	\$10,670	71	\$19,350	4	\$5,290	48	\$29,033	11	\$7,324	55	\$23,483	11
2	\$22,739	71	\$48,968	4	\$17,161	48	\$49,318	11	\$19,333	55	\$41,939	11
3	\$33,088	71	\$67,049	4	\$29,700	48	\$70,335	11	\$32,602	55	\$71,890	11
4	\$60,083	71	\$132,290	4	\$57,838	48	\$121,700	10	\$63,257	54	\$123,660	8

Some individuals suggested in their public comments that fishermen would not be harmed by permit stacking because the second permit in a stacked operation would only come from permits already fished. If no latent permits were used for permit stacking and each permit landed an equal number of fish this likely would be true. Figure 4 shows that many latent permits were brought into use since permit stacking went into effect. While permits are homogenous in providing access to the fishery, individuals that hold permits vary in ability to make

landings, as shown in Figure 5 and Table 8. With a lower proportion of locals participating in permit stacking, there is likewise a lower amount of benefits derived to locals. Figure 6 describes Table 9, which outlines the redistribution of landings brought about by permit

Figure 6. Redistribution Due to Stacking



stacking. The landings of individuals who fished in both 2008 and 2011 were compared. Residency was determined by the permit holder's 2011 status. While this may be a limited view comparing only two years, other years were observed and results were similar. Table 9 indicates that 33 nonlocals had stacked permit operations in 2011 and also made landings in 2008. This 3.4% of individuals landed 8.1% of all fish in 2008, before stacking, and 11.6% of the fish in 2011. As a result of permit stacking, for the comparison years, both locals and nonresidents landed fewer fish overall while nonlocals landed proportionately more. Each of the single permit operations effectively landed fewer fish as stacked operations increased their share of the landings.

Table 9. Proportion of Fish Landed Before and After S04T Permit Stacking Regulations

		People		Number of Fish Landed				
		<i>Count</i>	<i>Percent</i>	<i>2008</i>	<i>2011</i>	<i>2008</i>	<i>2011</i>	<i>difference</i>
Local	<i>Single</i>	207	21.4%	1,368,131	1,026,407	34.4%	31.9%	-2.4%
	<i>Stacked</i>	13	1.3%	101,734	128,018	2.6%	4.0%	1.4%
	<i>Total</i>	220	38.1%	1,469,865	1,154,425	36.9%	35.9%	-1.0%
Nonlocal	<i>Single</i>	135	14.0%	818,992	614,377	20.6%	19.1%	-1.5%
	<i>Stacked</i>	33	3.4%	322,043	371,340	8.1%	11.6%	3.5%
	<i>Total</i>	168	29.1%	1,141,035	985,717	28.7%	30.7%	2.0%
Nonresident	<i>Single</i>	157	16.3%	1,049,515	754,513	26.4%	23.5%	-2.9%
	<i>Stacked</i>	33	3.4%	319,085	317,985	8.0%	9.9%	1.9%
	<i>Total</i>	190	32.9%	1,368,600	1,072,498	34.4%	33.4%	-1.0%
<i>Total Single</i>		499	86.3%	3,236,638	2,395,297	81.3%	74.6%	-6.8%
<i>Total Stacked</i>		79	13.7%	742,862	817,343	18.7%	25.4%	6.8%

New Entrants into the S04T Fishery

Public comments to the Board indicated that permit stacking could affect new entrants into the S04T fishery. Opponents voiced concerns to the Board that permit stacking would make it more difficult to enter the fishery due to increases in permit prices or having to buy a second permit to be competitive. Proponents argued that permit stacking would make the fishery more profitable; therefore, more individuals would be enticed to enter the fishery.

New entrants are defined herein as individuals who record a landing on an S04T permit for the first time. Prior to permit stacking, on average just over 10% of the permit holders were new entrants between 1992 and 2011. In 2010, the rate dropped to 8.3%, and went to a historic low of 6% in 2011.

Figure 7. New Entrants into the S04T Fishery

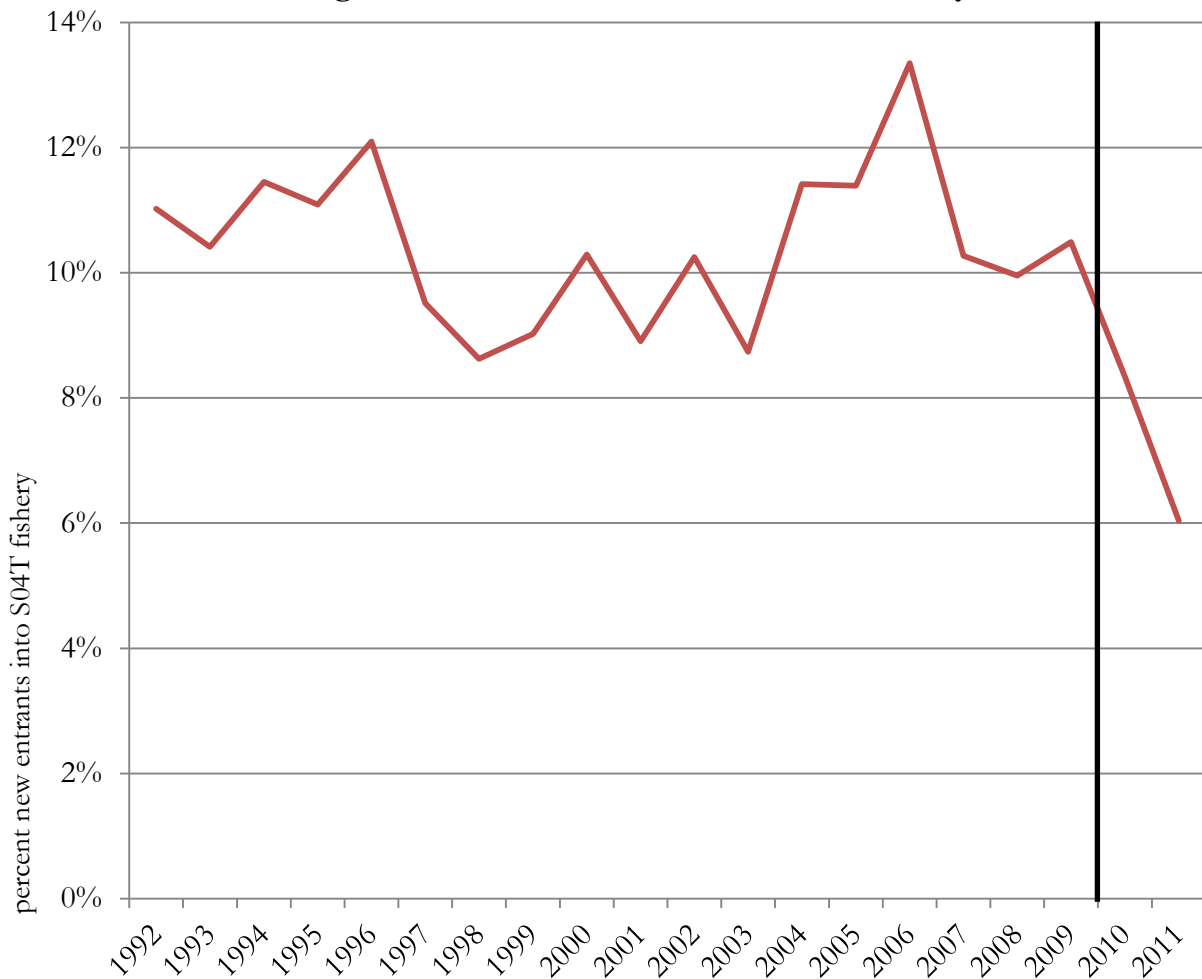


Table 10. New Entrants into the S04T Fishery

Year	Local			Nonlocal			Nonresident			Total S04T		
	New	Total	% New	New	Total	% New	New	Total	% New	New	Total	% New
1992	34	455	7.5%	41	292	14.0%	35	251	13.9%	110	998	11.0%
1993	44	451	9.8%	39	292	13.4%	19	246	7.7%	103	989	10.4%
1994	43	435	9.9%	30	272	11.0%	35	245	14.3%	109	952	11.4%
1995	41	448	9.2%	41	292	14.0%	28	252	11.1%	110	992	11.1%
1996	35	421	8.3%	35	291	12.0%	45	247	18.2%	116	959	12.1%
1997	33	406	8.1%	31	290	10.7%	26	250	10.4%	90	946	9.5%
1998	23	394	5.8%	27	273	9.9%	29	249	11.6%	79	916	8.6%
1999	21	386	5.4%	31	296	10.5%	32	249	12.9%	84	931	9.0%
2000	28	370	7.6%	30	297	10.1%	38	266	14.3%	96	933	10.3%
2001	26	334	7.8%	27	265	10.2%	22	243	9.1%	75	842	8.9%
2002	22	286	7.7%	19	186	10.2%	29	211	13.7%	70	683	10.2%
2003	23	301	7.6%	21	229	9.2%	22	237	9.3%	67	767	8.7%
2004	30	294	10.2%	28	247	11.3%	32	256	12.5%	91	797	11.4%
2005	35	308	11.4%	33	264	12.5%	27	262	10.3%	95	834	11.4%
2006	34	317	10.7%	33	263	12.5%	47	274	17.2%	114	854	13.3%
2007	27	309	8.7%	28	260	10.8%	32	278	11.5%	87	847	10.3%
2008	22	307	7.2%	29	267	10.9%	34	280	12.1%	85	854	10.0%
2009	19	302	6.3%	43	273	15.8%	28	283	9.9%	90	858	10.5%
2010	17	297	5.7%	25	243	10.3%	26	276	9.4%	68	816	8.3%
2011	20	300	6.7%	9	235	3.8%	19	260	7.3%	48	795	6.0%

New is the count of individuals who made landings for the first time in the S04T fishery

Total is the count of all individuals who made landings in the S04T fishery

Permit Value

A substantial amount of the discussion on permit stacking has revolved around how the regulations might affect the value of Bristol Bay set gillnet permits. Some persons have hypothesized that permit values would increase, while others have suggested the option would not influence values. Several of the proposals related to permit stacking for the December 2012 Board of Fisheries meeting mentioned that permit values have increased as a result of permit stacking.

Figure 8 illustrates monthly CFEC estimated permit values from January 2008 (prior to stacking) through October 2012, for both the Bristol Bay set gillnet and drift gillnet fisheries. From January 2008 through the end of 2009, Bristol Bay set gillnet permit prices maintained a relatively constant value. However, since January of 2010, when permit stacking was allowed, the fair market value of set gillnet permits rose 64.2% from \$25,700 to \$42,200. Values for drift gillnet permits fluctuated significantly over the period, while set gillnet permit values rose at a steady rate since permit stacking. Over the same period, drift gillnet permits also rose in value, from \$83,000 to \$96,700, which is a 16.5% increase.

Figure 8. Bristol Bay Salmon Permit Value

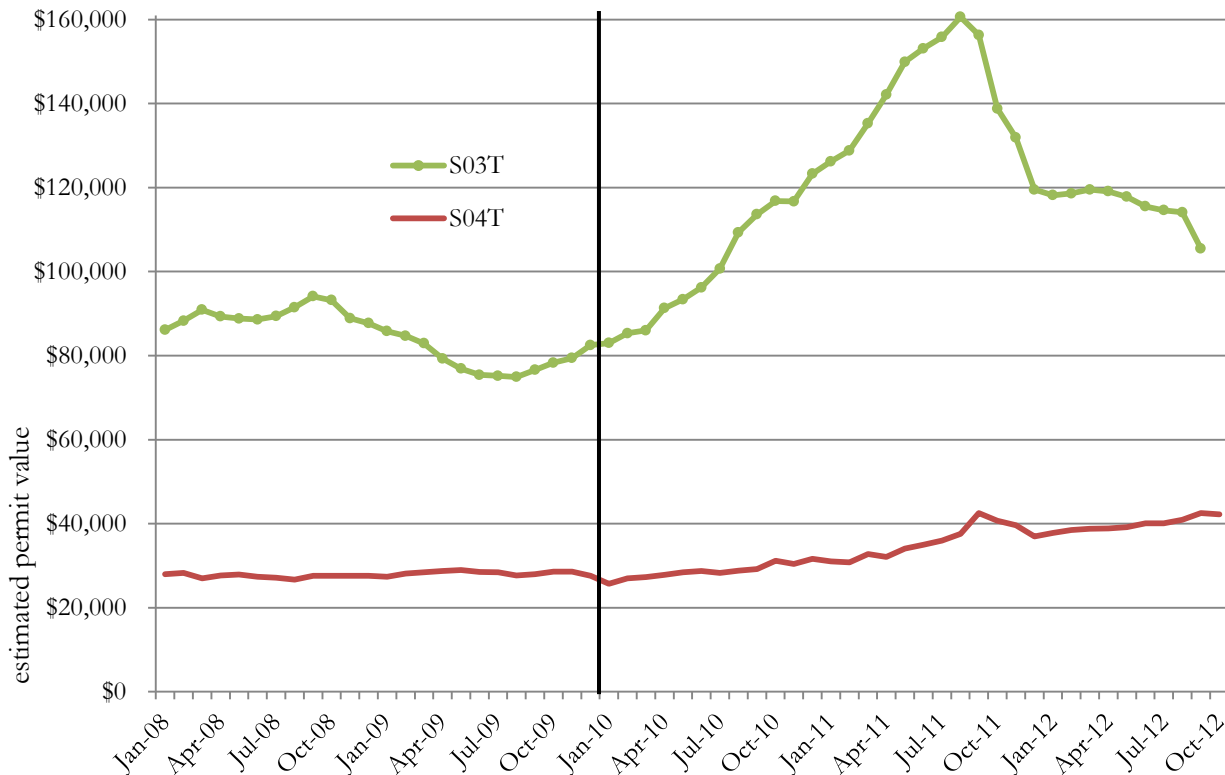


Table 11. Nominal Bristol Bay Salmon Permit Value by Month

Month	S03T	S04T	Month	S03T	S04T	Month	S03T	S04T
Jan-08	\$86,100	\$28,000	Sep-09	\$76,600	\$28,000	May-11	\$149,900	\$34,100
Feb-08	\$88,300	\$28,300	Oct-09	\$78,300	\$28,600	Jun-11	\$153,100	\$35,000
Mar-08	\$90,900	\$27,000	Nov-09	\$79,400	\$28,600	Jul-11	\$155,800	\$36,000
Apr-08	\$89,300	\$27,700	Dec-09	\$82,500	\$27,600	Aug-11	\$160,600	\$37,600
May-08	\$88,800	\$27,900	Jan-10	\$83,000	\$25,700	Sep-11	\$156,300	\$42,500
Jun-08	\$88,600	\$27,400	Feb-10	\$85,300	\$27,000	Oct-11	\$138,800	\$40,700
Jul-08	\$89,400	\$27,100	Mar-10	\$86,000	\$27,300	Nov-11	\$131,900	\$39,600
Aug-08	\$91,500	\$26,700	Apr-10	\$91,300	\$27,800	Dec-11	\$119,500	\$37,000
Sep-08	\$94,100	\$27,600	May-10	\$93,400	\$28,400	Jan-12	\$118,200	\$37,800
Oct-08	\$93,200	\$27,600	Jun-10	\$96,200	\$28,700	Feb-12	\$118,600	\$38,500
Nov-08	\$88,900	\$27,600	Jul-10	\$100,700	\$28,300	Mar-12	\$119,500	\$38,800
Dec-08	\$87,700	\$27,600	Aug-10	\$109,300	\$28,800	Apr-12	\$119,100	\$38,900
Jan-09	\$85,800	\$27,400	Sep-10	\$113,600	\$29,200	May-12	\$117,800	\$39,200
Feb-09	\$84,700	\$28,100	Oct-10	\$116,800	\$31,200	Jun-12	\$115,500	\$40,100
Mar-09	\$82,900	\$28,400	Nov-10	\$116,700	\$30,400	Jul-12	\$114,600	\$40,100
Apr-09	\$79,300	\$28,700	Dec-10	\$123,300	\$31,600	Aug-12	\$114,100	\$40,900
May-09	\$76,900	\$29,000	Jan-11	\$126,200	\$31,000	Sep-12	\$105,500	\$42,500
Jun-09	\$75,400	\$28,500	Feb-11	\$128,800	\$30,800	Oct-12	\$96,700	\$42,200
Jul-09	\$75,200	\$28,400	Mar-11	\$135,300	\$32,800			
Aug-09	\$74,900	\$27,700	Apr-11	\$142,100	\$32,100			

In addition to observing trends in estimated permit values, a regression model was developed to consider changes in permit value due to permit stacking. The model used all real (adjusted for inflation) permit prices from sale transactions between 1980 and 2011.

The model's coefficient of determination (R^2) produced a value of 0.78. This means that 78% of the variation in permit prices from 1980 to 2011 is explained by the model. The model suggests that permit stacking with a sunset date increased the value of a permit by \$14,685. For every pound of salmon landed by the salmon set gillnet fishery, the model suggests that permit value increases \$0.000451. In 2010, over 34 million pounds were harvested, and in 2011 the amount was more than 25 million pounds, so this amount is substantial. The model also indicates that for each metric ton of farmed Atlantic salmon that is produced, the value of an S04T permit drops more than a nickel.

Table 12. Model Values Output

Variable	Coefficient
<i>Intercept</i>	\$78,855
<i>Total Pounds Landed</i>	\$0.000451
<i>Permit Stacking</i>	\$14,685
<i>Metric Ton Farmed Atlantic Salmon</i>	-\$0.0513

Data for the model and additional output can be found in Appendix C. While individual sales transactions cannot be represented in this paper due to reasons of confidentiality, a boxplot representing permit value depicts measures of central tendency and dispersion among actual permit sales.

Conclusion

Permit stacking from 2010 to 2012 in the Bristol Bay salmon set gillnet fishery has brought about many changes in the fishery. Nonlocals and nonresidents have a higher rate of participation in permit stacking operations than locals. Permit stacking brings permits out of latency, thus increasing the number of permits used; however, the number of individuals fishing has substantially decreased with the exception of local fishermen. Limited data suggests that stacked permit operations reallocate harvests across residency classes in Bristol Bay. Since implementation of permit stacking, the number of new entrants into the S04T fishery has declined. The estimated value for the S04T permit has significantly increased as a result of permit stacking.

Appendix A. Derivation of 2012 Fishing Activity

	Permit Holders			Fishing Participation			Rate of Participation		
	<i>Local</i>	<i>Nonlocal</i>	<i>Nonresident</i>	<i>Local</i>	<i>Nonlocal</i>	<i>Nonresident</i>	<i>Local</i>	<i>Nonlocal</i>	<i>Nonresident</i>
2010	28	35	29	20	27	21	71.4%	77.1%	72.4%
2011	24	50	54	16	43	41	66.7%	86.0%	75.9%
2012	24	52	65	Average			69.2%	82.4%	74.7%

Permit Holdings for 2012 is as of October 8, 2012

As of this publication, 2012 ADF&G fish ticket data was not available so the rates of individuals who fished with stacked permits were estimated. The estimates were calculated as follows:

- Local Count of Fishing Participation: $24 * 69.2\% = 16.6$, rounds to 17
- Nonlocal Count of Fishing Participation: $52 * 82.4\% = 42.8$, rounds to 43
- Nonresident Count of Fishing Participation: $65 * 74.7\% = 48.6$, rounds to 49

Appendix B. S04T Participation by Residency, Showing Stacked versus Single Permit Operations

Prior to 2010, before permit stacking was allowed, individuals could fish only one permit. As a result, all in-season set gillnet operations were made up of individuals fishing either a single permanent permit, or a single permit they received through an emergency transfer (ET). When permit stacking came into effect in 2010 allowing for two permits to be fished concurrently by an individual, the number of possible combinations of permit holdings increased. The Appendix B tables describe the combinations, and indicate the number of individuals who fished in each of the possible permit holding combinations by residency.

For example, in 2008, 270 Bristol Bay local residents fished with set gillnet permits they held permanently, while 37 more locals fished permits they obtained through an ET. In 2009, the counts for locals changed slightly to 261 permanent permits and 41 ET permits. In 2010, with the advent of permit stacking, 240 locals fished a single permit that they held permanently, while 37 more fished a single permit they obtained from an ET. At the same time, a total of 20 locals used the permit stacking option to fish two permits (see *Total Local Stacked*): 14 of these individuals fished a combination of one permanent permit and one ET permit and 6 individuals fished two permanent permits. No individual fished with two emergency-transfer permits that year.

As mentioned previously, these figures help illustrate that ET permits have had an important impact on the composition of the entire fleet. This is especially true for stacked permit operations where ET permits have been used by 12% (nonlocals, 2011) to 70% (locals, 2010) of the people who fished stacked permits.

Appendix B Tables

<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>Local</i>
270	261	240	248	Single, only permanent permits
37	41	37	36	Single, only ET permits
0	0	14	5	Stacked, both permanent and ET permits
0	0	6	10	Stacked, only permanent permits
0	0	0	1	Stacked, only ET permits
<i>307</i>	<i>302</i>	<i>277</i>	<i>284</i>	<i>Total Local Single</i>
<i>0</i>	<i>0</i>	<i>20</i>	<i>16</i>	<i>Total Local Stacked</i>
<i>307</i>	<i>302</i>	<i>297</i>	<i>300</i>	<i>Total Local</i>

<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>Nonlocal</i>
237	231	196	172	Single, only permanent permits
30	42	20	20	Single, only ET permits
0	0	6	3	Stacked, both permanent and ET permits
0	0	20	38	Stacked, only permanent permits
0	0	1	2	Stacked, only ET permits
<i>267</i>	<i>273</i>	<i>216</i>	<i>192</i>	<i>Total Nonlocal Single</i>
<i>0</i>	<i>0</i>	<i>27</i>	<i>43</i>	<i>Total Nonlocal Stacked</i>
<i>267</i>	<i>273</i>	<i>243</i>	<i>235</i>	<i>Total Nonlocal</i>

<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>Nonresident</i>
264	262	235	208	Single, only permanent permits
16	21	20	11	Single, only ET permits
0	0	7	7	Stacked, both permanent and ET permits
0	0	13	33	Stacked, only permanent permits
0	0	1	1	Stacked, only ET permits
<i>280</i>	<i>283</i>	<i>255</i>	<i>219</i>	<i>Total Nonresident Single</i>
<i>0</i>	<i>0</i>	<i>21</i>	<i>41</i>	<i>Total Nonresident Stacked</i>
<i>280</i>	<i>283</i>	<i>276</i>	<i>260</i>	<i>Total Nonresident</i>

<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>Total Bristol Bay Set Gillnet Fishery</i>
771	754	671	628	<i>Total, Single, only permanent permits</i>
83	104	77	67	<i>Total, Single, only ET permits</i>
0	0	27	15	<i>Total, Stacked, both permanent and ET permits</i>
0	0	39	81	<i>Total, Stacked, only permanent permits</i>
0	0	2	4	<i>Total, Stacked, only ET permits</i>
<i>854</i>	<i>858</i>	<i>748</i>	<i>695</i>	<i>Grand Total Single</i>
<i>0</i>	<i>0</i>	<i>68</i>	<i>100</i>	<i>Grand Total Stacked</i>
<i>854</i>	<i>858</i>	<i>816</i>	<i>795</i>	<i>Grand Total</i>

Single – only one permit was held each day landings were made by the individual
Stacked – two permits were owned for at least one of the landings made
ET – emergency transfer

Appendix C. Regression on Permit Prices for Bristol Bay Set Gillnet permits

SAS Output for Model

Yule-Walker Estimates			
<i>SSE</i>	2.8964E11	<i>DFE</i>	1,303
<i>MSE</i>	222,287,343	<i>Root MSE</i>	14,909
<i>SBC</i>	28,967.2849	<i>AIC</i>	28,925.8565
<i>MAE</i>	9,256.98907	<i>AICC</i>	28,925.9671
<i>MAPE</i>	27.3862075	<i>HQC</i>	28,941.3941
<i>Durbin-Watson</i>	2.0406	<i>Regress R-Square</i>	0.1707
		<i>Total R-Square</i>	0.7814

<i>Variable</i>	<i>Estimate</i>	<i>Standard Error</i>	<i>t Value</i>	<i>Approx Pr> t </i>
<i>Intercept</i>	78,855	4,852	16.25	<.0001
<i>Total Pounds</i>	0.000451	0.000216	2.08	0.0373
<i>Stacked</i>	14,685	6064	2.42	0.0156
<i>Atlantic salmon</i>	-0.0513	0.003364	-15.25	<.0001

Estimates of Autoregressive Parameters			
<i>Lag</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>t Value</i>
1	-0.159787	0.027252	-5.86
2	-0.202048	0.027046	-7.47
3	-0.200389	0.027046	-7.41
4	-0.179663	0.027252	-6.59

At market equilibrium, permit prices equal the value placed on permits by those most willing to sell and those most willing to buy. Individuals who value the permit at or less than the fair market value of the permit will sell, while those who value the permit more than fair market value will choose to not sell. The fair market value of permits will increase when there are more individuals willing to purchase additional permits than there are available at the current price. If the market price of the permit is above the value placed on ownership by the marginal permit holder, the price will drop as the fishermen who value participation in the fishery is less than the market price they could get by buying the permit.

Inherent in permit price is the expectation of the stream of discounted future benefits derived from holding onto the permit. Future benefits may be mitigated by the presence of other market influences, such as the production of substitutes (for example, farmed salmon).

Appendix C Data for Regression

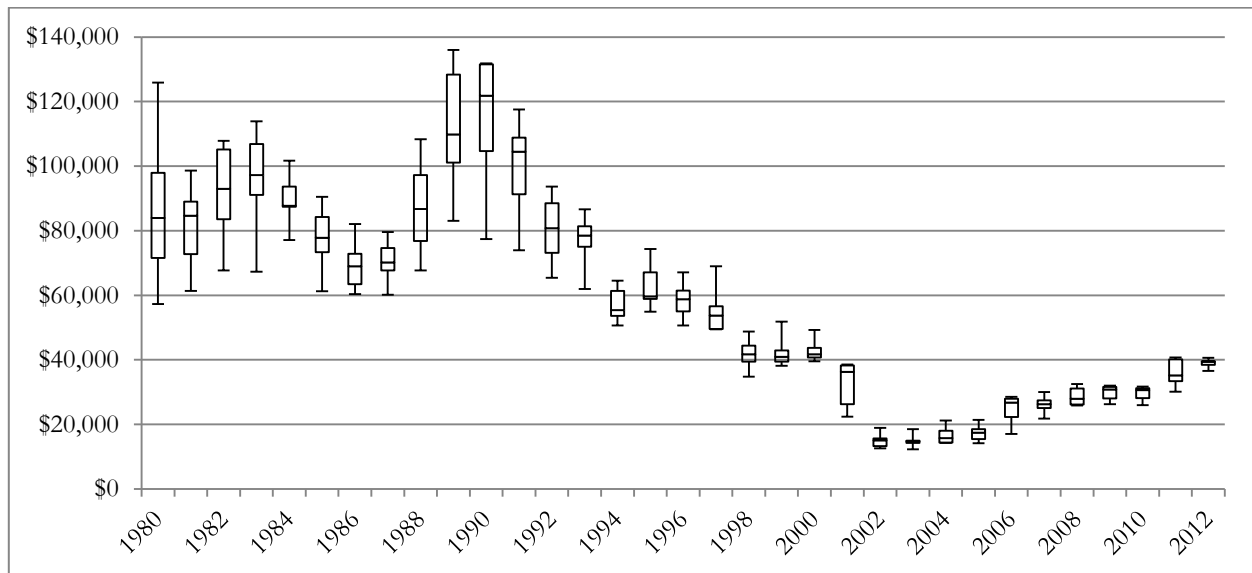
Year	Total Pounds landed by S04T	Atlantic salmon (metric tons)	Year	Total Pounds landed by S04T	Atlantic salmon (metric tons)
1980	20,921,279	5,288	1996	27,511,927	551,906
1981	26,786,653	10,108	1997	13,629,325	646,516
1982	15,751,265	13,265	1998	12,462,345	688,227
1983	23,983,657	20,638	1999	26,399,567	805,616
1984	19,000,702	26,985	2000	24,640,582	895,808
1985	15,272,942	38,797	2001	20,802,254	1,030,005
1986	16,514,325	58,979	2002	13,909,643	1,086,134
1987	14,653,854	67,146	2003	21,176,128	1,147,682
1988	14,973,567	110,599	2004	23,995,687	1,261,926
1989	25,255,730	168,063	2005	30,032,259	1,267,297
1990	26,740,334	225,642	2006	27,388,935	1,318,720
1991	22,414,026	266,283	2007	31,930,607	1,378,874
1992	25,231,870	247,528	2008	30,127,610	1,451,262
1993	32,627,106	305,610	2009	35,613,731	1,440,085
1994	24,719,309	374,931	2010	34,004,833	1,425,968
1995	33,470,092	465,245	2011	25,625,425	1,604,000

Pounds of S04T fish from CFEC Basic Information Tables

World Production of Atlantic salmon (metric tons) from FAO

2011 production of Atlantic salmon estimate from North Atlantic Salmon Conservation Organization

Appendix C Summary of S04T Permit prices, January 1980 to August 2012



Boxplot depicts median, 25 and 75 percentile, with whiskers at 10 and 90 percentile

Prices are adjusted for inflation at the January 2012 rate using U.S. Bureau of Labor Statistics Consumer Price Index

References

- Commercial Fisheries Entry Commission. 2012. Basic Information Tables, 1975-2011. *S 04T Salmon, Set Gillnet, Bristol Bay*. http://www.cfec.state.ak.us/bit/X_S04T.HTM (accessed October 2012).
- Commercial Fisheries Entry Commission. 2012. Estimated Permit Value Report, 1978-2012. *S 03T Salmon, Drift Gillnet, Bristol Bay*. http://www.cfec.state.ak.us/pmtvalue/X_S03T.HTM (accessed November 5, 2012).
- Commercial Fisheries Entry Commission. 2012. Estimated Permit Value Report, 1978-2012. *S 04T Salmon, Drift Gillnet, Bristol Bay*. http://www.cfec.state.ak.us/pmtvalue/X_S04T.HTM (accessed November 5, 2012).
- Federal Reserve System. 2012. *Japan/U.S. Foreign Exchange Rate*. <http://research.stlouisfed.org/fred2/data/EXJPUS.txt> (accessed September 2012)
- Fisheries and Aquaculture Department. 2012. Farmed Salmonid products. <http://www.fao.org/fishery/statistics/software/fishstat/en> (accessed September 2012).
- Muse, Ben. *Permit Values and Fish Stocks*, CFEC Report 90-9
- North Atlantic Salmon Conservation Organization. 2012. *Report of the ICES Advisory Committee*. http://www.nasco.int/pdf/2012%20papers/cnl_12_8.pdf. CNL(12)8
- Shriver, Jennifer, Marcus Gho, Kurt Iverson Craig Farrington. *Changes in the Distribution of Alaska's Commercial Fisheries Entry Permits, 1975-2011*, CFEC Report 12-1N