

*Economic Impact of the  
Prince William Sound Aquaculture  
Corporation*

*Prepared for:*  
**Prince William Sound  
Aquaculture Corporation**



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*October 2012*

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# Executive Summary

This study analyzes the impacts of the Prince William Sound Aquaculture Corporation (PWSAC) on regional and statewide economies. This is the fifth study in a series of PWSAC impact reports prepared by McDowell Group since 2001. Most data covered in the report reflects the recent five year period (2007-2011), but historical PWSAC data since 1990 is also included. The report examines the impact of PWSAC on Alaska's economy, Alaska's seafood industry, as well as sport, subsistence and personal use fisheries. It also examines the market conditions for key salmon species.

## Economic Impacts of PWSAC on Alaska's Economy

PWSAC is a private nonprofit corporation established to produce hatchery-born, ocean-raised wild salmon for the commercial, sport, personal use, and subsistence fisheries of the Prince William Sound (PWS) region. PWSAC operations are financed primarily by a cost-recovery program and supplemented by a voluntary salmon enhancement tax paid by commercial fishermen.

From 2007 to 2011, fishermen harvested 530 million pounds of PWSAC salmon in common property fisheries worth \$264 million in ex-vessel value. Over the past five years, PWSAC salmon and business spending created an annual average of \$51 million in labor income for an average of 2,495 workers, including fishermen, processing workers, PWSAC employees, and workers in the support sector.

**Table 1.1: Economic Impact of PWSAC on Alaska's Economy, Annual Averages (2007–2011)**

	Direct	Indirect	Induced	Total
<b>Impact of PWSAC Operations</b>				
Average Monthly Employment	70	31	38	139
Number of Workers	120	42	51	212
Labor Income (in \$Millions)	\$2.4	\$1.7	\$1.6	\$5.6
<b>Impact of Harvest and Production of PWSAC Salmon</b>				
Average Monthly Employment	707	112	134	953
Number of Workers	1,875	195	212	2,283
Labor Income (in \$Millions)	\$33.7	\$6.4	\$5.6	\$45.7
<b>Total Economic Impact of PWSAC</b>				
Average Monthly Employment	777	143	172	1,092
Number of Workers	1,995	237	263	2,495
Labor Income (in \$Millions)	\$36.1	\$8.1	\$7.2	\$51.3

Note: Totals may not sum due to rounding.

Source: McDowell Group estimates using IMPLAN, ADF&G, DOLWD, and PWSAC data.

The actual number of workers earning some income from PWSAC salmon or operations is much larger than the figures shown here. Because PWSAC accounts for 61 percent of the value of PWS common property salmon fisheries during the past five years, this study assumes that PWSAC would then account for 61 percent of the employment and income earned in the PWS salmon fisheries.

For every employee who works directly for PWSAC there are 19 other workers in Alaska whose jobs are somehow related to PWSAC salmon or PWSAC business expenditures. For every \$1 earned by PWSAC employees from 2007 to 2011, other Alaska workers earned \$21 as a result of PWSAC salmon, PWSAC business spending, or other indirect and induced impacts.

## Economic Return on State General Funds and Industry Tax Dollars

- The State of Alaska has provided PWSAC with \$15.9 million in grant funding to maintain and upgrade state-owned hatchery facilities. Since 1990, PWSAC salmon caught in commercial fisheries have returned \$9.3 million in fisheries business tax (FBT) to the State's General Fund. As such the net grant funding received by PWSAC from the State of Alaska is less than \$6.6 million.<sup>1</sup>
- PWSAC hatcheries have provided the State of Alaska and the PWS seafood industry with an extraordinary return on investment. For every \$1.00 of net grant funding provided by the State of Alaska, Alaska's seafood industry has received \$271 worth of PWSAC salmon in return since 1990. Fishermen have received \$23 worth of PWSAC salmon for every \$1.00 of enhancement taxes they have paid since 1990.

**Table 1.2: Economic Return to Alaska Economy from External PWSAC Funding Sources**

<b>External PWSAC Funding by Source since 1975</b>	
State of Alaska Grants	\$15.9 million
- Net Funding from State of Alaska (less contributions from FBT)	\$6.6 million
Enhancement Taxes and Self-Assessments (paid by fishermen)	\$27.9 million
Loans received from FERLF <sup>1</sup> and AIDEA for PWSAC-owned facilities	\$33.1 million
- Total Principal Repaid to State of Alaska	\$20.1 million
- Total Interest Repaid to State of Alaska	\$17.7 million
<b>Value of PWSAC Salmon (1990 to 2011)</b>	
Total First Wholesale Value	\$1.8 billion
Total Gross Margin for Processors <sup>2</sup>	\$1.2 billion
Total Ex-Vessel Value for Fishermen	\$482 million
Fisheries Business Tax (FBT) Paid to State of Alaska	\$9.3 million
Fisheries Business Tax (FBT) Paid to Local PWS Governments	\$9.3 million
<b>Economic Return on External PWSAC Funding Source</b>	
Return to Fishermen since 1990 (ex-vessel value per \$1 of net State grant funding)	\$73
Return to Processors since 1990 (gross margin per \$1 of net State grant funding)	\$177
Return to Industry since 1990 (first wholesale value per \$1 of net State grant funding)	\$271
Return to Fishermen since 1990 (per \$1 of tax/assessment funding)	\$23

<sup>1</sup> Fisheries Enhancement Revolving Loan Fund, administered by DCCED.

<sup>2</sup> Gross margin refers to the wholesale value of product sold, less the cost of fish (including cost recovery fish).

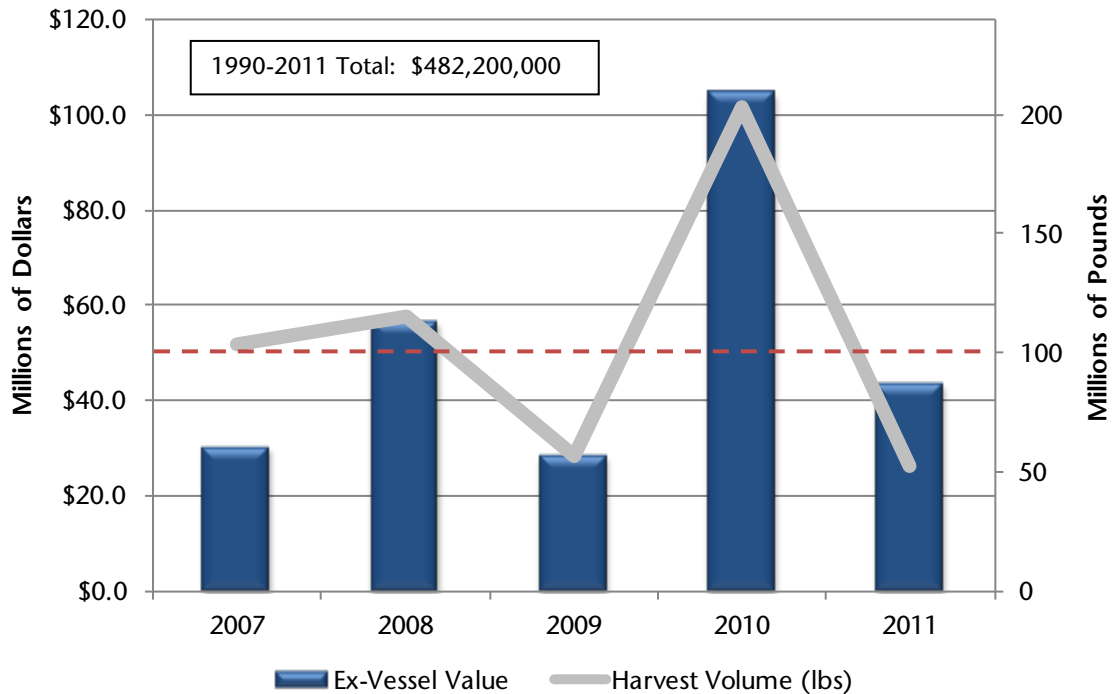
Source: McDowell Group estimates using ADF&G and PWSAC data.

<sup>1</sup> Estimates of PWSAC contributions to fisheries business tax are not available prior to 1990, therefore a direct comparison between the two time periods cannot be made. As a result, the actual amount of net funding received by PWSAC from the State is even lower, which would make the return on investment greater. Therefore the figures contained in this report are conservative.

## Impacts on Commercial Fisheries

- From 1990 through 2011, commercial fishermen harvested 1.4 billion pounds of PWSAC salmon in common property fisheries with a total ex-vessel value of \$482 million.<sup>2</sup>
- Fishermen have benefitted substantially from PWSAC salmon in recent years due to rising salmon prices and high marine survival rates. From 2007 to 2011, PWS commercial fishermen harvested 531 million pounds of PWSAC salmon in common property fisheries worth \$264.1 million.

**Figure 1.1: Ex-Vessel Value and Harvest Volume of PWSAC Salmon in Common Property Commercial Fisheries, 2007-2011**



Source: ADF&G and McDowell Group estimates.

- During the last five seasons (2007-2011), PWS fishermen harvested over 100 million pounds of PWSAC salmon in common property fisheries in three different years (2007, 2008, and 2010). The 100 million pound mark had never been reached prior to 2007.
- Licensed cost recovery fisheries in special harvest areas fund over 75 percent of PWSAC operations, yet cost recovery fisheries represented just 12 percent of the total regional salmon harvest value from 2007 to 2011. During that time, PWSAC salmon accounted for 61 percent of the total ex-vessel value of common property salmon fisheries in PWS.
- It is estimated that gillnetters earned \$123.7 million and seiners earned \$140.5 million from harvesting PWSAC salmon in common property fisheries during the last five seasons (2007-2011). The two gear groups combined to harvest over 203 million pounds worth \$105 million in 2010.

<sup>2</sup> Ex-vessel value is the gross value paid to commercial fishermen for their salmon harvest.

- Seiners grossed an annual average of \$177,900 as a result of catching PWSAC salmon from 2007 to 2011. The average seiner grossed a total of nearly \$900,000 catching PWSAC salmon for the five-year period.
- Gillnetters grossed \$48,300, on average, as a result of catching PWSAC salmon from 2007 to 2011. The average gillnetter grossed a total of \$241,300 catching PWSAC salmon over the five-year period.

**Table 1.3: Ex-Vessel Value of PWSAC Salmon in  
PWS Common Property Fisheries by Gear Type, 2007-2011**

<b>Value of PWSAC Salmon Harvested in 2007-2011 PWS Common Property Fisheries per Permit Fished (Annual Avg.)</b>	
Purse Seine	\$177,900
Drift Gillnet	\$48,300
<b>Value of PWSAC Salmon Harvested in 2007-2011 PWS Common Property Fisheries per Permit Fished (Cumulative)</b>	
Purse Seine	\$889,600
Drift Gillnet	\$241,300
<b>Total Value of PWSAC Salmon Harvested in Common Property Fisheries</b>	
Purse Seine	\$140,500,000
Drift Gillnet	\$123,700,000
<b>Total</b>	<b>\$264,100,000</b>

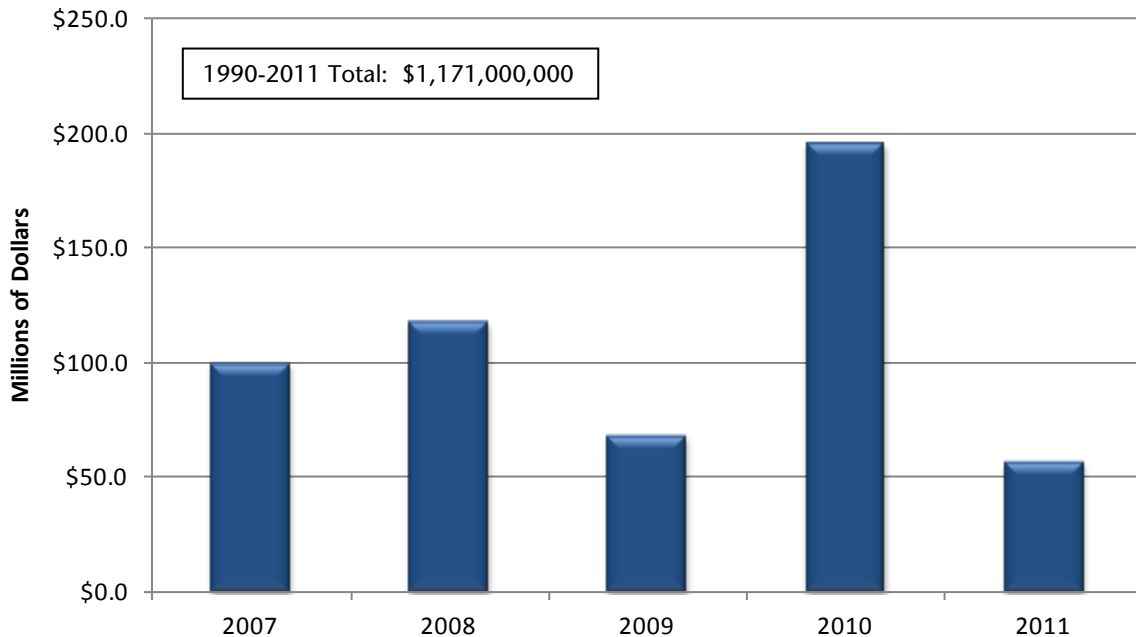
Note: Totals may not sum due to rounding.  
Source: McDowell Group calculations based on ADF&G data.

- As a result of big harvests and strong salmon prices, the value of PWS salmon permits has increased. PWS gillnetters have seen the value of their permits increase by \$129,100 since January 2007 while PWS seiners' permits have appreciated by \$143,700. The combined value of all PWS gillnet and seine permits has increased by a cumulative total of \$105 million since January 2007 (through May 2012). Permits have appreciated for several reasons, but it would not be possible without PWSAC hatcheries supplying a significant volume of salmon for the fisheries.
- From 2007 to 2011, pink salmon accounted for 49 percent of the ex-vessel value of PWSAC salmon harvested, followed by sockeye (25 percent), chum (24 percent), and coho (1 percent).
- Alaska resident permit holders see most of the economic benefits of PWSAC salmon production. In 2011, Alaska resident permit holders earned an estimated 76 percent of the total PWS ex-vessel value.
- Alaska residents from 32 different communities harvested PWSAC salmon in common property fisheries in 2010.

## Impact on Seafood Processing

- For the years 1990 through 2011, the total first wholesale value of commercial and licensed cost recovery PWSAC salmon was \$1.8 billion.<sup>3</sup> Net of payments to fishermen, processors earned a gross margin of \$1.2 billion from processing and selling PWSAC salmon.<sup>4</sup>

**Figure 1.2: Processors' Gross Margin from PWSAC Salmon, 2007 - 2011**



Source: ADF&G and McDowell Group estimates.

- PWSAC salmon typically account for 15 to 25 percent of Alaska's total pink salmon harvest, but in 2010 PWSAC production accounted for 46 percent of the statewide harvest. Excellent marine survival rates led to a large return of PWS pink salmon. Processors received an unexpected supply of 34.8 million additional PWSAC pink salmon, yielding a \$144.2 million increase in revenue (versus the 2010 projection). Thanks to PWSAC pink salmon, the 2010 season marked the first even year since 1998 when the statewide pink harvest exceeded the preceding odd year.

## Impact on Personal Use and Subsistence Fisheries

The Gulkana hatchery located near Paxson is the largest sockeye hatchery in the world and supplies sockeye for Alaska residents who participate in subsistence and personal use (SPU) fisheries.

- Alaskans have harvested 698,900 PWSAC sockeye in SPU fisheries since 1999. Residents of Anchorage, the Fairbanks North Star Borough, and the Matanuska-Susitna Borough have accounted for 73 percent of the harvest during that time.

<sup>3</sup> First wholesale value is the first sale of fish from a processor to a buyer outside of the processor's affiliate network.

<sup>4</sup> Gross margin is equal to revenue less the cost of goods sold. In this report, gross margin specifically refers to the first wholesale value (revenue) less the ex-vessel value paid to fishermen or payments for cost recovery fish (cost of goods sold). Gross margin is very different from net income because there are many other expenses incurred by processors such as: labor, rent, utilities, packaging, taxes, and materials to name a few.



- PWSAC sockeye reared by the Gulkana facility are also an important resource for rural interior communities on the road system. Between 2006 and 2010, residents from 34 rural/interior communities harvested a total of 55 pounds of PWSAC sockeye per capita. Therefore, PWSAC supplied the average rural/interior family of four with roughly 44 pounds of sockeye every year from 2006 to 2010.

## **Potential Impact of Unused Egg Take Allocation**

PWSAC has submitted to ADF&G a permit alteration request (PAR) that would allow the hatchery to retain more pink salmon eggs and release more pink fry. At the request of PWSAC management, McDowell Group has estimated the potential economic impact of this unused additional pink salmon production capacity.

- It is estimated that between 2009 and 2011, PWS fisheries could have harvested up to 26 million more pink salmon had PWSAC been permitted to collect the maximum number of pink salmon eggs in 2007 through 2009.
- Given the price of these fish, the ex-vessel value and first wholesale value of these fish for the three year period would have been equal to \$30.1 million and \$100.7 million, respectively.
- Had PWS fishermen harvested these additional fish, they stood to earn additional income of \$42,300 per active permit holder during the three-year period (2009-2011), or \$14,100 per year.
- The overall economic impact of this unused production capacity is estimated to be 134 average monthly jobs and \$12.9 million in labor income per year during the 2009-2011 period. This amount of jobs and income is roughly equal to the size of the construction sector in the Valdez-Cordova Census Area.
- A certain set of assumptions are required to quantify the potential economic impact of unused production capacity. These estimates assume 1) marine survival rates would have been unchanged, 2) the fleet and processors would have been able to harvest/process these additional fish, and 3) prices would not have changed in response to larger harvests.

## **Market Summary for Wild Alaska Salmon**

Chilean salmon producers have recovered from the ISA virus, which wiped out most of the country's Atlantic farmed salmon a few years ago. The increased supply associated with the recovery of Chilean production caused farmed salmon prices to fall from \$4.31/lb to \$2.43/lb in a span of just five months during mid-2011. Farmed salmon prices remain low and supplies are expected to increase 10 to 15 percent in 2012 (after increasing 11 percent in 2011). The last time farmed salmon supply increased at an annual rate of over 10 percent was 2001.

The farmed salmon market is important because a decade ago, rising supplies of farmed salmon played a key role in Alaska's "Salmon Value Crisis" when the ex-vessel price of pink salmon fell to \$0.10/lb and Bristol Bay sockeye was under \$0.50/lb. Today, many consumers view wild salmon as the superior alternative to farmed salmon. This report explores other reasons why the Alaska salmon industry will probably not see severe price erosion this time around. Key differences between 2002 and 2012 market conditions for Alaska salmon include improved product diversification and new product development, successful marketing efforts, consumer awareness, improved quality, higher farmed salmon costs, a weaker dollar, and other factors.

## Purpose and Scope

The purpose of this study is to provide an estimate of the economic impacts of PWSAC's hatcheries on the Alaska economy. Analyses include:

**Economic Impact of PWSAC Salmon and Operations.** This section quantifies PWSAC's economic impact on the Alaska and Anchorage/Mat-Su economies, in terms of employment and income.

**Commercial Harvest of PWSAC Salmon.** In this section, the overall and regional economic benefits of PWSAC salmon are estimated based on ex-vessel income to permit holders in the Prince William Sound commercial fishery.

**PWSAC Salmon Impact on Seafood Processing.** This section addresses the overall and regional economic impacts of processing PWSAC salmon based on first wholesale value and indirect economic impacts on the regional economy.

**Return on Investment in PWSAC.** This section analyzes the economic return earned by the State of Alaska and industry participants who have funded PWSAC's hatchery operations through salmon enhancement taxes or grant/loan funding.

**Sport, Subsistence and Personal Use Harvest of PWSAC Salmon.** The sport harvest of PWSAC salmon is addressed, including the percentage of salmon attributable to PWSAC. The Copper River dipnet and fishwheel personal use and subsistence PWSAC harvests are described, including estimated number of fish harvested by fishermen's town of residence.

**Potential Economic Impact of Expanding Pink Salmon Broodstock.** The potential economic impact of increasing the number of pink salmon fry released is discussed in this section.

**Salmon Market Summary.** This section provides an overview and analysis of current conditions and events in the salmon market.

## Methodology

The data used in this report comes from a variety of sources, including PWSAC, Alaska Commercial Fisheries Entry Commission (CFEC), Alaska Department of Labor and Workforce Development (DOLWD), Alaska Department of Revenue (DOR), and Alaska Department of Fish and Game (ADF&G). However, it should be noted that available data on the economics of the region's seafood industry, sport, personal use and subsistence fisheries are limited, and in some cases non-existent. This is particularly true in areas related to personal income of commercial fishermen. In these cases, estimates are based on the best available data.

Some commercial and sport harvest data were considered preliminary through 2011. Ex-vessel income for some communities and census areas was restricted due to state confidentiality laws. For this reason, the fishery average income per permit by gear type was used as a proxy to estimate ex-vessel value by community.

Commercial harvest data comes primarily from two series of ADF&G reports; the annual enhancement report and the PWSAC annual management report. Each report contains estimates on the number of fish which are caught in the region's commercial fisheries. Using price and weight data from ADF&G volume and value attributable to the PWSAC hatchery salmon was estimated.

The methodology for estimating first wholesale value was redesigned in this report because the study team felt prior methods might be too inconsistent when applied to historical data. Underlying data on seafood processing can be difficult to blend with harvest data when considering processing location. Certain assumptions or caveats must be made which can change over time, adversely affecting the resulting data.

This report employs ADF&G data to estimate the recovery rate associated with each species to estimate the volume of PWSAC salmon that ends up as processed product. From there, first wholesale prices from ADF&G's Commercial Operators Annual Report are applied to estimate the processed value of PWSAC salmon.

Sport fishery harvest figures for PWSAC Chinook, coho and sockeye salmon are based on PWSAC hatchery manager estimates reported in annual reports to ADF&G. PWSAC pink and chum salmon are not reported in PWSAC reports, but are assumed to be harvested in substantial numbers by Prince William Sound anglers. For pink and chum salmon, the percentage of PWSAC pink and chum in the sport fishery is assumed to be the same as the PWSAC contribution to the commercial fishery.

The Copper River dipnet and fishwheel fisheries are important to thousands of Alaskans. Estimating where these fishermen spend their dollars would require extensive research beyond the scope of this study. Furthermore, people would travel to the fishery to dipnet salmon even in the absence of PWSAC fish. However, data is provided on estimated harvest per Alaska community, based on ADF&G Subsistence Division data.

## **Economic Modeling**

Direct employment and income estimates come from primary data sources, or are extrapolated from regional data. In the case of labor income earned by fishermen, the study team created a formula which estimates the average labor income per permit fished. This labor income includes permit holder profits and payments made to crew members. The income formula is derived from the personal experience of study team members, who have over 50 years of experience fishing commercially and professionally analyzing seafood issues, as well as correspondence with industry colleagues.

The study team used data from ADF&G and DOLWD, in addition to proprietary research, to adjust IMPLAN economic models to estimate employment and labor income multipliers. These adjustments are necessary because IMPLAN models do not recognize nonresident labor; which is prevalent in Alaska's seafood industry. Also, processors and fishermen operate differently in Alaska than elsewhere in the US, which can lead the model to overestimate economic impacts if not properly adjusted. In addition, care must be taken to avoid double counting direct and indirect impacts.

## Introduction

The Prince William Sound Aquaculture Corporation (PWSAC) is a non-profit organization formed in 1974 by a local area fishermen's group to optimize salmon production in Prince William Sound for the long term well-being of all user groups. PWSAC headquarters are located in Cordova.

The organization operates four remote hatcheries in Prince William Sound and one inland on the Gulkana River. Five species of salmon are currently produced: pink, chum, coho, sockeye, and Chinook. The returning salmon benefit the commercial, sport, personal use and subsistence fishers in the Prince William Sound area and throughout the state.

PWSAC is a private non-profit corporation. It relies on licensed cost recovery revenues and a voluntary 2 percent tax on the regional commercial salmon harvest to fund its salmon enhancement activities.

## Facilities and Operations

### Armin F. Koernig Hatchery

The Armin F. Koernig Hatchery is located about 90 air miles west of Cordova in Sawmill Bay, on Evans Island. The site was originally a salmon cannery, and was converted to become the first PWSAC hatchery in 1974. The facility was built with monies borrowed from the State of Alaska's Fisheries Enhancement Revolving Loan Fund. Six on-site year-round staff and up to 12 seasonal staff operate the facility.

Armin F. Koernig was the only hatchery directly affected by the Exxon Valdez Oil Spill in 1989. Although oil exclusion booms surrounded the operation to protect the out-migrating fry, the effects of the spill to Armin F. Koernig and the Sound are still being investigated.

### Wally Noerenberg Hatchery

The Wally Noerenberg Hatchery was built in 1985 with monies borrowed from the State of Alaska's Fisheries Enhancement Revolving Loan Fund. It is located approximately 20 miles east of Whittier in Lake Bay on the southern tip of Esther Island, in the South Esther Island State Marine Park. WNH is the largest salmon production facility in North America. Eight on-site year-round staff and 30 seasonal staff operate the facility.

### Cannery Creek Hatchery

The Cannery Creek Hatchery was built in 1978 by the Alaska Department of Fish and Game (ADF&G) Fisheries Rehabilitation, Enhancement and Development (FRED) division. PWSAC took over management and operational control of the hatchery on July 1, 1988. The site is located on land managed by the U.S. Forest Service, approximately 40 miles east of Whittier, on the eastern shore of Unakwik Inlet in the northern area of Prince William Sound. PWSAC provides management and fish culture expertise at no cost to the State under a

20-year professional services agreement with the ADF&G. Six on-site, year-round staff and 14 seasonal staff operate the facility.

### **Main Bay Hatchery**

Main Bay Hatchery is also owned by the State of Alaska and situated on land managed by the U.S. Forest Service in Main Bay on the western shore of the sound, approximately 40 miles southwest of Whittier. Main Bay was built in 1981 by ADF&G FRED division as a chum salmon hatchery, but switched to a sockeye salmon enhancement program in 1986, becoming the first sockeye salmon smolt-producing hatchery in the world. PWSAC took over management and operational control on July 1, 1991. PWSAC provides management and fish culture expertise at no cost to the State under a 20-year professional services agreement with ADF&G. Six on-site, year-round staff and 8 seasonal staff operate the facility.

At one time, up to six different sockeye salmon stocks were incubated and reared at the facility. In 1998, PWSAC decided to concentrate on just one stock to improve fish culture, decrease the risk of disease, and possibly improve marine survival.

### **Gulkana Hatchery**

The Gulkana Hatchery is located on the Gulkana River near Paxson, 250 miles northeast of Anchorage and 177 miles south of Fairbanks on the Richardson Highway. The hatchery is situated on land managed by the Bureau of Land Management. The facility and program was established by ADF&G in 1973 with streamside incubator boxes in an attempt to enhance Copper River sockeye salmon. With a survival rate of 79 percent the first year, significant enhancement opportunities were recognized along with the possibility of future expansion. By 1984, the Gulkana Hatchery became the largest sockeye salmon fry production facility in North America.

PWSAC took over management and operational control of the program on July 1, 1993. PWSAC provides management and fish culture expertise at no cost to the State under a 20-year professional services agreement with ADF&G. Four on-site, year-round staff and 16 seasonal staff operate the facility.

### **Administrative Operations – Cordova and Anchorage**

PWSAC administration offices are located in Cordova. PWSAC also owns a distribution center in Anchorage. This facility is used to consolidate and expedite supplies for remote hatchery sites via Whittier.

# Impact of PWSAC on Alaska's Economy

From 2007 to 2011, PWSAC salmon and hatchery operations accounted for the equivalent of 2,495 workers who earned \$51.3 million (see Table 2.1). For every PWSAC employee, there were 19 more Alaska workers employed as a result of PWSAC salmon or PWSAC spending.

PWSAC salmon and operations directly employed the equivalent of 1,995 people in year-round or seasonal jobs per year from 2007 to 2011. Employment was created for an additional 500 workers through indirect and induced impacts.<sup>5</sup> For every four workers directly employed as a result of PWSAC salmon or PWSAC operations there was income created for one additional indirect/induced worker in Alaska.

**Table 2.1: Economic Impact of PWSAC Salmon and Operations on Alaska's Economy, Annual Averages (2007–2011)**

	Direct	Indirect	Induced	Total
Average Monthly Employment	777	143	172	1,092
Number of Workers	1,995	237	263	2,495
Labor Income (in \$Millions)	\$36.1	\$8.1	\$7.2	\$51.3

Note: Totals may not sum due to rounding.

Source: McDowell Group estimates using IMPLAN, ADF&G, DOLWD, and PWSAC data.

This section details the impact PWSAC has on Alaska's economy and attempts to answer three basic questions:

1. How many jobs are created or affected as a result of PWSAC?
2. How many people benefit from those jobs?
3. How much do workers employed in those jobs earn?

Typically, when performing labor analysis a job is regarded as a position that employs somebody throughout the year, or provides 100 percent of their income. As a result, job figures are often quoted in terms of full-time equivalents or average monthly employment. Many jobs do employ people year-round, and in those industries there is little difference between the number of workers working in the industry and the average monthly employment figure. However, Alaska's seafood industry is an exception because it is very seasonal. Here, most workers are employed for a two to four month stretch. Therefore, a regional seafood industry may employ 1,000 different workers during the year, but show average monthly employment of 300. These workers may earn the majority of their earnings from these seasonal jobs, or use them to supplement other sources of income.

<sup>5</sup> Indirect impacts occur as a result of business spending related to PWSAC salmon or PWSAC operations. For example, indirect employment is created when PWSAC hires a local plumber to do maintenance work at a facility or when a commercial fisherman buys fishing gear for their boat. Induced impacts occur as a result of direct and indirect workers spending their earnings (as consumers) within the study area's economy.

The distinction between average monthly employment per calendar year and the number of workers needed to fill those jobs each year is important. Analysis presented in this section provides estimates for each figure, as well as data on the estimated amount of income earned by workers and small business owners (net of expenses) as a result of PWSAC.

## Economic Impact from Harvesting PWSAC Salmon in Commercial Fisheries

During the past five seasons, from 2007 to 2011, commercial fishermen collectively earned average gross revenues of \$48.3 million per year harvesting PWSAC salmon. Labor income (net of expenses) for permit holders and crew derived from harvesting PWSAC salmon is estimated to be \$25.1 million per year. It is estimated that PWSAC salmon generated jobs for 1,111 permit holders and crew, on average, per year during the recent five-year period. These are seasonal fishing jobs, but most permit holders likely derive the majority of their annual income from PWS fisheries<sup>6</sup> which typically run from late May until early September.

Converting seasonal jobs into average monthly employment totals reveals that commercial fishermen catching PWSAC salmon directly led to 433 year-round equivalent jobs and an additional 153 jobs through fishermen’s indirect and induced spending activity. In total, it is estimated that PWSAC salmon supported 586 average monthly jobs in Alaska generating total wages and net income of \$32.8 million during the 2007 to 2011 time period (Table 2.2).

**Table 2.2: Economic Impact of PWSAC Salmon and Commercial Fishermen on Alaska’s Economy, Annual Averages (2007–2011)**

	Direct	Indirect	Induced	Total
Average Monthly Employment	433	62	91	586
Number of Workers	1,111	116	144	1,372
Labor Income (in \$Millions)	\$25.1	\$3.8	\$3.8	\$32.8

Note: Totals may not sum due to rounding.

Source: McDowell Group estimates using IMPLAN, ADF&G, DOLWD, and PWSAC data.

## Economic Impact from Processing PWSAC Salmon

During the past five seasons, from 2007 to 2011, seafood processors have earned average gross margins of \$107.7 million per year from processing PWSAC salmon. For the purposes of this study, gross margin is equal to revenue (payments received for selling processed fish) less the cost of that fish (payments to fishermen or hatcheries for cost recovery fish). Processors have many more expenses than just the cost of fish, so gross margin is not a measure of profitability, however it does provide a measure of relative scale. In 2010, gross margins from processing PWSAC salmon reached \$195.5 million. Total gross margin in 2010 was three times higher than the previous 10-year average.

In total, PWSAC salmon running through seafood processing lines created jobs and income for an estimated 911 workers per year who earned \$12.9 million in labor income in Alaska (see Table 2.3 on next page). These

<sup>6</sup> Based on data presented in data presented in an *Alaska Economic Trends* article from November 2007, entitled “Alaska’s Fishermen: They don’t just fish for a living.”

figures do not include commercial fishing employment utilizing PWSAC salmon or the activities of PWSAC itself (which are covered in other sections).

**Table 2.3: Economic Impact of PWSAC Salmon and Seafood Processors on Alaska’s Economy, Annual Averages (2007–2011)**

	Direct	Indirect	Induced	Total
Average Monthly Employment	274	50	43	367
Number of Workers	764	79	68	911
Labor Income (in \$Millions)	\$8.6	\$2.6	\$1.8	\$12.9

Source: McDowell Group estimates using IMPLAN, ADF&G, and DOLWD data.

Direct employment and wages refers to workers employed by seafood processors, who are directly utilizing PWSAC salmon. Indirect employment is created when processors spend money on inputs in Alaska such as shipping, maintenance work, supplies, utilities, tender boats, or equipment. Additional employment is created – referred to as induced employment - when direct and indirect workers spend their earnings in Alaska’s economy. The relationship between indirect/induced impacts and the size of direct impacts is known as the economic multiplier (which can apply to several metrics, such as employment, labor income, or output).

### **Economic Impact of PWSAC Operations**

As the operator of five salmon hatcheries, PWSAC itself has a significant impact on Alaska’s economy. PWSAC employs about 120 workers per year and spends roughly \$10 million per year on operational costs, capital costs, and payroll.<sup>7</sup> That spending, and the spending of its workforce, creates secondary employment in Alaska’s economy.

It is estimated that PWSAC operations and spending directly or indirectly created jobs for 212 workers who earned \$5.6 million per year in labor income (see Table 2.4). PWSAC’s remote operations consume significant amounts of fuel and require relatively large expenditures on freight, airfare, customized trade work, and specialty components. These expenditures provide significant revenue to many small businesses in Cordova, the Copper River basin, Anchorage, the Mat-Su borough, and Whittier. The vast majority of PWSAC’s operational expense flows to small businesses in these areas.

**Table 2.4: Economic Impact of PWSAC Operations on Alaska Economy, Annual Averages (2007–2011)**

	Direct	Indirect	Induced	Total
Average Monthly Employment	70	31	38	139
Number of Workers	120	42	51	212
Labor Income (in \$Millions)	\$2.4	\$1.7	\$1.6	\$5.6

Note: Totals may not sum due to rounding.

Source: McDowell Group estimates using IMPLAN, ADF&G, DOLWD, and PWSAC data.

<sup>7</sup> Spending figure does not include debt service payments.



## Economic Impact of PWSAC on the Anchorage/Mat-Su Area

PWSAC operations and PWSAC salmon impact Anchorage and Mat-Su residents in a variety of ways. It is estimated that PWSAC generates jobs for 172 workers living in the Anchorage/Mat-Su area (see Table 2.5). These jobs are created by PWSAC business operations and by PWSAC salmon when Anchorage/Mat-Su residents participate in PWS salmon fisheries. For example, jobs are created directly by Copper River Seafoods processing and wholesaling operations based in Anchorage.

A broad variety of workers owe a part of their job to PWSAC salmon or PWSAC spending. For example, the Wasilla pipefitter who does a two week job at a remote PWSAC hatchery, the Mat-Su eye doctor who cares for a PWS fisherman's family, or the Anchorage refrigeration equipment wholesaler all owe a fraction of their job to PWSAC. The economic model translates all those fractional jobs to annual average employment that would be 100 percent due to PWSAC.

Since 2007, PWSAC has paid \$8.4 million to businesses located in the Anchorage/Mat-Su region. This spending supports jobs for Anchorage and Mat-Su residents, as it represents new money flowing into the Anchorage/Mat-Su economy. In addition, PWSAC maintains a distribution center in Anchorage and office space for eight full-time administrative employees who reside in the area. From 2007 to 2011, it is estimated that PWSAC operations accounted for 34 jobs, in average monthly employment terms, for workers residing in the Anchorage/Mat-Su region.

According to CFEC data, an average of 85 Anchorage/Mat-Su residents fished salmon permits in PWS commercial fisheries each year between 2007 and 2011. It is estimated that PWS permit holders employed 89 crew members from the Anchorage/Mat-Su area. Since PWS fishermen have derived 61 percent of their earnings, on average, from PWSAC salmon during that time; it can be said that PWSAC salmon have effectively created jobs for 106 commercial fishermen workers residing in the Anchorage/Mat-Su area. Jobs directly or secondarily associated with PWSAC salmon employed an estimated 172 workers annually who earned \$5.0 million in labor income per year from 2007 to 2011.

**Table 2.5: Economic Impact of PWSAC on the Anchorage/Mat-Su Economy, Annual Averages (2007–2011)**

	Direct	Indirect	Induced	Total
<b>Impact of PWSAC Operations</b>				
Average Monthly Employment	8	19	7	34
Number of Workers	8	25	10	43
Labor Income (in \$Millions)	\$0.4	\$1.1	\$0.3	\$1.8
<b>Impact of PWSAC Salmon</b>				
Average Monthly Employment	41	6	11	58
Number of Workers	106	14	14	134
Labor Income (in \$Millions)	\$3.9	\$0.3	\$0.8	\$5.0
<b>Total PWSAC Impact</b>				
Average Monthly Employment	49	25	18	92
Number of Workers	114	39	24	177
Labor Income (in \$Millions)	\$4.3	\$1.4	\$1.8	\$6.8

Note: Totals may not sum due to rounding.

Source: McDowell Group estimates using IMPLAN, ADF&G, DOLWD, and PWSAC data.

# Commercial Harvest of PWSAC Salmon

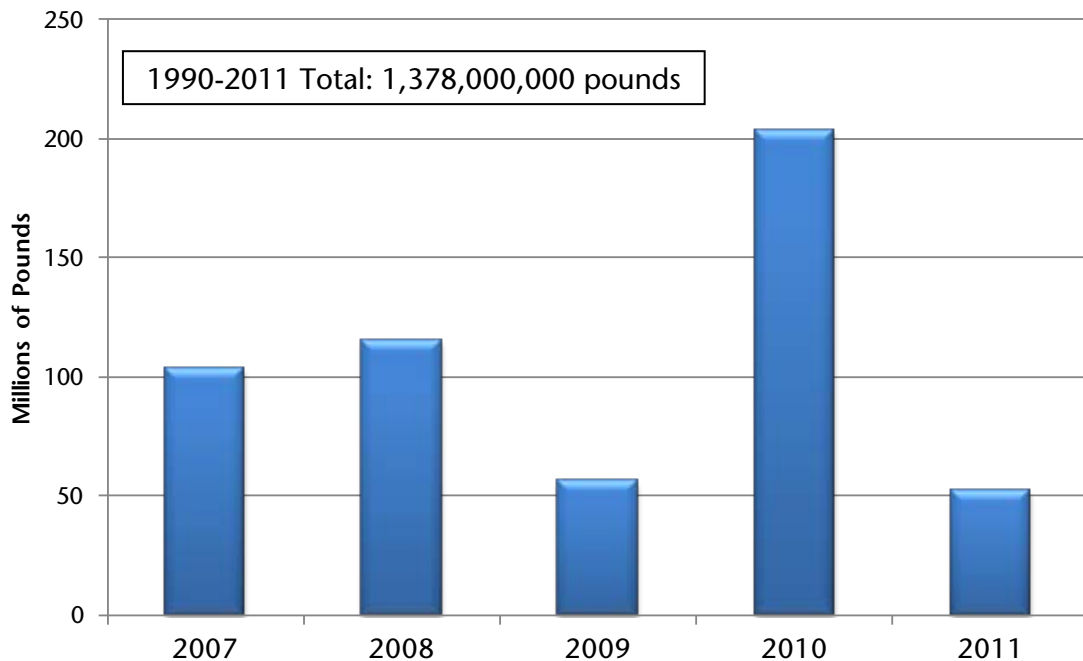
## Commercial Harvest and Ex-Vessel Value

From 1990 to 2011, PWS commercial fishermen harvested nearly 1.4 billion pounds of PWSAC salmon in common property fisheries. To put that in perspective, that's the same as the weight of 23,500 Boeing 737-100's.<sup>8</sup>

Similar to wild stocks, hatchery returns exhibit significant year-to-year fluctuations due to ocean conditions and predation. Three of the past five seasons have seen abnormally high returns. PWS common property salmon fisheries harvested over 100 million pounds of PWSAC salmon in 2007 and 2008, and over 200 million pounds in 2010 (see Figure 3.1).

In 2011, PWS fishermen caught 52 million pounds of PWSAC salmon in common property fisheries. This figure is slightly below the 2009 volume but slightly above the 1990-2004 average of 50 million pounds.

**Figure 3.1: Total Pounds of PWSAC Salmon Harvested in Common Property Commercial Fisheries, 2007-2011**



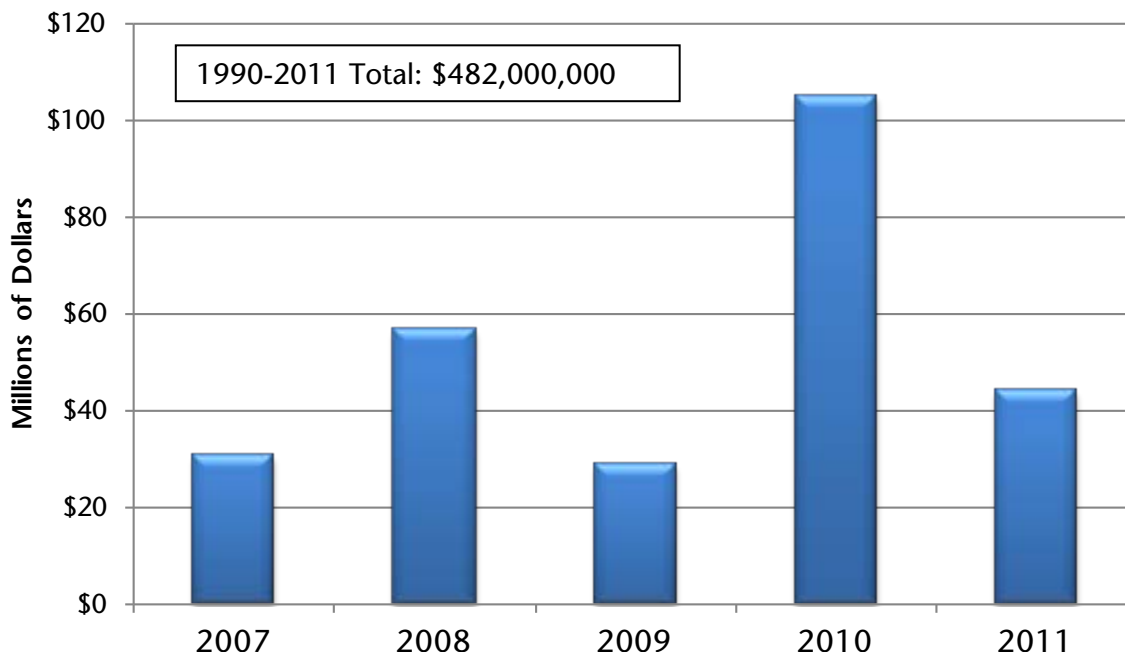
Source: ADF&G and McDowell Group estimates. Number of PWSAC fish provided by Alaska Department of Fish and Game annual enhancement reports; total poundage based on average weight by species by gear type.

Commercial fishermen earned an estimated \$264 million in ex-vessel value from PWSAC salmon in common property fisheries during the past five seasons (2007-2011), an average of \$53 million per year (see Figure 3.2). Since 1990, commercial fishermen have grossed \$482 million by catching PWSAC salmon in common property fisheries (an average of \$22 million per year).

<sup>8</sup> Empty operating weight of a Boeing 737-100 is equal to 58,600 pounds (<http://www.boeing.com/commercial/airports/acaps/737sec2.pdf>).

From 2007 to 2011, an average of 665 permits were fished each year in PWS salmon fisheries. PWSAC salmon provided a significant financial benefit to these permit holders. Over the past five seasons each active PWS salmon permit grossed an average of \$78,700 per year by catching PWSAC salmon.

**Figure 3.2: Ex-Vessel Value of Common Property Commercial Harvest of PWSAC Salmon, 2007-2011**



Source: ADF&G and McDowell Group estimates.

Due to rising prices the value of all PWSAC salmon caught in common property fisheries during 2011 were worth more than all PWSAC salmon caught in 2007; despite the fact that fishermen landed twice the volume of PWSAC fish in 2007 as compared to 2011.

**Table 3.1: Ex-Vessel Value of PWSAC Salmon in PWS Common Property Fisheries by Gear Type, 2007-2011**

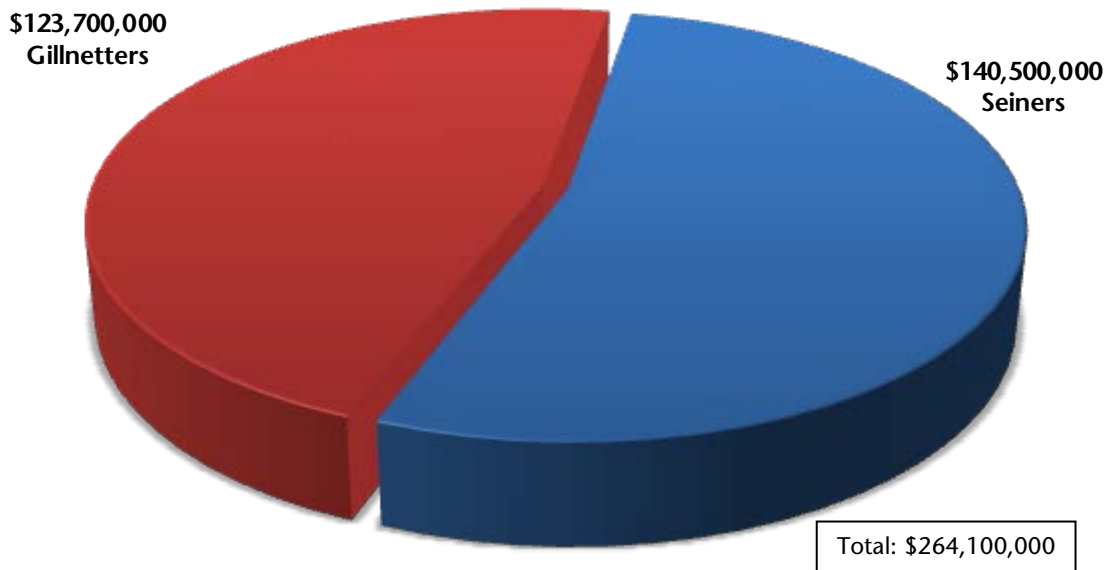
	2007	2008	2009	2010	2011
<b>Total Value of PWSAC Salmon Harvested in Common Property Fisheries</b>					
Purse Seine	\$18,000,000	\$35,100,000	\$9,800,000	\$64,000,000	\$13,700,000
Drift Gillnet	12,300,000	21,700,000	18,800,000	40,800,000	30,000,000
<b>Total</b>	<b>\$30,300,000</b>	<b>\$56,800,000</b>	<b>\$28,600,000</b>	<b>\$104,800,000</b>	<b>\$43,700,000</b>
<b>Average Value of PWSAC Salmon Harvested in Common Property Fisheries per Permit Fished</b>					
Purse Seine	\$147,200	\$243,500	\$63,500	\$361,300	\$74,100
Drift Gillnet	24,600	42,800	36,700	78,700	58,500
<b>Total</b>	<b>\$48,700</b>	<b>\$87,600</b>	<b>\$42,900</b>	<b>\$151,200</b>	<b>\$62,800</b>

Source: McDowell Group calculations based on ADF&G data.

From 2007 to 2011, PWS seiners earned \$140.6 million from PWSAC salmon caught in common property fisheries, or \$28.1 million per year. Gillnetters earned \$123.6 million for the PWSAC salmon they harvested, or \$24.7 million per year. Earnings derived from PWSAC salmon are generally split evenly between seiners and gillnetters; outside of 2010. Seiners typically receive much gross earnings per permit; however, seine

boats employ about as many people as two gillnetters. Seine boats require larger crews and bigger capital commitments, so comparisons of average earnings per gear type must take these factors into account. Figures given in this section refer to gross fishing revenues, not net profit (income after paying crew, fuel, maintenance, and any other costs).

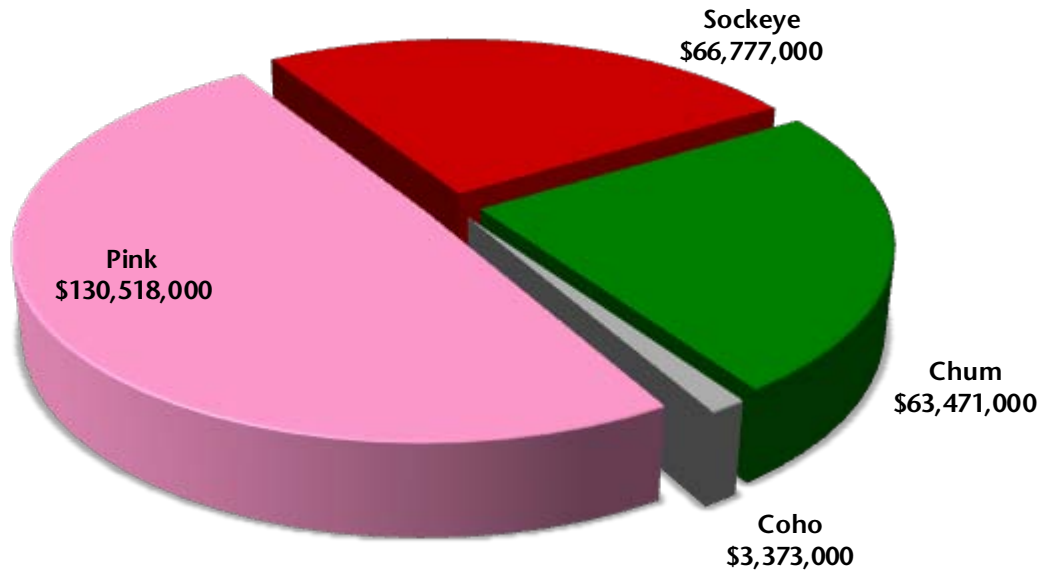
**Figure 3.3: Ex-Vessel Value of PWSAC Salmon by Gear Type, 2007-2011 Total**



Source: ADF&G and McDowell Group estimates. This data excludes fish used for cost recovery.

During the past five seasons (2007–2011), pink salmon accounted for about half of the ex-vessel value (\$131 million), followed by sockeye salmon (\$67 million), chum (\$63 million), and coho (\$3 million) (see Figure 3.4). Roughly half of the \$131 million in pink salmon harvested by PWS fishermen was caught in 2010. Marine survival rates for the 2010 pink salmon “class” were extremely high, leading to a large return of hatchery-reared pink salmon.

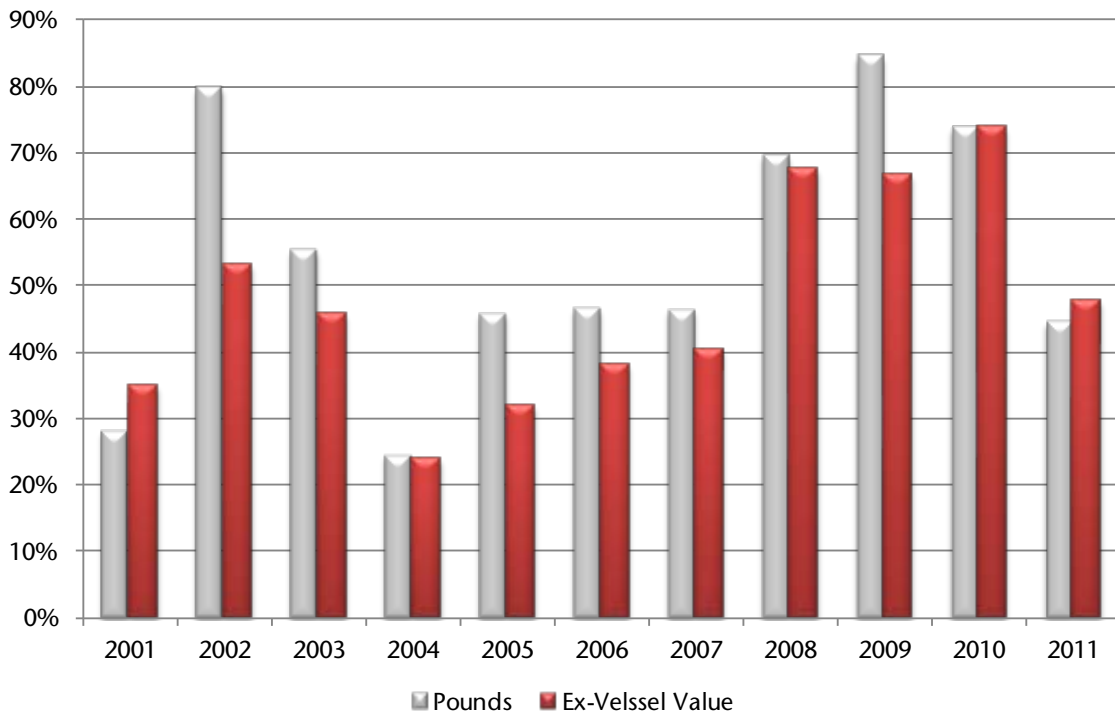
**Figure 3.4: Ex-Vessel Value of PWSAC Salmon by Species, 2007-2011 Total**



Source: ADF&G and McDowell Group estimates. This data excludes fish used for cost recovery.

PWSAC salmon production is crucial to the Prince William Sound salmon fisheries. Since 1990, PWSAC salmon have accounted for, on average, 46 percent of ex-vessel value and 54 percent of volume. PWSAC salmon made up a larger share of the total harvest in 2008, 2009, and 2010.

**Figure 3.5: Ex-Vessel Value and Harvest Volume of PWSAC Salmon as a Percent of the Prince William Sound Commercial Salmon Harvest, 2001-2011**

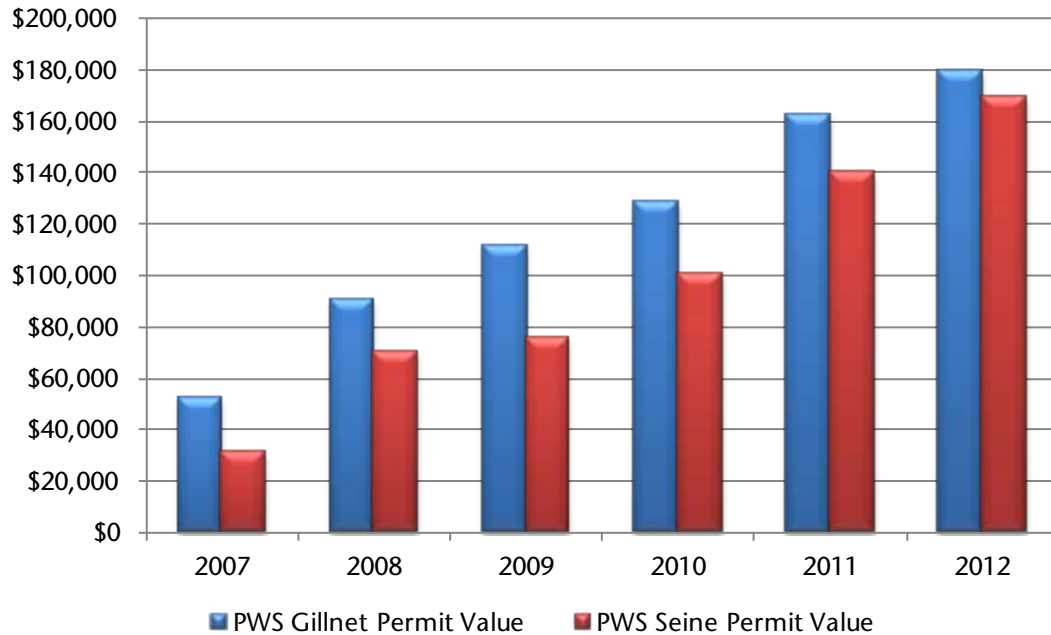


Source: ADF&G and McDowell Group estimates.

## PWS Permit Values Up in Recent Years

PWSAC salmon have benefitted commercial fishermen in two ways during recent years. The primary economic benefit of PWSAC salmon occurs when fishermen harvest PWSAC salmon from common property fisheries and sell those fish to processors. However, PWS gillnet and seine permit holders have also benefited significantly from rising permit values.

**Figure 3.6: PWS Gillnet and Seine Average Permit Value, 2007-2012**



Note: Data for 2012 reflects average permit values based on sales made during the month of May.  
Source: ADF&G (CFEC).

Rising salmon prices (see Table 3.2 on next page), in addition to large hatchery returns in 2007, 2008, and 2010, have led to increasing PWS permit values. From January 2007 to December 2011, the average value of a PWS seine permit increased by \$123,900 and the average value of a PWS drift gillnet permit increased by \$114,100. As a group, PWS salmon permits have appreciated by \$108 million from January 2007 to May 2012.

Rising permit values are obviously a double-edged sword, as existing permit holders benefit at the expense of new entrants. However, in general rising permit values are a direct indication of increased profitability in the fisheries. Higher permit values also provide the industry with capitalization and increased owner equity.

**Table 3.2: Alaska Pink Salmon Prices and PWS Seine Permit Values, 2003-2011**

Year	Average Wholesale Price (48-tall case)	Average Wholesale Price/lb. (Frozen H&G)	Ex-vessel Pink Price/lb.	PWS Seine Permit Value
2003	\$35.57	\$0.41	\$0.09	\$13,500
2004	36.94	0.52	0.10	14,000
2005	41.00	0.62	0.12	19,200
2006	46.12	0.82	0.16	26,100
2007	56.48	0.77	0.19	30,900
2008	59.77	0.94	0.35	70,200
2009	75.93	0.93	0.26	75,300
2010	78.30	1.27	0.41	100,500
2011	81.57	1.45	0.47	140,500

Note: Wholesale data shown for 2011 is preliminary. Permit values represent a yearly average of actual sales prices.

### Distribution of Commercial Fishing Value from PWSAC Salmon

The Prince William Sound salmon fisheries are dominated by Alaska residents. In 2011, Alaska residents earned an estimated 76 percent of the ex-vessel value of PWSAC salmon. The Alaska resident harvest is widely distributed, with participation by residents from Dutch Harbor to Delta Junction to Petersburg.

**Table 3.3 Geographic Distribution of Active PWS Permit Holders by Place of Residence, 2007-2011**

	Fishermen Fishing Permits in PWS Salmon Fisheries: 2007 – 2011 avg.			Fishermen Fishing Permits in PWS Salmon Fisheries: 2011 <sup>1</sup>		
	Seiners	Gillnetters	Total	Seiners	Gillnetters	Total
Valdez-Cordova Census Area	61	250	311	70	244	314
Kenai Peninsula Borough	35	76	111	44	84	128
Municipality of Anchorage	14	36	50	17	37	54
Matanuska-Susitna Borough	2	31	33	3	39	42
Southeast Fairbanks Census Area	0	6	6	0	8	8
Kodiak Island Borough	2	2	2	1	1	2
Yukon-Koyukuk Census Area	0	2	2	0	2	2
Wrangell-Petersburg Census Area	1	<1	1	2	1	3
Aleutian Islands West Census Area	0	1	1	0	1	1
City and Borough of Yakutat	0	<1	<1	0	1	1
Skagway-Hoonah-Angoon Census Area	0	<1	<1	0	1	1
Fairbanks North Star Borough	0	<1	<1	0	1	1
Prince of Wales-Outer Ketchikan CA	0	<1	<1	0	0	0
<i>Nonresidents</i>	40	122	162	48	114	162
<b>Total Number of Active Permit Holders</b>	<b>156</b>	<b>530</b>	<b>686</b>	<b>185</b>	<b>534</b>	<b>714</b>
<b>Total Number of Estimated Skippers and Crew</b>	<b>704</b>	<b>794</b>	<b>1,498</b>	<b>833</b>	<b>801</b>	<b>1,634</b>

<sup>1</sup> Data for 2011 is preliminary.

Source: CFEC, DOLWD, and McDowell Group Estimates.

**Table 3.4: Total Ex-vessel Value Derived from  
PWSAC Salmon (in \$Millions), by Place of Permit Holders' Residence 2007-2011**

	2007	2008	2009	2010	2011	2007-2011
Valdez-Cordova	\$14.0	\$24.8	\$12.5	\$41.8	\$18.9	\$112.1
Kenai Peninsula Borough	4.9	10.4	5.1	21.5	8.0	49.9
Anchorage/Mat-Su Area	3.6	6.2	3.2	12.1	5.8	30.8
Other AK Residents	0.3	1.5	0.6	4.2	1.1	7.7
<i>Nonresidents</i>	<i>7.4</i>	<i>13.8</i>	<i>7.2</i>	<i>25.3</i>	<i>10.0</i>	<i>63.6</i>
<b>Total Gross Earnings from PWSAC Salmon</b>	<b>\$30.3</b>	<b>\$56.8</b>	<b>\$28.6</b>	<b>\$104.8</b>	<b>\$43.7</b>	<b>\$264.1</b>

Note: See "Note About Gross Earnings by Place of Residence" on page 22.  
Source: CFEC, ADF&G, and McDowell Group Estimates.

From 2007 to 2011 the PWS salmon fisheries employed an average of about 1,500 permit holders and crew, who grossed a total of \$341.6 million. During this period, it is estimated that 64 percent (or \$264.1 million) of these gross earnings came from harvesting PWSAC salmon.

The PWS seine fishery added 63 active permits between 2007 and 2011, while participation in the gillnet fishery was relatively steady. Permit counts by place of residence do not change much from year to year, although some permits have migrated<sup>9</sup> to the Mat-Su borough and Kenai Peninsula. More nonresidents<sup>10</sup> have entered the gillnet fishery in recent years, although there are fewer nonresident seiners fishing despite the increase in overall permit utilization.



Cordova and Valdez benefit the most from PWSAC salmon caught in commercial fisheries. From 2007 to 2011, permit holders residing in the Valdez-Cordova Census Area caught \$112.1 million worth of PWSAC salmon.

Over 57 percent of PWSAC salmon were harvested by fishermen who reside outside of Prince William Sound. From 2007 to 2011, it is estimated that Kenai area residents earned \$49.9 million, Anchorage/Mat-Su residents earned \$30.8 million, and other Alaska residents earned \$7.7 million from commercially harvesting PWSAC salmon. Nonresidents (who reside outside of Alaska) earned an estimated \$63.6 million.

In all, permit holders hailing from 32 different communities around Alaska commercially harvested salmon in Prince William Sound during 2010. Each of these permit holders and their community benefits when they harvest PWSAC salmon in common property fisheries.

Active PWS permit holders grossed, on average, a total of \$393,200 from 2007 to 2011 by catching PWSAC salmon, or \$78,700 per year for every active permit holder. PWS seiners have grossed an estimated total of

<sup>9</sup> Through permit sales or permit holder relocation.

<sup>10</sup> Permit holders who make their permanent residence outside of Alaska.



\$889,600 per permit over the past five seasons by catching PWSAC salmon, while PWS gillnetters have grossed \$241,800 on average.

**Table 3.5: Average Gross Earnings from PWSAC Salmon per Permit Fished, 2007-2011**

	2007	2008	2009	2010	2011	Avg. ('07-'11)	Total ('07-11)
Gillnetters	\$24,600	\$42,800	\$36,700	\$78,700	\$58,500	\$48,300	\$241,800
Seiners	147,200	243,500	63,500	361,300	74,100	177,900	889,600
<b>Total</b>	<b>\$48,700</b>	<b>\$87,600</b>	<b>\$42,900</b>	<b>\$151,200</b>	<b>\$62,800</b>	<b>\$78,700</b>	<b>\$393,200</b>

Note: Figures are estimated based on average earnings for each gear type, for PWSAC salmon taken in common property fisheries, by active permit holders.

Source: CFEC, ADF&G, and McDowell Group Estimates.

#### **NOTE ABOUT GROSS EARNINGS BY PLACE OF RESIDENCE**

Estimates of gross earnings by place of residence attributable to PWSAC salmon are estimated by applying the average gross earnings (derived from PWSAC salmon) per active permit holder to the number of permit holders who fished in PWS from each area. Using actual earnings of permit holders by place of residence is not possible due to confidentiality restrictions and limited access to harvest sampling data. These estimates assume that each PWS permit holder catches an equal share of PWSAC salmon. In reality, some fishermen may be more reliant on wild stock runs but ADFG harvest sampling data are not publically available at this level of detail.

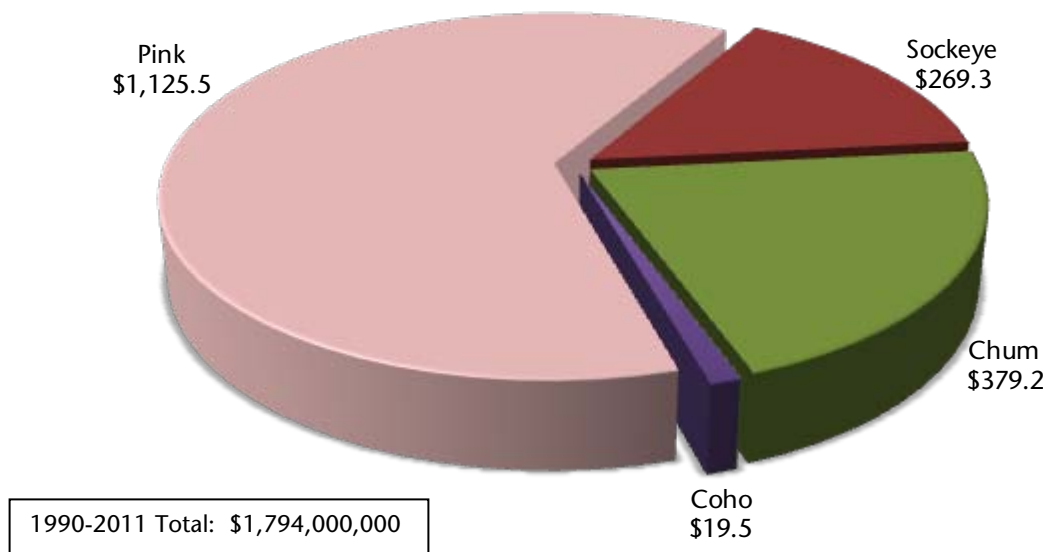
# PWSAC Salmon Impact on Seafood Processing

## First Wholesale Value and Gross Earnings of PWSAC Salmon

Seafood processors in Southcentral Alaska benefit greatly from the commercial harvest of PWSAC salmon, as indicated by the first wholesale value (i.e. the income received by a processor when it is sold to an unaffiliated buyer for the first time). Processing plants employ hundreds of local workers and are a significant source of tax revenue.

From 1990 to 2011 processors generated a total first wholesale value of \$1.8 billion utilizing PWSAC salmon and roe harvested in commercial and cost-recovery fisheries (Figure 4.1). That works out to an estimated \$1.2 billion in gross margin (first wholesale value less the cost of fish) for processors over the 22 year period.

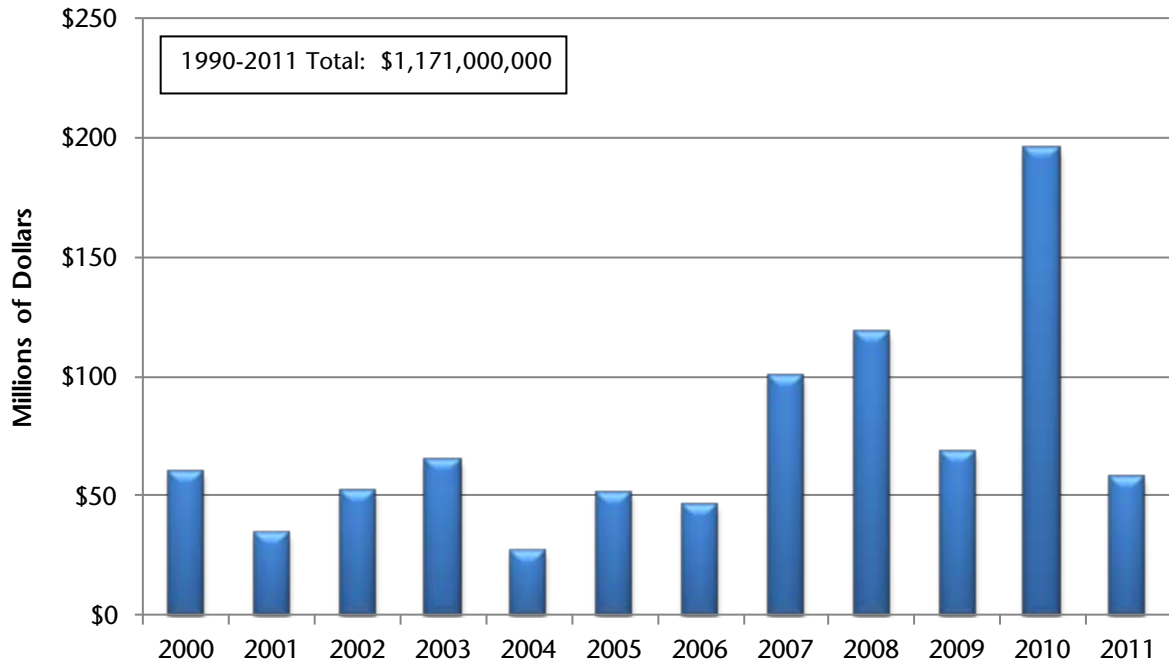
**Figure 4.1: First Wholesale Value of PWSAC Salmon and Roe by Specie, 1990-2011 (in \$Millions)**



Source: ADF&G and McDowell Group estimates. Excludes confidential values.

Pink salmon make up the largest share of wholesale value (63 percent), followed by chum (21 percent) and sockeye (15 percent). Coho accounted for 1 percent of wholesale value while Chinook was less than 1 percent.

**Figure 4.2: Processors' Gross Margin on PWSAC Salmon and Roe, 2000-2011**



Note: Gross margin represents first wholesale value of fish less the estimated ex-vessel payments to fishermen (for common property and cost recovery fish).  
 Source: McDowell Group estimates based on ADF&G data.

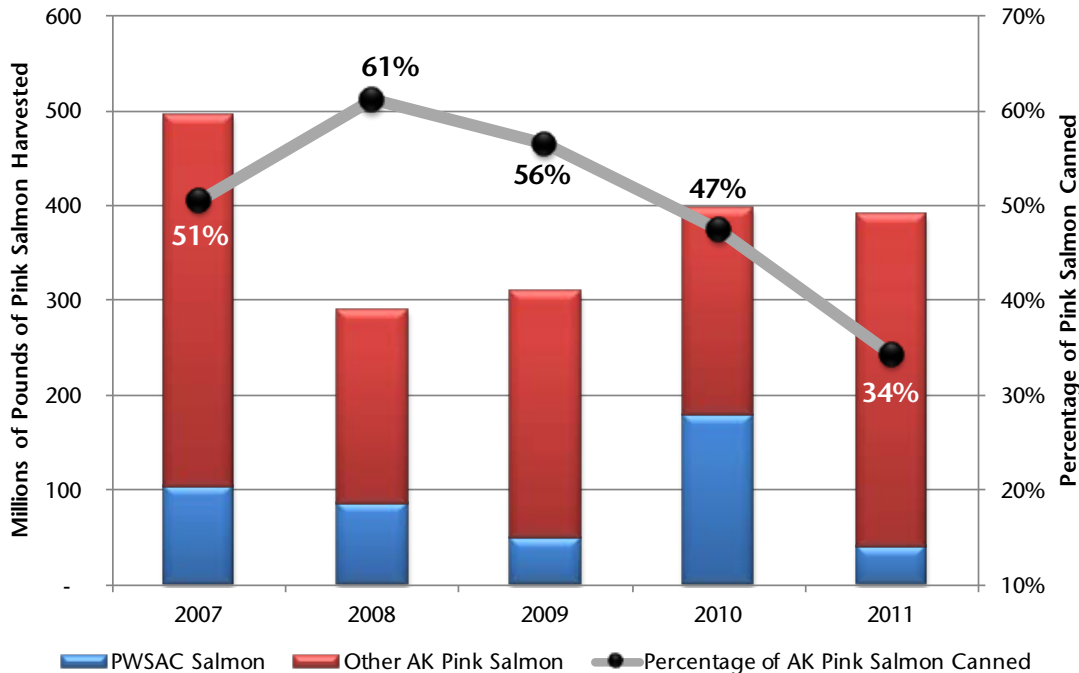
Processors sold a total of \$416 million worth of PWSAC salmon in 2010 and 2011. Less the cost of fish, they received a gross margin of \$253 million in 2010 and 2011 from selling PWSAC salmon. Revenues earned by catching and processing PWSAC salmon have been particularly high in three of the past five years for both fishermen and processors.

### **PWSAC Salmon Support of Product Form Innovation and Utilization**

Prior to the “salmon value crisis” of the early 2000s, over 80 percent of Alaska’s pink salmon went into a can. When the canned salmon market became oversupplied (due to rising canned production) and farmed salmon contained prices for frozen product; ex-vessel prices for Alaska pink salmon declined 53 percent (from \$0.19 per pound in 1995 to \$0.09 per pound in 2003). If the Alaska salmon industry was going to recover, it would have to adapt. Diversifying product forms was a key goal. Through innovation, better quality, and increased marketing efforts; the industry has diversified its products and markets. As a result, Alaska salmon prices have appreciated in recent years.

PWSAC salmon typically account for 15 to 25 percent of Alaska’s total pink salmon harvest. Having this consistent supply has been instrumental in providing the economies of scale necessary to create new pink salmon product forms, avoiding another canned salmon supply glut. The percentage of pink salmon going towards canned production has fallen from 61 percent in 2008 to 34 percent in 2011 (Figure 4.3).

**Figure 4.3: Pink Salmon Harvest Volume and Product Form Mix, 2007-2011**



Source: ADF&G and Alaska Department of Revenue, Alaska Salmon Price Report.

The shift towards frozen product has resulted in less waste, higher revenue, and better product recovery. In 2011, Alaska processors achieved a product recovery rate of 67 percent on pink salmon, meaning they were able to sell 67 pounds of pink salmon product for every 100 pounds of pink salmon purchased.<sup>11</sup> Not only did they improve the relative efficiency of their operations, but the average price/lb paid to fishermen and processors improved. In other words, Alaska processors were able to get more product out of each pink salmon and earned a higher price per pound at the same time.

**Table 4.1: Pink Salmon Product Recovery Rates and Historical Average Price for Fishermen and Processors**

Year	Product Recovery Rate	Avg. Ex-Vessel Price	Avg. First Wholesale Price
2000	58%	\$0.15	\$1.17
2001	54	0.13	1.01
2002	54	0.10	0.94
2003	52	0.09	0.88
2004	57	0.11	0.87
2005	50	0.12	0.93
2006	59	0.16	1.21
2007	59	0.19	1.24
2008	60	0.35	1.84
2009	59	0.26	1.53
2010	65	0.40	1.78
2011	67	0.47	1.83

Source: ADF&G (Statewide COAR) data.

<sup>11</sup> Product recovery rates and price data on this page represent statewide averages as data specific for PWS was either not available or (when available) could not provide a consistent measurement of product recovery rates.

# PWSAC Pink Salmon in 2010

For the past two decades if the calendar year ends in an even number that typically means less pink salmon available for Alaska fishermen. Odd years are sometimes referred to as an “up” year by those in the industry. The reason pink harvests fluctuate so significantly between odd and even years is due to the wild-stock pink salmon from Southeast Alaska. Southeast is a major pink producing region and these fish return in greater numbers during odd years.

PWSAC saw a phenomenal run of pink salmon return to the Sound in 2010. Marine survival rates do vary considerably, but on average 5 adult salmon return for every 100 fry released (i.e. a 5 percent marine survival rate). The marine survival rate for PWSAC pinks returning in 2010 was over 12 percent, as all three pink-producing hatcheries saw above average survival rates.

The result was a PWS pink run that far exceeded preseason forecasts. PWS common property fisheries were predicted to harvest 19.8 million pink salmon, but ended up harvesting 65.6 million. The majority of the increase came from PWSAC fish, as PWSAC exceeded their forecast by 34.8 million fish.

**Table 5.1: PWS Pink Salmon Common Property Harvest Forecast and Actual Harvest, 2010**

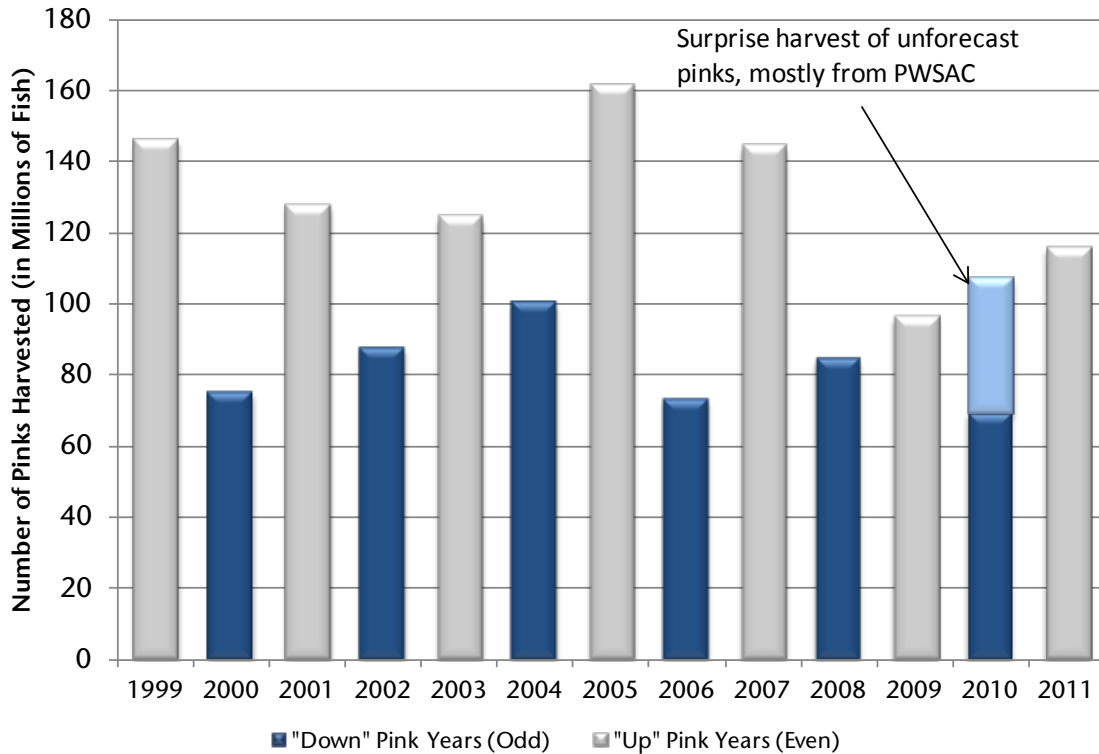
	In Millions of Fish
PWSAC Projected Pink Salmon Harvest	12.5
Actual PWSAC Pink Salmon Harvest	47.3
<b>PWSAC Difference</b>	<b>34.8</b>
VFDA Projected Pink Salmon Harvest	6.5
Actual VFDA Pink Salmon Harvest	16.1
<b>VDFA Difference</b>	<b>10.4</b>
Total Projected PWS Pink Salmon Harvest	19.8
Actual PWS Pink Salmon harvest	65.6
<b>PWS Difference</b>	<b>45.8</b>

Source: ADFG harvest and preseason projection data, 2010.

The difference PWSAC and VFDA<sup>12</sup> made to the 2010 pink harvest was evident at the statewide level. ADF&G forecast the commercial fisheries would harvest 69.1 million fish in 2010. The final statewide pink harvest was 107.3 million and the majority of the additional pink salmon were released as fry by PWSAC hatcheries (see Figure 5.1 on next page).

<sup>12</sup> The Valdez Fisheries Development Association (VFDA) operates the Solomon Gulch Salmon Hatchery located in Valdez, AK. The facility is permitted to produce 230 million pink salmon eggs and 2 million coho salmon eggs.

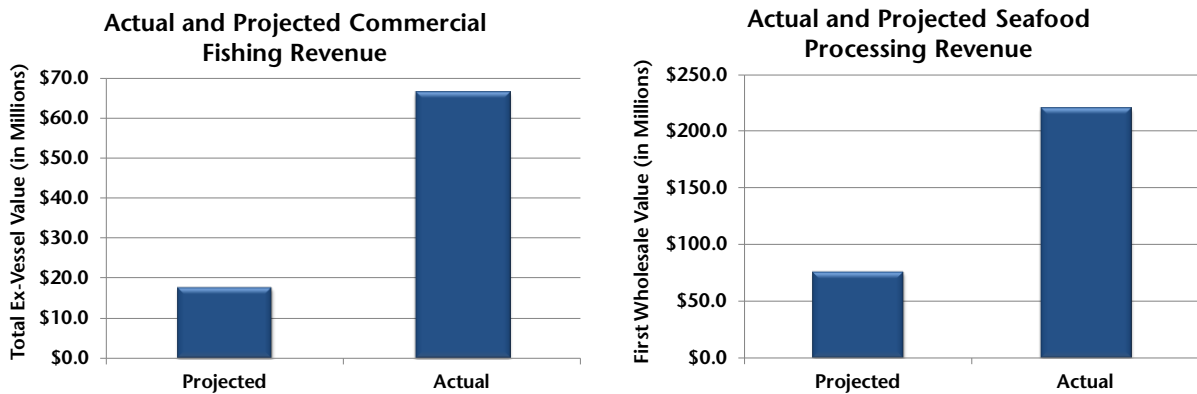
**Figure 5.1: Statewide Pink Salmon Harvest, 1999-2011**



Source: ADF&G and McDowell Group.

PWS commercial fishermen stood to make \$17.5 million from PWSAC pinks in 2010 common property fisheries, given 2010 ex-vessel prices and the number of PWSAC pink salmon forecast to return. However, thanks to an additional 34.8 million PWSAC pinks hitting the Sound, fishermen grossed \$66.3 million catching PWSAC pinks in 2010 – a difference of \$48.8 million.

**Figure 5.2: Projected and Actual Revenue from Harvesting and Processing PWSAC Pinks, 2010**



Source: McDowell Group estimates using ADF&G data.

PWS processors also benefitted greatly from the additional fish. Given a wholesale value of \$1.88/lb, processors could have expected to gross \$75.6 million processing PWSAC pinks in 2010. However, they ended up grossing \$219.8 million – a difference of \$144.2 million.

# Fisheries Business Tax

As with all salmon commercially harvested and processed in Prince William Sound, PWSAC salmon are subject to a 3 percent State of Alaska Fisheries Business Tax, half of which is deposited into the State's General Fund.

From 1990 to 2011, Prince William Sound commercial salmon fishermen and processors paid an estimated \$37 million in total fisheries business tax. The tax collected on PWSAC salmon accounted for roughly \$19 million of this total value, including fisheries business taxes paid on PWSAC cost recovery fish.

During the past five seasons (2007-2011), fisheries business tax receipts from PWSAC salmon have increased as larger returns and higher prices have increased overall ex-vessel values. In the past five years, PWSAC salmon resulted in \$9.0 million in fisheries business tax revenue. Those tax monies are split 50/50 between the state and local governments where PWSAC salmon are commercially harvested.

**Table 6.1: Estimated Fisheries Business Tax Receipts Resulting from PWSAC Salmon, 2007-2011**

	2007	2008	2009	2010	2011	Total
<b>Fisheries Business Tax (FBT)</b>						
FBT to State of Alaska General Fund	\$580,000	\$928,000	\$526,000	\$1,670,000	\$776,000	\$4,479,000
FBT to Local PWS Gov.	580,000	928,000	526,000	1,670,000	776,000	4,479,000
<b>Total FBT</b>	<b>\$1,160,000</b>	<b>\$1,856,000</b>	<b>\$1,052,000</b>	<b>\$3,340,000</b>	<b>\$1,552,000</b>	<b>\$8,959,000</b>

Source: McDowell Group estimates ADF&G data.

Fisheries business tax revenues can be a substantial part of local government revenues. For instance, in Cordova fish taxes amounted to \$1.5 million in 2011 and accounted for 14 percent of the city's general fund revenue. A significant part of that \$1.5 million likely came from catching and processing PWSAC salmon. The city's general fund revenue from fish taxes ranks third, behind sales tax revenues and property tax revenues. The City of Cordova employs 52 people in full-and-part-time positions, in addition to the 125 employees who work for the school district and hospital.

PWSAC salmon also make significant contributions to property and sales taxes indirectly as fishermen and processors use money earned from selling PWSAC salmon to pay these taxes. After all, the salmon fishery is Cordova's primary economic driver and PWSAC salmon account for over half of the ex-vessel value of all salmon caught in Prince William Sound. Quantifying the amount fishermen and processors contribute to sales/property tax is beyond the scope of this study.

# Return on Investment in PWSAC Salmon

By almost any measure, Alaskans have received tremendous “bang for the buck” as a result of supporting PWSAC operations. The State of Alaska has committed \$15.9 million in grant money to upgrade and maintain facilities that are owned by the State but managed by PWSAC. In addition, PWSAC has received \$33.1 million in loans (in nominal terms) from the State, primarily used to fund capital projects on facilities owned by PWSAC. Since 1975, the industry has paid \$27.9 million in self assessment and enhancement taxes. State of Alaska and enhancement tax revenue are referred to here as external funding sources. The rest of PWSAC’s operating income (\$187.0 million) has come from internal revenue sources, such as cost recovery operations (which also benefit the industry) and investment income.

Since 1990, PWS fishermen have earned \$482 million catching PWSAC salmon and processors have received gross margins<sup>13</sup> of \$1.2 billion selling PWSAC salmon. The first wholesale value of PWSAC salmon during this time totals \$1.8 billion. The industry has paid fisheries businesses taxes of \$18.6 million to the State and local governments. Therefore, for every \$1.00 of net grant funding the State of Alaska has invested in PWSAC facilities since 1975, the hatcheries have returned \$271 to the seafood industry (in first wholesale value).

**Table 7.1: Economic Return to Alaska Economy from External PWSAC Funding Sources**

<b>External PWSAC Funding by Source since 1975</b>	
State of Alaska Grants	\$15.9 million
- Net Funding from State of Alaska (less contributions from FBT)	\$6.6 million
Enhancement Taxes and Self-Assessments (paid by fishermen)	\$27.9 million
Loans received from FERLF <sup>1</sup> and AIDEA for PWSAC-owned facilities	\$33.1 million
- Total Principal Repaid to State of Alaska	\$20.1 million
- Total Interest Repaid to State of Alaska	\$17.7 million
<b>Value of PWSAC Salmon (1990 to 2011)</b>	
Total First Wholesale Value	\$1.8 billion
Total Gross Margin for Processors <sup>2</sup>	\$1.2 billion
Total Ex-Vessel Value for Fishermen	\$482 million
Fisheries Business Tax (FBT) Paid to State of Alaska	\$9.3 million
Fisheries Business Tax (FBT) Paid to Local PWS Governments	\$9.3 million
<b>Economic Return on External PWSAC Funding Source</b>	
Return to Fishermen since 1990 (ex-vessel value per \$1 of net State grant funding)	\$73
Return to Processors since 1990 (gross margin per \$1 of net State grant funding)	\$177
Return to Industry since 1990 (first wholesale value per \$1 of net State grant funding)	\$271
Return to Fishermen since 1990 (per \$1 of tax/assessment funding)	\$23

<sup>1</sup> Fisheries Enhancement Revolving Loan Fund, administered by DCCED.

<sup>2</sup> Gross margin refers to the wholesale value of product sold, less the cost of fish (including cost recovery fish).

Source: McDowell Group estimates using ADF&G and PWSAC data.

<sup>13</sup> Gross margin represents the value of fish sold into wholesale markets, less the cost of raw product (payments to fishermen or payments to hatcheries for cost recovery fish).

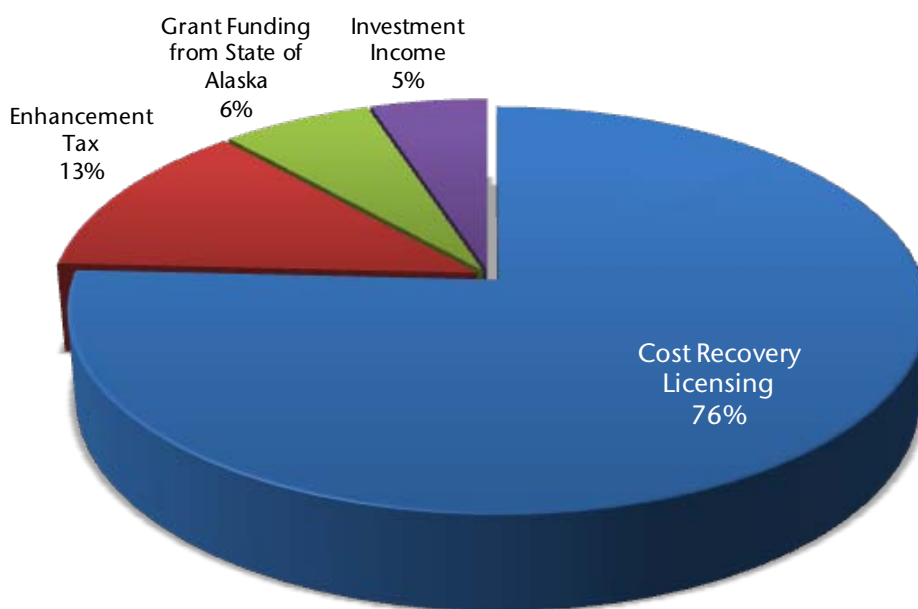


PWSAC has paid \$17.7 million in interest to the State of Alaska since 1985, and continues to pay interest on capital and operating loans aimed at improving capacity, efficiency, and safety at PWSAC facilities. PWSAC continues to pay principal and interest on monies loaned by DCCED’s Fisheries Enhancement Revolving Loan Fund (FERLF) and AIDEA (Alaska Industrial Development and Export Authority). While most of these loan payments will eventually fund other economic development projects within Alaska, the FERLF also generates additional income for the State of Alaska’s general fund.

## PWSAC Funding Sources

PWSAC hatcheries are primarily funded through cost recovery licensing where PWSAC grants processors a right of access to fish in PWSAC’s statutorily-created special harvest areas. The processors in turn pay a licensing fee to PWSAC and proceed to make their own arrangements to procure and sell the fish. Cost recovery licensing revenue and investment income accounted for 81 percent of PWSAC funding from 2008 to 2012 (Figure 7.1). PWSAC relied on enhancement tax proceeds for only 13 percent of their funding in during the past five years. PWSAC received 6 percent of their funding in the form of grants from the State of Alaska to perform deferred maintenance on hatchery facilities and upgrade or maintain other assets owned by the State.

**Figure 7.1: PWSAC Funding Sources, 2008-2012**



Source: PWSAC

Over the past five years licensed cost recovery access represented 9 percent, 12 percent and 2 percent of the total regional harvest value for PWS pink, chum and sockeye salmon, respectively. During that same period PWSAC salmon accounted for 61 percent, 97 percent and 52 percent of the common property<sup>14</sup> harvest for pink, chum and sockeye (respectively).

<sup>14</sup> Common property harvest is the volume, or in this case, the value of fish available to commercial fishermen. It does not include fish caught in special harvest areas and sold to processors under a cost recovery license.

# Potential Economic Impact of Expanding PWSAC Pink Salmon Broodstock Capacity

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## Statement of the Situation

In February 1999, ADF&G took action to remove the unused portion of permitted hatchery capacities statewide. Before that time, PWS hatcheries were permitted to collect 788 million pink salmon eggs although the facilities were not only collecting 460 million eggs due to the limitations of incubation infrastructure at the facilities. At that time, Alaska salmon prices were highly sensitive to local harvest volumes. As a result of ADF&G's regulatory action, PWSAC's permitted egg capacity was reduced.

PWSAC's Armin F. Koenig (AFK), Wally Noerenberg (WNH) and Cannery Creek (CCH) hatchery facilities, under current ADF&G regulations, are collectively permitted to fertilize 497 million pink salmon eggs. From 2007 to 2010, the facilities collected roughly 460 million eggs each year. Historically, these facilities have been permitted or designed to collect 608 million pink salmon eggs per year. Therefore, if PWSAC were permitted to obtain the volume of broodstock its facilities were historically permitted for, an additional 111 million pink salmon eggs could be collected.

PWSAC submitted to ADF&G for a Permit Alteration Request (PARs) in 2010. ADF&G denied the request to increase pink salmon production capacity at the AFK and WNH facilities, but CCH was permitted to collect an additional 35 million eggs in the 2011 season. PWSAC is still seeking to increase permitting capacity to the historical mark of 608 million eggs.

Explaining the rationale for and against increasing permitting capacity is beyond the scope of this economic study. Rather, this report examines the potential economic value of these additional salmon eggs on the seafood industry and Alaska's economy.

The 2007 to 2011 period was chosen as the study period, since new regulations went into effect in 2007. Pink salmon hatched in 2007 would have returned two years later in 2009. During the study period, there have been three age classes which hatched and returned to PWS fisheries as adults. Therefore, the focus is on 2009 to 2011 fishing seasons as many pink salmon caught in these years came from PWSAC pink salmon hatched in 2007, 2008, and 2009. This section attempts to estimate the additional volume and value that would have resulted during these years had PWSAC facilities been permitted to collect egg volumes in accordance with their historical targets rather than the current regulatory structure.

## Estimating the Increase in Returning Adult Pink Salmon

The first step in estimating the economic value of collecting more pink salmon eggs is to determine how many additional adult salmon would have returned to PWS fisheries as a result. In order to estimate the volume of pink salmon added to the fishery, the following formula was applied for each of the three hatcheries (AFK, WNH, and CCH):

$$\begin{aligned}
 & \text{Unused egg permitting capacity (the hatchery's permit goal versus actual release)} \\
 & \times \text{Fertility rate associated with that hatchery (for each year)} \\
 & = \text{Number of pink salmon smolt released} \\
 & \dots \\
 & \text{Number of pink salmon smolt released} \\
 & \times \text{Marine survival rate for that hatchery's smolt class (for each year)} \\
 & = \text{Number of returning adult pink salmon}
 \end{aligned}$$

**Table 8.1 Estimated Increase in PWSAC Salmon Production from Additional Broodstock**

Brood Year	2007	2008	2009	2007-2009 Total	2007-2009 Average
<b>Unused Egg Capacity by Hatchery (Egg Counts)</b>					
AFK	30,000,000	29,000,000	28,000,000	87,000,000	29,000,000
WNH	63,000,000	63,000,000	63,000,000	189,000,000	63,000,000
CCH	55,000,000	55,000,000	55,000,000	165,000,000	55,000,000
Total	148,000,000	147,000,000	146,000,000	441,000,000	147,000,000
<b>Fertility Rate by Hatchery (in pct.)</b>					
AFK	90.0%	90.1%	92.0%	-	-
WNH	91.9	86.5	91.9	-	-
CCH	86.2	92.8	91.4	-	-
<b>Marine Survival Rate by Hatchery (in pct.)</b>					
AFK	5.8%	4.0%	9.9%	-	-
WNH	8.4	4.8	8.9	-	-
CCH	9.9	2.3	5.4	-	-
Fishing Season	2009	2010	2009	2009-2011 Total	2009-2011 Average
<b>Estimated Number of Returning Adult Pink Salmon from Prior Brood Year</b>					
AFK	2,664,900	890,624	1,913,454	5,468,979	1,822,993
WNH	5,146,589	6,167,870	1,377,827	12,692,286	4,230,762
CCH	2,550,191	3,979,539	1,272,490	7,802,220	2,600,740
Total (rounded)	10,400,000	11,000,000	4,600,000	26,000,000	8,700,000

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

During the 2007 to 2009 brood years, it is estimated that collecting an additional 441 million pink salmon eggs (or 147 million per year) would have resulted in 26 million additional returning pink salmon during the 2009 to 2011 fishing seasons (8.7 million pinks per season, see Table 8.1).

## Value of Additional Pink Salmon Production

It is estimated that increasing pink salmon broodstock capacity in 2007 to 2009 would have resulted in an additional 26 million fish available for harvest in the common property fisheries during the 2009 to 2011 period. Assuming PWS commercial fishermen would have harvested these returning salmon, it is estimated that fishermen would have earned an additional \$30.1 million during the 2009 to 2011 fishing seasons. That is equal to \$42,300 per active permit holder for the three year period, or \$14,100 per year.

Most of this increase in gross earnings would have gone directly to fishermen's bottom line and crew shares. Aside from crew shares and fuel (to some extent), most fishing expenses are relatively fixed and do not change drastically depending on the amount of revenue earned during the course of a season.

**Table 8.2: Value of Additional Pink Salmon Production**

Fishing Season	2009	2010	2009	2009-2011 Total	2009-2011 Average
<b>Estimated Number of Returning Adult Pink Salmon</b>					
AFK	2,664,900	890,624	1,913,454	5,468,979	1,822,993
WNH	5,146,589	6,167,870	1,377,827	12,692,286	4,230,762
CCH	2,550,191	3,979,539	1,272,490	7,802,220	2,600,740
Total	10,361,680	11,038,034	4,563,771	25,963,485	8,654,495
<b>Weight of Pink Salmon Caught in PWS Common Property Fisheries</b>					
Avg. Wt. (lbs.)	3.06	3.59	3.05	-	-
Total lbs. (rounded)	31,710,000	39,630,000	13,900,000	85,240,000	28,410,000
<b>Average Ex-Vessel Pink Salmon Price for PWS Fishermen</b>					
Avg. Price/lb.	\$0.26	\$0.39	\$0.45	-	-
<b>Estimated Ex-Vessel Value of Additional PWSAC Pink Salmon</b>					
Ex-Vessel Value (rounded)	\$8,380,000	\$15,490,000	\$6,220,000	\$30,090,000	\$10,030,000
<b>Average First Wholesale for PWS Pink Salmon Price (Adjusted for Round Weight)</b>					
Avg. Price/lb.	\$1.07	\$1.22	\$1.31		
<b>Estimated First Wholesale Value of Additional PWSAC Pink Salmon</b>					
First Wholesale Value (rounded)	\$33,930,000	\$48,520,000	\$18,260,000	\$100,710,000	\$33,570,000

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

Getting access to an additional 26 million pink salmon from 2009 to 2011 could have provided PWS processors with additional first wholesale revenues of \$100.7 million. Less the cost of fish, processors could have gained \$70.6 million in gross margin during the three year period.

These estimates make three key assumptions. First, it is assumed that processors and fishermen could have utilized additional volume. Although 2010 saw a record return of pink salmon, seiners and processors were able to harvest and process enormous volumes of fish. Estimating the amount of production capacity lost during 2010 due to capacity constraints from either the fleet or the processors would be speculation. Therefore, it is assumed that harvesters and processors could have dealt with the additional volume, but the

reader should recognize that the figures are estimates of the potential value (without regard for issues such as short-term processing/harvesting constraints).

Secondly, it can be reasonably assumed that prices would not have been materially affected by the increase in volume. The pink salmon market has become less sensitive to regional supply fluctuations in recent years as a result of globalization. Today, Alaska’s pink salmon prices are more related to global pink and chum salmon supply, exchange rates, and roe market dynamics.

Finally, these estimates assume that marine survival rates from each age class would not have suffered as a result of more fry being released. It is possible, perhaps even likely, that marine survival rates would decrease as more fry are released due to competition for food. However, without any means to project what the resulting marine survival rate would have been, the survival rate associated with each returning adult pink salmon class is utilized and applied to the additional number of fry released.

### **Potential Economic Impact of Additional Pink Salmon Production**

Providing additional pink salmon to PWS fisheries would have a clear financial impact on fishermen and processors in the short-term. However, in the long term the added earnings boost to fishermen and processors would also create additional jobs in Alaska’s economy.

It is estimated that contributing an additional 26 million pink salmon to PWS fisheries, from 2009 to 2011, would have created seasonal jobs for 211 additional fishermen and processors plus indirect and induced jobs for an additional 69 Alaska workers. This assumes that the existing relationship between revenue and employment in fishing and processing sectors holds true for any additional production. Therefore, additional pink salmon would have added the equivalent of 134 year-round jobs and \$12.9 million in labor income to the Alaska economy, per year from 2009 to 2011 (Table 7.3). For context, this amount of jobs and income is similar to the entire construction sector in the Valdez-Cordova Census Area.

**Table 8.3: Estimated Economic Impact of Additional PWSAC Pink Salmon on Alaska Economy, Annual Averages (2009–2011)**

	Direct	Indirect	Induced	Total
Average Monthly Employment	82	14	38	134
Number of Workers	211	20	48	279
Labor Income (in \$Millions)	\$10.4	\$0.8	\$1.7	\$12.9

Note: Totals may not sum due to rounding.

Source: McDowell Group estimates using IMPLAN, ADF&G, PWSAC, and DOLWD data.

# Sport, Subsistence, and Personal Use Fisheries

## Subsistence and Personal-Use of PWSAC Salmon

The Gulkana hatchery is located near Paxson, on the Gulkana River. PWSAC manages and operates the facility for ADF&G under a 20-year professional services agreement at no cost to the state. The Gulkana hatchery is the largest sockeye salmon hatchery in the world, releasing just over 20 million fry each year. Survival rates for these sockeye fry are typically lower than other salmon species. Generally, only 1 fry in 100 survives to return back to the area it was released.

Alaskans travel from around the state to participate in the Copper River dipnet personal use and fishwheel subsistence fisheries. PWSAC salmon play an important role in these fisheries. In 2008, 2009, and 2010 returning adult sockeye reared by PWSAC hatcheries accounted for over 50 percent of the total subsistence harvest in each of those years.

Alaskans harvested 698,900 sockeye that were released by PWSAC hatcheries from 1999 to 2010. Residents of Fairbanks harvested more of these fish than residents of any other community, followed by Anchorage, Wasilla, North Pole, and Copper Center. Residents of Palmer, Glennallen, and Eagle River also harvested large numbers of PWSAC sockeye in these fisheries.

**Table 9.1: Number of PWSAC Sockeye Harvested, by Fishermen’s Place of Residence, Copper River Personal Use and Subsistence Fishery, 1999–2010**

	2006	2007	2008	2009	2010	1999-2010 Avg.	1999-2010 Grand Total
<b>By Region</b>							
Anchorage & Mat-Su	4,255	19,938	49,600	31,313	44,418	23,964	280,715
Fairbanks North Star Borough	3,594	15,675	41,334	26,397	46,150	18,955	227,464
Valdez-Cordova Census Area	1,959	7,455	23,714	17,083	21,393	11,540	126,885
Southeast Fairbanks CA	675	2,193	7,305	5,436	7,443	3,459	41,374
Kenai Peninsula Borough	52	304	813	497	945	-	-
Other AK Residents	160	608	3,287	1,392	2,448	-	-
<b>By Community</b>							
Anchorage	1,867	8,618	21,362	13,533	19,627	10,775	129,303
Barrow	6	22	83	167	122	75	896
Big Lake	51	100	375	239	253	196	2,352
Chickaloon	14	178	487	100	85	133	1,601
Chistochina	57	0	482	310	147	208	1,454
Chitina	212	703	1,547	1,236	1,236	721	8,646
Chugiak	106	481	1,303	740	1,280	707	8,484
Copper Center	553	2,416	6,061	3,111	5,404	3,241	38,895
Delta Junction	416	1,358	5,283	3,128	4,684	2,134	25,612
Eagle River	405	1,479	3,886	2,387	3,369	2,208	26,500
Eielson	0	0	0	0	0	268	3,219
Elmendorf AFB	17	35	76	185	78	76	918
Ester	76	314	1,013	696	819	399	4,787
Fairbanks	2,620	11,353	30,993	19,946	33,264	13,685	164,222
Fort Richardson	8	40	101	90	57	72	868
Fort Wainwright	40	186	325	176	754	319	3,827
Gakona	226	1,066	2,250	1,707	1,878	1,281	15,369
Girdwood	22	103	132	92	241	128	1,539

Glennallen	428	1,689	2,588	1,608	3,029	2,093	25,119
Healy	22	114	290	223	384	160	1,915
Kenny Lake	0	0	1,446	1,349	2,070	867	5,199
Nenana	50	218	427	174	533	215	2,147
North Pole	752	3,424	8,513	5,152	10,482	4,042	48,509
Northway	9	25	97	298	211	133	1,458
Palmer	581	2,998	6,867	4,862	6,637	3,428	34,284
Salcha	63	214	527	291	987	333	3,995
Slana	70	141	1,080	895	928	409	4,910
Sutton	53	251	493	330	433	219	2,632
Talkeetna	16	54	102	76	186	88	1,053
Tazlina	0	0	2,071	1,472	1,536	893	5,361
Tok	169	514	1,038	1,474	1,143	859	10,309
Two Rivers	23	82	228	123	285	116	1,388
Valdez	383	1,429	3,382	3,146	3,576	1,828	21,931
Wasilla	1,067	5,334	13,571	8,271	11,537	5,737	68,848
Willow	41	211	454	299	232	194	2,333
Other Alaska <sup>1</sup>	270	1,023	7,118	4,232	5,187	1,581	18,968
<b>Grand Total</b>	<b>10,700</b>	<b>46,200</b>	<b>126,100</b>	<b>82,100</b>	<b>122,700</b>	<b>59,800</b>	<b>698,900</b>

<sup>1</sup> "Other Alaska" includes communities whose residents harvested 500 fish or fewer from 1999 to 2010.

Source: ADF&G and McDowell Group Estimates.

## PWSAC Sockeye for Rural Interior Communities

Between 2006 and 2010, the most recent five-year period for which data is available, Alaska residents from 34 rural communities on the road system harvested sockeye from personal use or subsistence fisheries supported by PWSAC operations. For interior families living on the road system in the Copper River Basin, the Southeast Fairbanks Census Area, and the greater Mat-Su borough, these sockeye can be a substantial source of protein.

Based on ADF&G data on PWSAC sockeye caught in personal use and subsistence fisheries, it is estimated that from 2006 to 2010 residents of these 34 communities caught 86,402 PWSAC sockeye. That amount of sockeye equates to about 55 pounds of sockeye per person, throughout the five-year period. Buying the equivalent amount of fish, chicken, pork, or beef at a store would cost at least \$150. Therefore, the average family of four from these rural communities would have received over 200 pounds of sockeye, valued at over \$600. Naturally, there are costs involved in harvesting



**Dipnet fishermen with sockeye salmon.**

these fish. However, the residents which do harvest fish by definition would generally exceed the 55 pound average, making their overall value higher and likely offsetting costs associated with the trip. Many rural residents share the fish with friends and family.

**Table 9.2: Personal Use and Subsistence Harvest Per Capita in Rural Interior Communities, 2006-2010**

	2010 Population	Estimated 2006-2010 PWSAC Sockeye Harvest	PWSAC Sockeye lbs. per Capita
Copper Center	328	17,544	320.9
Delta Junction	958	14,869	93.1
Glennallen	483	9,342	116.1
Gakona	218	7,127	196.2
Tazlina	297	5,079	102.6
Chitina	126	4,933	234.9
Kenny Lake	355	4,865	82.2
Tok	1,258	4,339	20.7
Slana	147	3,113	127.1
Gulkana	119	2,316	116.8
Salcha	1,095	2,082	11.4
Nenana	378	1,402	22.3
Copperville	N/A	1,044	-
Healy	1,021	1,032	6.1
Chistochina	93	997	64.3
Chickaloon	272	989	21.8
McCarthy	28	683	146.3
Northway	169	640	22.7
Silver Springs	114	438	23.1
Talkeetna	876	434	3.0
Nelchina	59	301	30.6
Tolsona	30	267	53.5
Paxson	40	251	37.6
Mentasta Lake	112	227	12.2
Nabesna	5	213	255.4
Lower Tonsina	N/A	159	-
Cantwell	219	130	3.6
Mendeltna	39	116	17.9
Lake Louise	46	103	13.4
Tanacross	136	98	4.3
Mentasta	N/A	87	-
Dot Lake	75	79	6.3
Dry Creek	94	70	4.5
Eagle	86	34	2.4
<b>All Interior Routed Communities</b>	<b>9,276</b>	<b>85,402</b>	<b>55.2</b>

Source: ADF&G Subsistence Division and 2010 US Census population data.

## Sport Harvest of PWSAC Salmon

PWSAC salmon play an important role in the Prince William Sound sport fisheries, contributing 760,000 fish to the sport fishery from 1990-2010 (Table 9.3), an average of 36,000 fish annually. The PWSAC salmon sport harvest is spread over a wide area, including the entire Prince William Sound area and the Gulkana and Copper River drainages.

A significant proportion of sport fish landed in the Sound are most likely pink salmon. The study team estimates sport fishermen have caught and retained nearly 424,000 pinks since 1990. While they may not be the target specie for guides (usually that would be coho), many clients appreciate the mild taste of pink salmon and are excited about catching an Alaskan salmon regardless of species.

Sport fishing for coho is serious business for many PWS residents who operate charter boats or fish recreationally. A sampling of PWS charter websites reveals an average price of roughly \$200 per person for a



full day of guided fishing, not including licenses. PWSAC coho have made up 15 percent of the total regional sport harvest of coho since 2005. The Wally Noerenberg facility near Whittier is the only PWSAC facility currently producing coho.

**Table 9.3: Sport Harvest of PWSAC Salmon in Numbers of Fish, 2007-2010**

Species	2007	2008	2009	2010	1990-2010 Total
Chinook*	0	0	0	0	10,234
Sockeye	500	700	700	1,200	53,482
Coho	24,350	20,250	4,700	11,700	243,167
Pink	16,891	17,759	22,242	16,646	423,614
Chum	1,168	2,260	1,512	2,593	29,666
<b>Total</b>	<b>42,909</b>	<b>40,969</b>	<b>29,154</b>	<b>32,139</b>	<b>760,163</b>

\*The last return of PWSAC Chinook occurred in 2002; however, a Chinook program was re-initiated in 2012 with approximately 48,000 Chinook smolt released in Chenega Bay.,  
Source: ADF&G, PWSAC and McDowell Group estimates.

# PWSAC Business Expenses

Between 2007 and 2011, PWSAC spent \$25.6 million in 25 Alaska communities. Spending was highest in Juneau, Anchorage, Cordova, and Whittier. The bulk (\$9.9 million) of PWSAC spending in Juneau is associated with a Fisheries Revolving Loan Fund payment, which is made annually to the Alaska Department of Commerce, Community and Economic Development. ADF&G offices in Juneau also perform hatchery evaluation projects. Total five year expenditures in Juneau, less payments made to state agencies, totaled \$368,000. PWSAC spent a total of \$13.3 million in Anchorage, Cordova, Whittier, and Seward from 2007 to 2011.

**Table 10.1: PWSAC Spending by Community, 2007-2011**

Community	Total	Annual Average
Juneau <sup>1</sup>	\$11,148,200	\$2,229,633
Anchorage	8,425,100	1,685,020
Cordova	3,610,200	722,037
Whittier	994,300	198,860
Seward	223,900	44,787
Girdwood	178,900	35,782
Fairbanks	177,300	35,451
Eagle River	171,300	34,269
Gakona	148,700	29,740
Palmer	126,600	25,315
Wasilla	120,100	24,018
Glennallen	111,900	22,383
Valdez	51,500	10,291
Chenega Bay	28,500	5,702
Homer	26,800	5,362
Chenega	14,300	2,867
Sitka	14,200	2,848
Anchor Point	7,500	1,510
Moose Pass	4,000	808
Two Rivers	3,400	677
Kodiak	2,100	415
Nikiski	1,200	245
Soldotna	600	119
Tok	400	<100
Talkeetna	<100	<100

<sup>1</sup> PWSAC makes repayments to a revolving loan program administered by the State of Alaska. The vast majority of payments which are spent in Juneau are spent on loan repayment.

Source: PWSAC.

# Salmon Market Overview

PWSAC primarily produces pink, chum, and sockeye salmon fry and those species are the focus of this salmon market overview. By value, the five-year average of PWSAC production (2007-2011) is 49 percent pink, 25 percent sockeye, 24 percent chum and 1 percent coho.

## Major Market Event: Chile's Production Rebound Oversupplies the Salmon Market

In July 2007, Chilean salmon farmers were hit with a viral outbreak of Infectious Salmon Anemia (ISA). The virus spread quickly and Chile's Atlantic salmon production fell from over 850 million pounds to less than 300 million pounds by 2010. Since that time, Chilean production has recovered and producers expect to double their 2011 production of 400 million pounds in 2012. In addition, Norway expects to increase farmed salmon production by roughly 200 million pounds in 2012.

Currently, the salmon market is struggling to find a place for increasing Chilean farmed salmon production. Wholesale prices for whole, fresh Atlantic salmon fell from an all-time high of \$4.31/lb in May 2011 to \$2.43/lb by November 2011, according to Urner Barry (see Figure 11.1 on next page). Currently, wholesale prices are between \$2.65/lb and \$2.90/lb for whole (dressed) Atlantic salmon and there are reports of substantial inventories. A survey of Urner Barry's retail features database revealed most boneless/skinless fillets of Atlantic salmon are currently selling for \$5.99 to \$8.99 per pound.

Some salmon farming companies have announced plans to cut production, and many are actively trying to refinance their debt. Low prices are squeezing salmon farmers, and market conditions suggest salmon farmers are selling product near or below cost. Looking ahead, less access to credit and potentially higher feed costs could make the situation even worse for salmon farmers.

Salmon farming profits are greatly impacted by fishmeal and fish oil prices. These products are key elements in the feed used to grow farmed salmon. Feed expenses can represent 40 to 50 percent of a salmon farmer's total costs. Fishmeal prices have fluctuated in recent years, but contemporary prices are generally two to three times greater than prices seen 10 years ago (when Alaska's salmon industry went through its own value crisis). Peru, the world's largest fishmeal producer, recently announced that landings of fish used for fishmeal and fish oil were down substantially through the first four months of 2012, which could impact the future price of fishmeal.

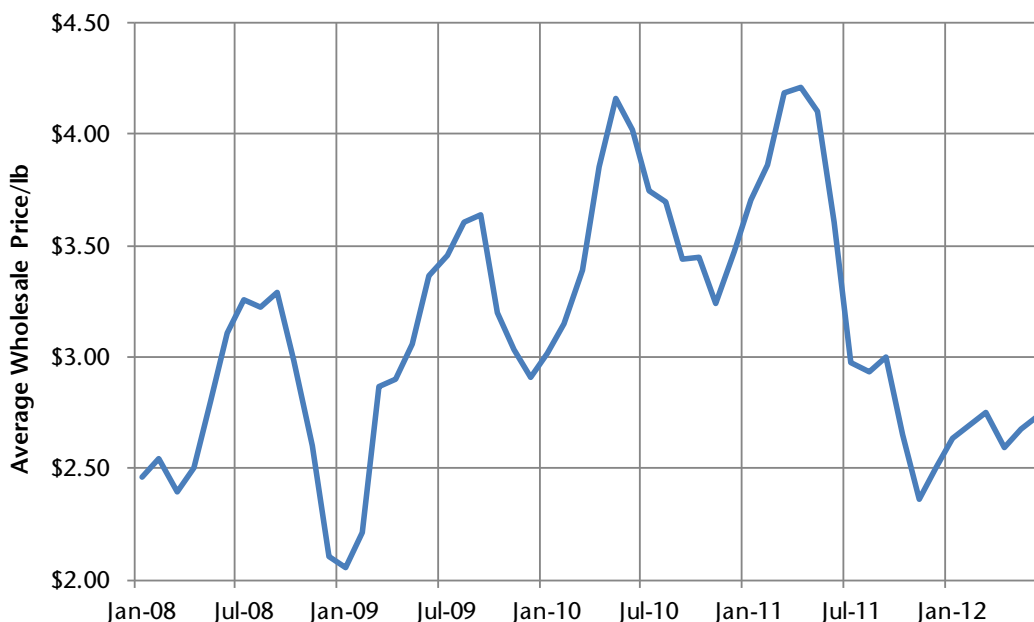
On the demand side, high salmon prices and the global recession eroded demand for farmed salmon through 2010 and 2011. That dynamic came to a head in mid-2011 when growing supply met stagnant



June 2012 weekly circular ad from Von's grocery store in Los Angeles, CA.

demand and farmed salmon prices quickly fell. Europe, the US, and Japan are the world’s largest salmon markets, but precarious economic conditions will probably limit prices for a commodity such as farmed salmon in the short-term (given the production forecast for 2012).

**Figure 11.1: Average Monthly Atlantic Salmon Wholesale Price per Pound (Dressed), 2008-2012**



Source: Urner Barry (Fresh Wholefish, FOB Los Angeles, 12-14 lbs).

### Why It Might Be Different for the Alaska Salmon Industry This Time

Salmon farmers increased production 11 percent in 2011 and are projected to increase production by 10 to 15 percent in 2012. The last time farmed salmon supplies grew by more than 10 percent was 2001 – the year before prices for Alaska salmon (and farmed salmon) essentially tanked. Heading into another farmed salmon supply glut, is there any reason to expect Alaska salmon prices won’t fall precipitously again? It turns out that Alaska is in a much more favorable position today, than it was 10 years ago due to several key factors:

#### KEY DIFFERENCES IN ALASKA WILD SALMON MARKET BETWEEN 2002 AND 2012

- Improved Product Diversification
- High Demand from Roe Markets
- Weaker Dollar
- Successful Marketing Efforts
- Improved Quality
- Globalization and a Bigger Market
- Farmed Salmon Feed Costs
- Consumer Awareness
- New Wild Salmon Products

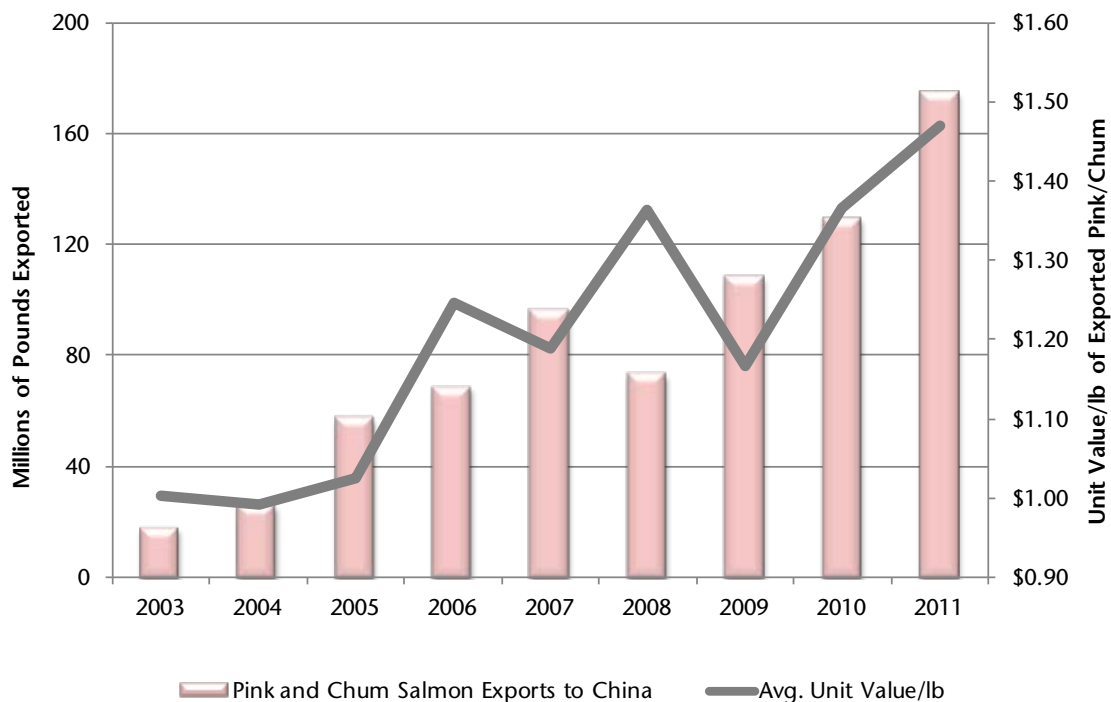
Alaska’s salmon industry has spent a great deal of time and money since 2002 to educate consumers about the unique benefits of wild, Alaska salmon. Industry investment, grant/loan programs, and the efforts of the Alaska Seafood Marketing Institute (ASMI) have resulted in a premium price for Alaska salmon, to accompany its well-respected market position. The industry has also worked to diversify its products and improve quality. The percentage of pink and sockeye salmon that wind up in a can is now less than 50 percent (down from +80 percent prior to 2002) and the majority of the fleet now chills their fish. The result is more appealing, higher quality products made from Alaska salmon with a better balance between supply and demand.

Exchange rates have also moved in Alaska’s favor. In January 2002, one US dollar (USD) could be exchanged for 9.0 Norwegian kroner (NOK) or 640 Chilean pesos (CLP). Today, that same USD would only buy 6.0 Norwegian kroner or 505 Chilean pesos. During the last 10 years, the Norwegian kroner appreciated 49 percent and the Chilean peso appreciated 31 percent versus the dollar. A weaker dollar and stronger NOK and CLP makes imported Atlantic salmon from Norway or Chile more expensive, which is good for Alaska salmon. So even though salmon prices may be up 20 percent over the past 10 years, farmed salmon exporters are still receiving less (in terms of their own currency).

Contemporary salmon consumers care more about where their food comes from and what sort of chemicals may be in it, compared to consumers a decade ago. Wild Alaska salmon are a perfect fit for social and health conscious consumers. The perceived value of a “wild” salmon, to these consumers, is usually greater than the one or two extra dollars they may spend on a wild fish compared to a farmed salmon. The extraordinary health benefits of wild salmon also appeal to aging consumers looking for protein sources that can lower cholesterol.

Globalization has greatly increased the value of pink and chum salmon. Ten years ago, salmon processors struggled to find markets for mature pink and chum flesh. With the rise of China as a trading partner, pink and chum salmon are now being exported for secondary processing. Cost-effective secondary processing performed in China (and other places) has helped Alaska salmon diversify product forms away from canned salmon.

**Figure 11.2: Pink and Chum Salmon Exports to China, 2003-2011**



Source: NMFS Trade Data.

The price of salmon roe has increased in recent years driven by increased demand from markets in Eastern Europe and lower Hokkaido chum harvests in Japan. In 2009, Russia harvested an incredible 1.2 billion pounds of salmon (virtually all pink and chum). As a result, pink salmon and salmon roe were very affordable

in Russia following the record season. This appears to have had a carry-over effect, as Russians and Ukrainians are now importing more and more Alaska salmon roe to supplement domestic supplies. Historically, Japan has bought almost all of Alaska's salmon roe, but now with another major buyer there is more competition for product.

Salmon roe markets are completely dependent on wild salmon harvests. Farmed salmon do not produce marketable roe because they are almost always harvested before the fish reaches sexual maturity. Salmon flesh and feed conversion ratios are best just before the onset of sexual maturation. After a salmon begins to sexually mature their body diverts caloric energy to roe or milt production instead of body growth. Flesh texture also softens as fish mature.

Farmed salmon neared killed the Alaska salmon industry, but ten years after Alaska's "salmon value crisis" the industry may be in an even better position partially thanks to farmed salmon. Alaskan salmon production is limited by natural conditions. The state's constitution mandates that fishermen take no more than the maximum sustained yield. Farmed salmon, which outnumber wild salmon three-to-one, has introduced more consumers to salmon. The breadth of the market has grown considerably and Alaska,



**Stock photography from Alaska's Wild salmon fisheries**

accounting for about 12 percent of world salmon supply, has carved out a prominent niche. As a result, prices are less dependent on regional harvest volume than they were ten years ago and thanks to the prevalence of farmed salmon more people are being introduced to salmon every day. Eventually, some of those consumers will learn they value the wild taste of Alaska salmon just a little more, in the same way people develop an affinity for wines from a certain region. The difference is wine can be made in many places, but wild salmon only thrive in very specific environment.

### **IMPACT OF FARMED SALMON ON ALASKA SALMON SPECIES**

Pink and chum salmon are the most affordable salmon options available to consumers and are utilized in three major product forms: canned (mostly pink), frozen, and roe product. Farmed salmon cannot currently compete on price with pink and chum salmon, and are only sold into the fresh/frozen market. In addition to being more affordable, pink and chum salmon have the beneficial distinction of being a wild/organic product. Pink and chum salmon are expected to be largely unaffected by the fall in farmed salmon prices due to product diversification and their affordable price point.

Sockeye are under more competitive pressure from farmed salmon. Intense price pressure has led to a loss of market share in Japan and Europe. However, the Copper River sockeye are regarded as the gold standard for

many salmon consumers around the world. Sockeye benefit from access to roe and canned markets, but are much more dependent on fresh/frozen sales than pink or chum salmon.

To some consumers, a salmon is still a salmon. However, Alaska salmon are in a much better position to withstand a farmed salmon supply glut in comparison to the situation which played out a decade ago. Alaska salmon products are now more diversified and of higher quality. The competition is operating in a higher cost environment and are more disadvantaged by contemporary currency valuations. Marketing efforts have created loyal fans of wild salmon, willing to pay a premium for sustainably harvested Alaska salmon. Alaska salmon and farmed salmon are not completely decoupled, but this time the fallout from the farmed salmon market is expected to be modest in comparison to the early 2000s.



***Alaska Seafood Marketing Institute (ASMI) booth at Boston Seafood Show, where ASMI staff and other Alaska Seafood Industry professionals work to increase the value of Alaska Seafood by seeking new markets and exploring new product applications.***