

March 2013

Economic Impact of Douglas Island Pink and Chum, Inc.



Prepared by



Prepared for

**Douglas Island Pink
and Chum, Inc**

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Juneau • Anchorage

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Executive Summary

This study analyzes the economic impact of the Douglas Island Pink and Chum Salmon, Inc. (DIPAC). Most data covered in the report reflects the recent five-year period (2008-2012), but historical DIPAC data since 2001 and cumulative figures extending back to 1990 are also included. The report examines the impact of DIPAC on Alaska's economy, on Alaska's commercial seafood industry, and regional sport fishing industry. It also examines market conditions for chum salmon roe and meat products.

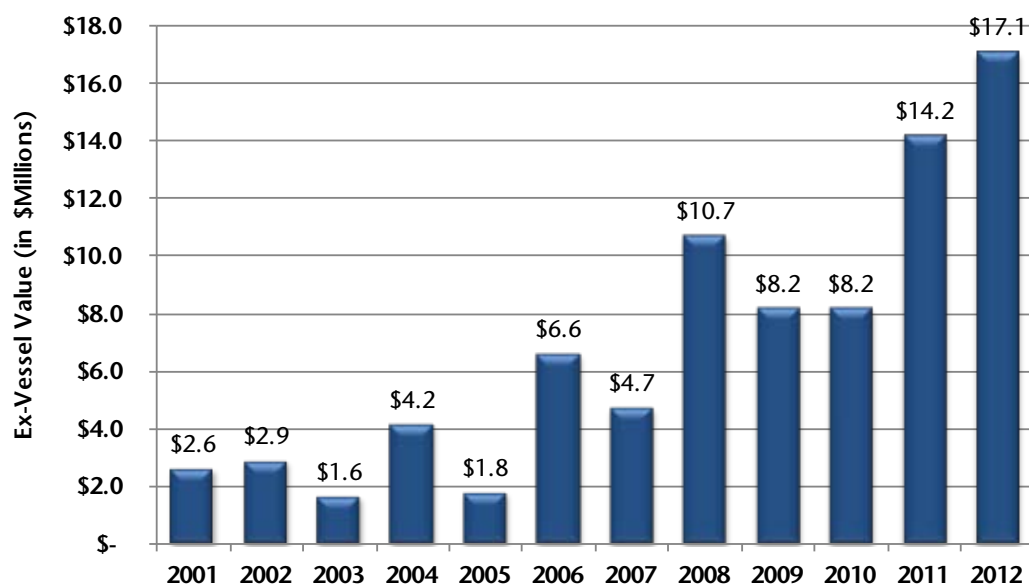
DIPAC is a private nonprofit salmon hatchery operation based in Juneau working "to sustain and enhance valuable salmon resources of the State of Alaska for the economic, social and cultural benefit of all citizens, and to promote public understanding of Alaska's salmon resources and salmon fisheries through research, education and tourism."

The economic impact of DIPAC salmon production and business operations primarily benefit Southeast Alaska, with the greatest impact in Juneau and Haines. Key findings from the analysis of DIPAC's economic impacts are presented in this section.

Commercial Harvest

- Since 1979 commercial fishermen fishing in common property (CP) fisheries have caught 25.9 million DIPAC-bred salmon worth \$105 million in ex-vessel terms. Over 55 percent of this total value has been realized in just the past five seasons (2008-2012).
- DIPAC's contribution to common property fisheries reached record highs in 2011 and 2012.

Figure 1.1: Total Ex-vessel Value of DIPAC Salmon Harvested in Common Property Commercial Fisheries (2001–2012)



Note: 2012 data is preliminary.
Source: DIPAC, 2013.

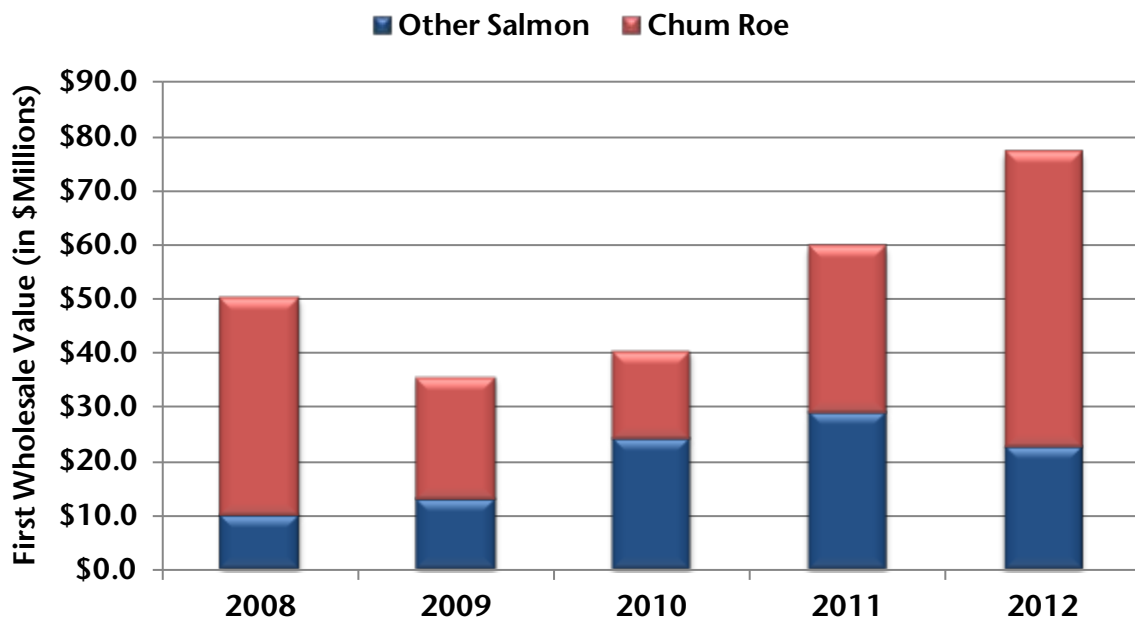
- DIPAC benefits commercial fisheries in northern Southeast Alaska primarily through supplementing the region's wild chum salmon stocks. Since 2008, chum salmon have accounted for 94 percent of DIPAC production by ex-vessel value and 97 percent by volume of fish contributed to CP fisheries.
- Of the three primary salmon gear groups present in northern Southeast Alaska, DIPAC salmon are most beneficial to the local gillnet fleet. Since 2008, gillnetters have caught 87 percent of the total ex-vessel value contributed to CP fisheries.
- DIPAC salmon accounted for 71 percent of northern Southeast gillnetters' total ex-vessel earnings between 2008 and 2012.
- On average, DIPAC salmon accounted for 7 percent of seiners' gross earnings in northern Southeast districts; however, DIPAC salmon accounted for 29 percent of seiners' gross earnings in 2012 when waters near Amalga Harbor were opened to seining.
- DIPAC typically contributes less than 1 percent to Southeast Alaska troll fisheries, but trollers in northern Southeast Alaska have begun targeting DIPAC chum salmon. In 2011, trollers grossed nearly \$1.1 million catching mostly DIPAC chum salmon in Icy Strait.
- In terms of geography, gillnet fishermen from Juneau earned the largest proportion (36 percent) of this income between 2008 and 2012, followed by Haines resident fishermen (27 percent).
- DIPAC salmon created jobs for a 436 commercial salmon fishermen who averaged ex-vessel harvests of \$11.6 million per year during the 2008-2012 study period. Including indirect and induced impacts, DIPAC salmon caught in commercial fisheries created 259 annual average jobs for 542 workers and \$20.4 million in total economic output.

Seafood Processing

- DIPAC produced \$262.9 million worth of salmon between 2008 and 2012 in terms of first wholesale value. During the five-year study period the average first wholesale value of DIPAC salmon was \$52.6 million. This includes DIPAC salmon sold to regional processors by fishermen fishing in common property fisheries and contracted payments made by processors on cost recovery harvests.
- High prices for chum salmon and the second-largest return of DIPAC chum salmon ever made 2012 the most valuable season on record for DIPAC. In 2012, the first wholesale value of DIPAC salmon caught in common property and cost recovery fisheries was \$77.0 million.
- Despite accounting for less than 10 percent of a chum salmon's body weight, the fishes' roe is a valuable commodity. Prices for chum roe increased substantially in 2012 due to production shortages in Japan and increasing demand for salmon roe in Russia and Eastern Europe.
- Chum roe is estimated to account for over 60 percent of the total first wholesale value of all DIPAC salmon harvested in 2012 (see Figure 1.1 on next page).

- During the 2008 to 2012 study period, DIPAC accounted for 15 percent of the total first wholesale value of all salmon processed in Southeast Alaska. It is estimated that DIPAC accounted for 9 percent of the total regional first wholesale value of all seafood species during the study period, including 13 percent of the total in 2012.
- DIPAC salmon created jobs for an estimated 439 seafood processing workers who earned \$6.4 million in labor income during the study period. Including indirect and induced impacts, DIPAC salmon processed in Southeast Alaska created jobs for 518 workers, \$9.4 million in labor income, and \$41.1 million in total economic output (in addition to impacts associated with commercial fishing).

Figure 1.2: First Wholesale Value of DIPAC Salmon, with Chum Roe Shown Separately (2008–2012)



Note: Includes common property and cost recovery harvests. 2012 data is preliminary.
Source: DIPAC, 2013.

Sport and Personal Use Harvest

- DIPAC's chinook, coho, and sockeye programs contribute significantly to sport fisheries and personal use fisheries in the Juneau and Skagway area. Sport fishermen and residents fishing personal use permits harvested a total of 165,400 DIPAC salmon between 2001 and 2012; including 101,700 chinook and coho, 36,400 sockeye, and 27,300 chum salmon.
- During the past five years of available sport fishing data (2007 to 2011), DIPAC accounted for 18.1 percent of all chinook and 16.9 percent of all coho caught in Juneau-area sport fisheries. Together DIPAC chinook and coho made up 17.1 percent of the Juneau-area sport harvest during this time.
- DIPAC salmon caught in sport and personal use fisheries led to an estimated \$4.9 million in total economic activity per year and created 37 average annual jobs during the study period.

- From 2007 to 2011, an average of 31,130 people went sport fishing each year in northern Southeast Alaska. As DIPAC salmon accounted for nearly 20 percent of the total chinook/coho sport salmon harvest during that period, it is likely that several thousand anglers harvested DIPAC salmon. Although DIPAC salmon caught in regional sport fisheries do not create as much total direct economic activity as those caught in commercial fisheries, sport fisheries are a vital contributor to the region's quality of life and an important draw for summer visitors. About 1-in-7 Juneau residents bought a sport fishing license in 2012 and over 11,000 summer visitors purchased sport fishing licenses in Juneau and Skagway.

DIPAC Business Operations

- DIPAC created a monthly average of 42 jobs per year, including staff at both the Macaulay and Snettisham hatcheries, between 2008 and 2012. Over half of DIPAC's workforce is seasonal while the organization retains roughly 30 full-time staff positions. DIPAC employed 80 people per year, on average, during the study period.
- DIPAC spends over two-thirds of its budget within Alaska. This spending generates a significant amount of salmon for regional user groups, but also creates secondary employment for local businesses.
- In total, it is estimated that DIPAC's business operations created 79 annual average jobs during the study period and \$12.1 million in economic output per year. In 2012, the number of indirect jobs created increased due to the hatchery's capital improvement projects. It is estimated that capital projects alone employed an average of 35 construction workers per month in 2012.

Alaska's Economic Return on Investment in DIPAC

- Since 1987, the State of Alaska has awarded \$3.2 million in grants and loaned \$23.4 million to DIPAC for capital and operating projects. Since 1990, DIPAC has returned nearly \$3.2 million to the State of Alaska via Fisheries Business Taxes levied on DIPAC salmon. DIPAC has repaid all of its loans, providing the State with \$23.4 million in principal and \$19.1 million in interest.
- Since 1990, funding from the State of Alaska, coupled with the efforts of DIPAC's founders, employees, and board members has produced \$482 million worth of DIPAC salmon (in first wholesale terms), including \$105 million in ex-vessel value earned by commercial fishermen in common property fisheries.
- In addition, DIPAC salmon have generated an estimated \$3.2 million in tax revenues since 1990 for local governments in northern Southeast Alaska. Over half of this revenue has been realized within the past five years (2008-2012).

Total Economic Impacts

- DIPAC business operations and DIPAC salmon caught in commercial/sport fisheries created a total annual average of 575 jobs for 1,235 workers during the 2008 to 2012 study period. DIPAC accounted for \$25.7 million in labor income and \$78.5 in economic output per year during this time.

- The economic impact of DIPAC increased in 2012 due to a strong return of chum salmon and the construction of new storage and raceway facilities. It is estimated that DIPAC created year-round and seasonal jobs for a total of 1,542 workers earning \$34.8 million in labor income in 2012.

Table 1.1: Economic Impact of DIPAC on Alaska’s Economy, Annual Averages (2008–2012)

	Direct Impacts	Indirect & Induced Impacts	Total Economic Impacts	Total Impacts (2012 Only)
Impact of DIPAC Business Operations				
Annual Average Employment	42	37	79	93
Number of Workers	80	49	129	154
Labor Income (in \$Millions)	\$2.2	\$1.7	\$3.9	\$5.0
Output (in \$Millions)	\$6.7	\$5.4	\$12.1	\$17.6
Impact of DIPAC Salmon on Commercial Fishing				
Annual Average Employment	178	81	259	280
Number of Workers	436	106	542	585
Labor Income (in \$Millions)	\$7.4	\$3.4	\$10.8	\$15.4
Output (in \$Millions)	\$11.6	\$8.8	\$20.4	\$28.8
Impact of DIPAC Salmon on Seafood Processing Sector				
Annual Average Employment	139	62	200	282
Number of Workers	439	79	518	757
Labor Income (in \$Millions)	\$6.4	\$3.0	\$9.4	\$12.8
Output (in \$Millions)	\$28.7	\$12.4	\$41.1	\$58.4
Impact of DIPAC Salmon in Sport and Personal Use Fisheries				
Annual Average Employment	15	22	37	N/A
Number of Workers	17	29	46	N/A
Labor Income (in \$Millions)	\$0.8	\$0.83	\$1.59	N/A
Output (in \$Millions)	\$2.1	\$2.77	\$4.88	N/A
Total Economic Impact of DIPAC				
Average Monthly Employment	373	202	575	692
Number of Workers	972	263	1,235	1,542
Labor Income (in \$Millions)	\$16.7	\$8.9	\$25.7	\$34.8
Output (in \$Millions)	\$49.1	\$29.4	\$78.5	\$109.6

Note: Totals may not sum due to rounding.

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

Notes about Economic Impact Estimates: the table above illustrates the estimated economic impact of DIPAC business operations and salmon produced by DIPAC. Primary data on DIPAC expenditures, employment, and salmon production have been modeled to reflect economic value and resulting employment associated with this activity during the 2008 to 2012 study period. It is important to note that these estimates are built on the premise that if DIPAC salmon account for 30 percent of the region’s commercial harvest value, then by extension DIPAC salmon are responsible for 30 percent of the employment during that period. In reality, while many more fishermen benefit from DIPAC salmon these figures reflect the number of whole jobs (seasonal and year-round) associated with DIPAC. Indirect and induced impacts are arranged in a similar fashion. Each direct worker creates dozens of fractional jobs for other workers in the economy. The model adds up these fractional jobs into whole numbers of indirect and induced jobs and workers solely attributable to DIPAC.

Purpose and Methodology

Purpose and Scope

Douglas Island Pink and Chum, Inc. (DIPAC) contracted with McDowell Group, an Alaska research and consulting firm, to analyze the economic impacts of its salmon enhancement program. This report updates information published in a 2009 McDowell Group impact analysis. It presents volume and value data associated with DIPAC-produced salmon harvested between 1979 and 2012, as well as economic impacts associated with DIPAC production and operations during the 2008 to 2012 time period. The analysis is presented in the following five sections:

1. **Commercial Harvest** - The economic value of commercially caught DIPAC salmon is measured using the ex-vessel income earned by Southeast Alaska fishermen. Ex-vessel income represents the gross value paid to fishermen for their catch.
2. **Salmon Processing** - The economic benefits from processing DIPAC salmon are presented in terms of the first wholesale value of those fish commercially harvested in Southeast Alaska. First wholesale value represents the value paid to the primary processor by the initial buyer outside their affiliate network.
3. **Sport and Recreational Harvest** - Estimates of the economic contributions of DIPAC salmon to the Southeast Alaska sport fishery are discussed, including economic activity resulting from non-resident harvests facilitated by the charter industry.
4. **DIPAC Operations** - Economic and employment information related to DIPAC operations and administration are presented.
5. **Economic Impacts** - The overall economic benefits to Alaska resulting from the commercial harvest, processing and sport harvest of DIPAC salmon, and DIPAC operations, are estimated in this section. This includes local and regional tax benefits generated via the Salmon Enhancement Tax and the Fisheries Business Tax.

For purposes of this report, northern Southeast Alaska is defined as commercial fishing districts 11, 12 (Juneau), and 15 (Haines).

This report analyzes DIPAC's impact on the commercial fishing, salmon processing, and sport fishing sectors, as well as the regional economy overall. This report also investigates the return on the State of Alaska's investment in DIPAC. Finally, this document contains a discussion of current market conditions for chum salmon.

Methodology

The data presented in this report comes from a variety of sources, including DIPAC, the Alaska Department of Fish and Game (ADFG), Alaska Commercial Fisheries Entry Commission (CFEC), Alaska Department of Labor and Workforce Development (ADOLWD) and the Alaska Department of Revenue (ADOR). Additionally, McDowell Group conducted interviews with Southeast sport fish charter operators and incorporated recent research relevant to communities in Southeast.

Estimates provided in this report are based on the most recent and relevant data. Volume and ex-vessel value estimates of DIPAC salmon harvested in commercial fisheries are based on data provided by DIPAC, ADFG, and CFEC. First wholesale values are calculated using average annual prices per product from Southeast Alaska processors, as published by ADOR.

Some first wholesale data is unavailable due to ADOR confidentiality regulations. In these instances, McDowell Group used conservative estimates of ex-vessel to wholesale mark-ups. Therefore, wholesale values reported in this study should be considered minimum estimates.

Sport fish estimates are based on data provided by DIPAC and ADFG.

McDowell Group developed a model to estimate the direct and indirect economic impacts related to DIPAC production and operations. Inputs to this model were drawn from the sources described above. The model linked ADOLWD employment and payroll data, ex-vessel volume and value data, first wholesale value data, and other information to generate estimates of average annual employment, income, and total economic activity related to DIPAC-produced salmon.

Douglas Island Pink and Chum, Inc. (DIPAC), a private nonprofit salmon hatchery operation, was formed in 1976 by a group of Juneau residents concerned about depleting fisheries resources. The organization's mission is "to sustain and enhance valuable salmon resources of the State of Alaska for the economic, social, and cultural benefit of all citizens, and to promote public understanding of Alaska's salmon resources and salmon fisheries through research, education and tourism."

DIPAC currently produces four species of Pacific salmon: chum, sockeye, chinook, and coho. Chum and sockeye are produced for commercial fleets, while chinook and coho are produced for sport and commercial fishing fleets. The operation also benefits subsistence and personal use fisheries, and produces a surplus of fish for cost recovery to cover hatchery operation costs. DIPAC operations have grown, with 76,000 chum released in Kowee Creek (facility now closed) in 1976 and almost 130 million salmon released in 2012.

DIPAC is governed by a board of directors, which consists of representatives from the commercial fishing fleets, processors, sport fishing community, and subsistence fishermen. The City and Borough of Juneau, environmental groups, and members of the public are also represented on the board. DIPAC receives no enhancement tax revenue from commercial harvests; instead, it relies primarily on cost-recovery harvests of salmon to fund its enhancement activities. State contracts also fund its chinook and trans-boundary sockeye programs.

Facilities and Operations

DIPAC currently owns and/or operates three hatcheries and several remote release sites throughout the northern inside waters of Southeast Alaska. Its administrative offices are located at the Macaulay Salmon Hatchery site in Juneau. The organization also owns the Sheep Creek Hatchery in Juneau and operates the state-owned Snettisham Hatchery 40 miles south of Juneau. A description of each facility is provided below.

Macaulay Salmon Hatchery and Visitor Center

The Macaulay Salmon Hatchery is a large facility located just north of downtown Juneau. Constructed in 1989, the facility currently produces three species of salmon: chum, chinook, and coho. The hatchery, which can hold up to 300 million eggs, is currently permitted to incubate 50 million pink, 125 million chum, 1.5 million coho and 1.25 million chinook salmon annually. Macaulay hatchery chum releases occur in Gastineau Channel, Amalga Harbor, Boat Harbor, and Limestone Inlet. All coho releases are in Gastineau Channel and chinook are released in Gastineau Channel, Auke Bay, Fish Creek, and in Skagway. A small number of chinook are also released into Twin Lakes in Juneau.

The Ladd Macaulay Visitor Center at the hatchery attracts an average of over 80,000 visitors per year during the summer and hosts over 3,000 local children, parents, and teachers as part of its year-round educational programming. Outside of the hatchery, visitors can view some hatchery operations and view returning salmon. Inside the visitor center, an assortment of aquariums and interpretive displays focus on local marine

life. The DIPAC Tourism Division oversees the center's operations, and supports its own budget through admissions, concessions, and rental revenue.

The Macaulay Salmon Hatchery also donates wet lab space to the University of Alaska Fairbanks for research use by the Juneau Center for Fisheries and Ocean Sciences.

Adjacent to the Macaulay site is a public dock used for sport fishing. Local residents are the primary users, and it is a popular fishing site for people who do not own a boat and children learning how to fish. In 2001, the Alaska Department of Transportation and Public Facilities expanded the dock and adjacent uplands to provide off-street parking and handicap access.

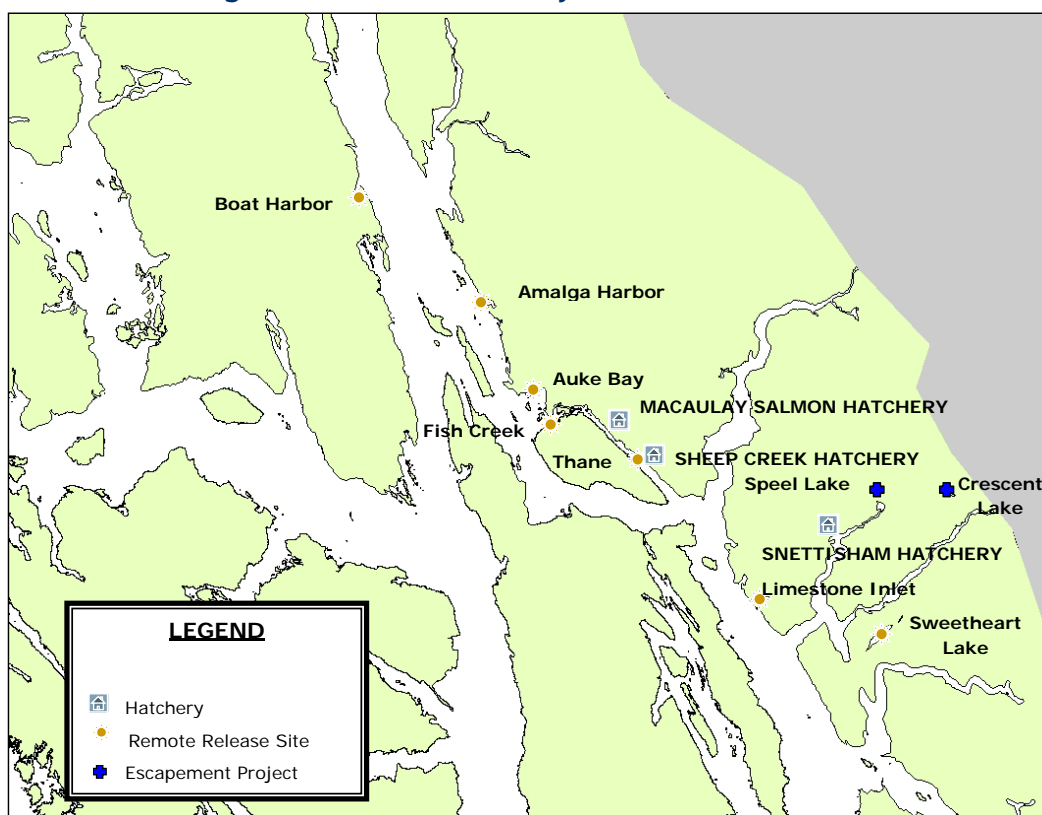
Sheep Creek Hatchery

DIPAC owns the Sheep Creek Hatchery, located four miles south of downtown Juneau. The facility, built in 1980 to enhance pink and chum runs, is currently used to rear additional coho for the Macaulay hatchery.

Snettisham Hatchery

DIPAC commenced management of the Snettisham Hatchery in 1996. Prior to that time, the facility was built and operated by the Alaska Department of Fish and Game. This single-species sockeye hatchery, located in Port Snettisham, between Juneau and Petersburg, is one of the largest smolt facilities in the state. The facility is permitted to incubate 33.5 million sockeye salmon annually. The hatchery produces sockeye salmon for local commercial and personal use fisheries and also operates a unique trans-boundary enhancement program under the auspices of the U.S./Canada Salmon Treaty.

Figure 2.1: DIPAC Hatchery and Release Site Locations



DIPAC Salmon in Commercial Fisheries

DIPAC contributes a significant number of salmon to common property fisheries in northern Southeast Alaska. These hatchery-bred salmon provide additional harvest volume for local commercial fishermen, leading to increased earnings and employment. When the region's commercial fishermen catch more salmon it stimulates the economies of regional communities through increased business and personal spending, as well as increased tax revenue. In addition, DIPAC contracts with a few seine boats to execute cost recovery harvests each year as well.

Regional Commercial Salmon Fishing Fleet

Drift Gillnet Fleet

Most DIPAC salmon taken in the common property fishery by gillnetters are caught in northern Southeast Alaska Salmon Districts 11 and 15. The northern Southeast gillnet fleet consists of 298 boats. Roughly half of these boats are based in Juneau and Haines. Participation in the fishery has increased in recent years from 230 boats in 2007 to 298 boats in 2012.¹ Most active gillnet permit holders employ one crew member to assist them during the fishing season. Therefore, it is estimated the northern Southeast Alaska gillnet fleet employed a total of 596 individuals during the 2012 season, with 286 of these fishermen residing in the Juneau or Haines area.² DIPAC salmon are a crucial part of gillnetters' earnings in northern Southeast, accounting for 65 to 76 percent of the fleet's ex-vessel earnings during the study period.



Photo Courtesy of Luke Fanning Family, Juneau, Alaska.

Table 3.1: Northern Southeast Gillnet Fleet (2008–2012)

	2008	2009	2010	2011	2012*
Permits Fished	253	267	279	294	298
Harvest (Millions of lbs.)	19.0	15.9	14.2	19.0	23.7
Ex-Vessel Value (in \$Millions)	\$13.6	\$9.6	\$11.9	\$16.5	\$19.8
Ex-Vessel Value/permit	\$53,608	\$35,837	\$42,803	\$56,194	\$66,445
Pct. Ex-Vessel Value from DIPAC	76%	75%	65%	70%	70%

Notes: 2012 figures are preliminary. Northern Southeast region refers to Districts 11 and 15.

Source: ADF&G and DIPAC, 2013.

¹ In gillnet, purse seine, and power troll fisheries, virtually all boats deliver fish under the same permit within any given year. Therefore, permits and boats are used interchangeably in this section to describe participation in the fishery.

² Employment estimates for Juneau and Haines assume a permit owner and their crew member reside in the same area. Participation by crew members in specific fisheries are not tracked, so there is no data available on exactly how many permit owners and crew members fished in a specific fishery or region.

The northern Southeast gillnet fleet earned a total ex-vessel value of \$71.4 million from 2008 to 2012, or \$14.3 million per year on average. Ex-vessel earnings in the northern Southeast gillnet fishery averaged \$50,977 per boat per year during the five-year study period (2008-2012). Based on fish tickets and conservative, preliminary pricing data, the 2012 season was the fleet's most valuable in recent history despite more fishermen participating in the fishery. The average boat grossed an ex-vessel value of \$66,445 in 2012, though that amount will likely increase after accounting for retroactive payments sent to fishermen.

Purse Seine Fleet

The total Southeast Alaska seine fleet consists of 240 to 270 active permits. Roughly half of these boats caught fish in District 12 and District 11 (Amalgam Harbor), where returning DIPAC salmon account for a portion of the seine harvest. In contrast to the gillnet fishery, most seine boats fishing in the area are owned by fishermen who live in other Southeast Alaska communities (besides Juneau or Haines). In 2011, a total of 201 seiners made landings in northern Southeast, but just 10 of these permits were owned by fishermen from Juneau. Seiners are much more likely than gillnetters to fish in multiple districts in northern and/or southern Southeast. Purse seine vessels typically consist of a permit owning skipper, plus four to five crew members. Therefore, it is estimated the northern Southeast seine fleet employed a total of 732 individuals in Districts 11 and 12 during the 2012 season.



Photo Credit: Douglas Island Pink and Chum, Inc.

Table 3.2: Northern Southeast Purse Seine Fleet (2008–2012)

	2008	2009	2010	2011	2012*
Permits Fished	153	166	144	201	133
Harvest (Millions of lbs.)	15.1	35.2	6.4	78.0	12.7
Ex-Vessel Value (in \$Millions)	\$10.3	\$13.5	\$4.6	\$38.8	\$10.2
Ex-Vessel Value/permit	\$67,424	\$81,254	\$32,050	\$192,794	\$76,833
Pct. Ex-Vessel Value from DIPAC	1%	5%	1%	4%	29%

Notes: 2012 figures are preliminary. Data refers to purse seine permits participating in District 11 or 12 purse seine fisheries. Purse seine boats typically fish in districts outside of northern Southeast as well.

Source: ADF&G and DIPAC, 2013.

The Southeast seine fleet earned a total of \$77.4 million fishing in Districts 11 and 12, where DIPAC salmon make up a portion of the harvest, from 2008 to 2012. The majority of seiners' income comes from pink and chum salmon. Pink salmon have a distinct even-odd cycle in Southeast Alaska, where pink salmon harvests are very large in odd years but much lower in even years. For this reason, seiners' ex-vessel earnings fluctuate significantly from one year to the next. However, during the five-year study period the total average annual

seine harvest from Districts 11 and 12 consisted of 29.5 million pounds of salmon worth \$15.5 million. Each vessel earned an average of \$90,071 during this period.

DIPAC salmon typically make up a small portion of the seine harvest in northern Southeast. However, in 2012, seiners were allowed to harvest mature chum salmon near Amalga Harbor. This harvest accounted for 29 percent of the fleet's total ex-vessel earnings in northern Southeast during 2012.

Southeast Alaska Troll Fleet

The Southeast Alaska troll fishery is made up of roughly 740 power trollers and 350 hand troll vessels. With more boats in the fishery and the ability to fish more gear, power trollers account for the vast majority of the fishery's harvest volume and value. Most power troll operations consist of a permit holder and one crew member, while hand trollers sometimes fish alone, resulting in an average of 0.5 crew members per hand troll permit fished. Therefore, it is estimated the Southeast Alaska troll fleet employed a total of 2,045 individuals during the 2011 season, with 197 of these fishermen residing in the Juneau or Haines area.

Table 3.3: Southeast Alaska Troll Fleet (2008–2012)

	2008	2009	2010	2011	2012
Pct. Total Ex-Vessel Value from DIPAC	<1%	<1%	1%	3%	<1%
Hand Troll					
Hand Troll Permits Fished	375	364	339	372	352
Hand Troll Harvest (Millions of lbs.)	1.0	0.9	1.0	1.1	0.8
Hand Troll Ex-Vessel Value (in \$Millions)	\$3.0	\$1.5	\$2.1	\$2.2	\$1.8
Hand Troll Ex-Vessel Value/permit	\$7,806	\$4,079	\$6,236	\$5,981	\$5,132
Power Troll					
Power Troll Permits Fished	745	745	729	760	743
Power Troll Harvest (Millions of lbs.)	13.0	15.5	16.6	18.1	\$15.5
Power Troll Ex-Vessel Value (in \$Millions)	\$33.6	\$21.5	\$29.8	\$30.2	\$26.0
Power Troll Ex-Vessel Value/permit	\$45,154	\$28,802	\$40,900	\$39,694	\$34,946

Notes: 2012 figures are preliminary.

Source: ADF&G (CFEC) and DIPAC, 2013.

Southeast Alaska trollers earned a total ex-vessel value of \$151.6 million from 2008 to 2012. DIPAC contributes chinook and coho salmon to the fishery, but in recent years trollers' have also begun targeting chum salmon in Icy Strait. The average power troller grossed an estimated \$37,895 per year during the 2008 to 2012 study period, while hand trollers averaged \$5,858 per year.

DIPAC salmon make up a very small portion of trollers earnings. Most of the power troll fleet fishes in outside waters where the odds of hooking a DIPAC chinook or coho are much smaller due to the presence of so many other stocks. However, some trollers did earn a significant amount of money catching returning DIPAC chum salmon in Icy Strait during 2011. This "chum troll" fishery was very helpful to trollers in 2011, as it was located in inside waters, cutting down on fuel costs, and could be fished around chinook and coho openings. Many power trollers fished the Icy Strait "chum troll" fishery in 2012, but despite a large run of DIPAC chum salmon the catch per unit of effort (CPUE) fell significantly. Fishermen and processors have some theories

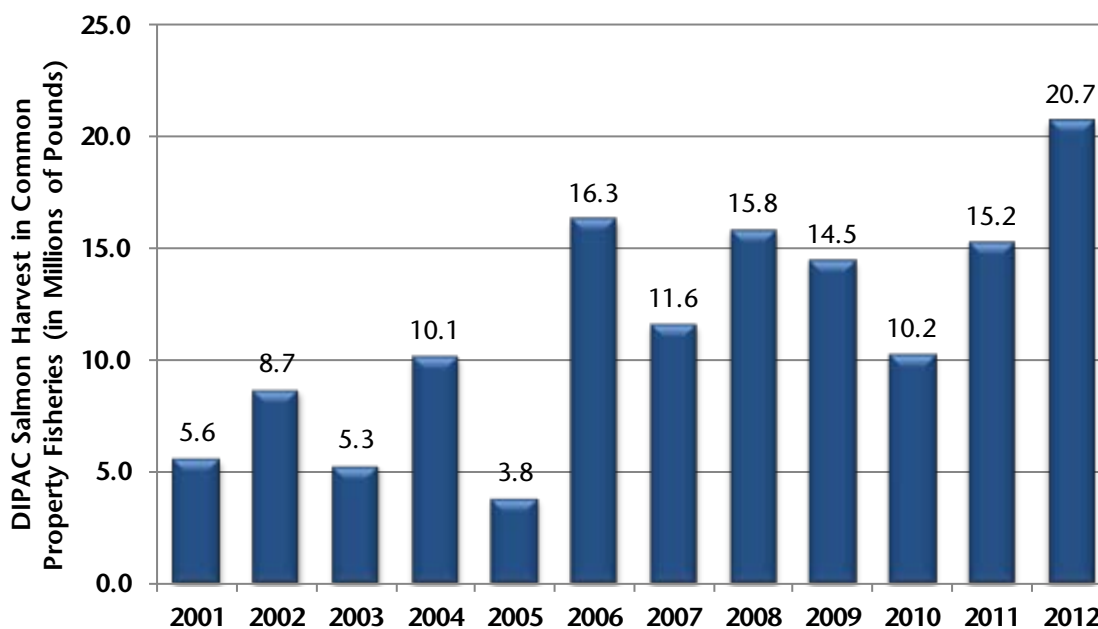
about why the CPUE fell, but if the CPUE improves in coming years the chum troll fishery could become an additional source of income for the region's troll fleet.

Commercial Harvest of DIPAC Salmon

Salmon reared and released by DIPAC contribute greatly to commercial fisheries in northern Southeast Alaska. Between 1979 and 2012, DIPAC contributed over 25 million salmon worth an ex-vessel value of \$105 million to common property fisheries. DIPAC's most significant contributions have come in recent years, as returns have exceeded historical averages and prices for chum salmon have increased. In fact, the top five seasons in terms of contribution to common property fisheries occurred between 2008 and 2012. DIPAC salmon accounted for an estimated 55 percent of the region's total ex-vessel value during that time.

DIPAC contributed an average of 15.3 million pounds and a total of 76.5 million pounds of salmon to common property fisheries during the five-year study period. The number of salmon contributed to the fishery by DIPAC has generally increased since 2001. Based on preliminary data, the 2012 season ranks as the largest contribution ever made by DIPAC to common property salmon fisheries, in terms of numbers of salmon and ex-vessel value.

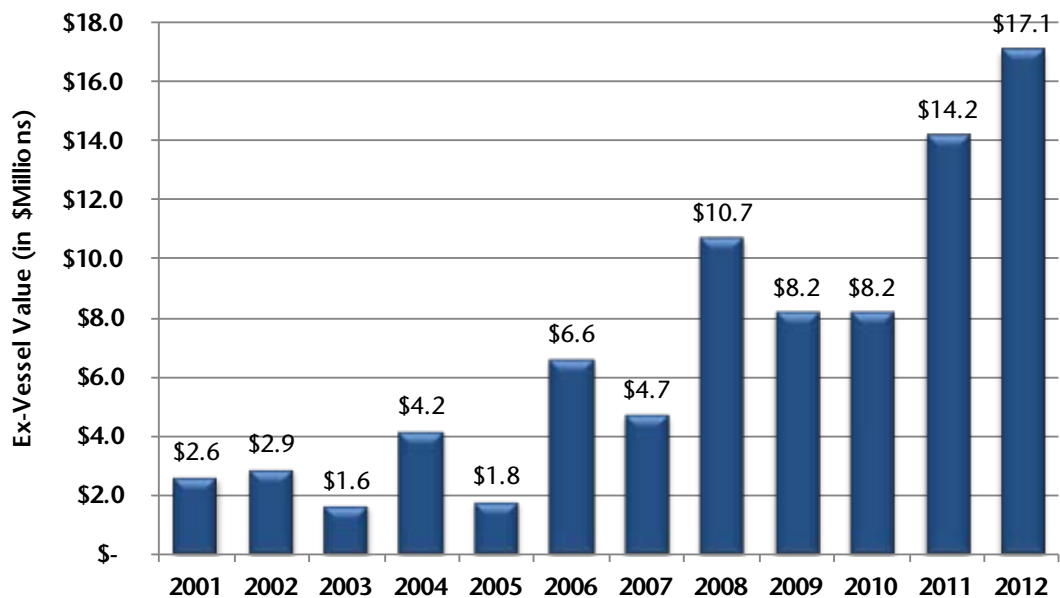
**Figure 3.1: Total Pounds of DIPAC Salmon
Harvested in Common Property Commercial Fisheries (2001–2012)**



Note: 2012 data is preliminary.
Source: DIPAC, 2013.

With larger hatchery returns and increasing prices for Alaska salmon – particularly chum salmon – DIPAC's contribution to the common property fishery has substantially increased in value since 2001. From 2008 to 2012, DIPAC salmon caught in common property fisheries were valued at an estimated \$58.4 million, averaging \$11.7 million per year. These years rank as the top five seasons in DIPAC's history in terms of value contributed to the common property fisheries (in nominal terms, see Figure 3.2 on next page).

Figure 3.2: Total Ex-Vessel Value of DIPAC Salmon Harvested in Common Property Commercial Fisheries (2001–2012)



Note: 2012 data is preliminary.
Source: DIPAC, 2013.

Like other salmon hatcheries in Southeast Alaska, DIPAC tends to focus its production efforts on a relatively high-volume, low-value species: chum salmon. Chum are widely considered the best value in hatchery production, as a large number of fish can be produced at relatively low cost. Between 2008 and 2012, chum salmon accounted for 97 percent of DIPAC salmon harvested in common property fisheries.

Table 3.4: Harvest Volume of DIPAC Salmon Caught in Common Property Fisheries, by Species (2008–2012)

Species	2008 - 2012 Average		2011		2012	
	000s lbs.	Percent	000s lbs.	Percent	000s lbs.	Percent
Chum	14,870	97%	14,496	95%	20,153	97%
Sockeye	329	2	634	4	525	3
Coho	76	<1	95	1	27	<1
Chinook	19	<1	9	<1	26	<1
Total	15,294	100%	15,234	100%	20,726	100%

Note: Percentage totals may not equal column sums due to rounding. Data for 2012 is preliminary
Source: DIPAC, 2013.

DIPAC's largest contribution to commercial fisheries comes in the form of chum salmon provided for the northern Southeast gillnet fleet (as illustrated by the pie charts on the next page in Figure 3.3). Chum salmon account for nearly 95 percent of the ex-vessel value of DIPAC salmon caught in common property commercial fisheries. The northern Southeast gillnet fleet benefits the most of any commercial gear type from DIPAC salmon. That fleet accounts for 87 percent of the ex-vessel value associated with DIPAC salmon caught in the region's common property fisheries. In total, DIPAC contributed 76.5 million pounds and \$62.6 million dollars to the region's common property fisheries between 2008 and 2012.

Figure 3.3: Average Annual Ex-Vessel Value of DIPAC Salmon Harvested in Common Property Fisheries, by Species and Gear Type (2008–2012)



Source: DIPAC, 2013.

Table 3.5 presents annual ex-vessel values from 2008 to 2012 associated with the four salmon species produced by DIPAC and with the three gear types. Earnings from chum and sockeye increased dramatically in 2011 and 2012. Contributions to the gillnet fleet increased as result of larger returns and prices for chum and sockeye salmon. In addition, contributions to the seine fleet increased in 2012 significantly, as seiners were allowed to harvest mature chum salmon near Amalga Harbor north of Juneau.

Table 3.5: Ex-Vessel Value of DIPAC Salmon Caught in Common Property Fisheries, by Gear Type and Species (in \$000s, 2008–2012)

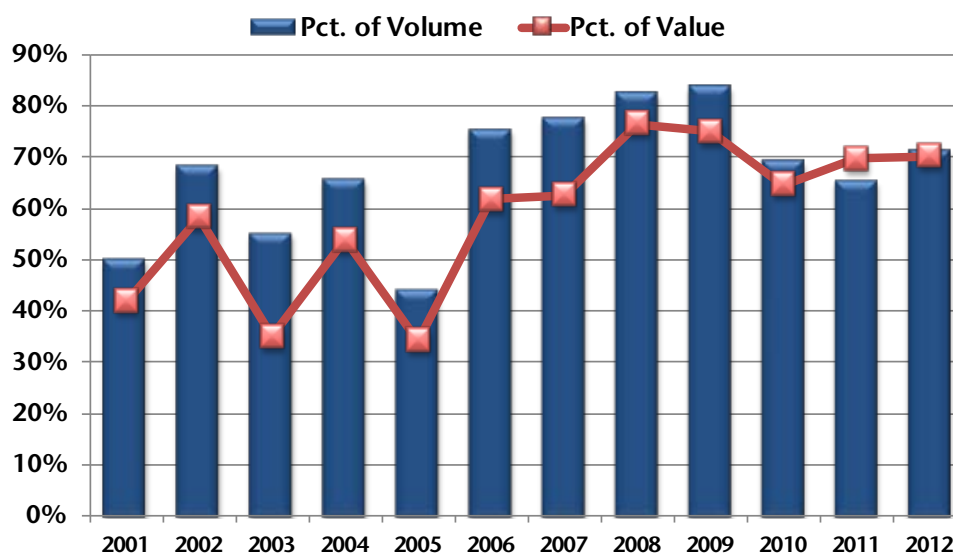
	2008	2009	2010	2011	2012	2008-2012 Total	2008-2012 Average
Species							
Chum	\$10,068	\$7,545	\$7,650	\$13,012	\$16,201	\$54,476	\$10,895
Sockeye	287	180	252	1,063	771	2,553	511
Coho	214	24	148	85	41	512	102
Chinook	154	77	42	26	80	380	76
Total	\$10,723	\$7,826	\$8,092	\$14,187	\$17,094	\$57,921	\$11,584
Gear Type							
Gillnet	\$10,362	\$7,177	\$7,714	\$11,522	\$13,887	\$50,662	\$10,132
Purse Seine	77	610	40	1,576	2,992	5,295	1,059
Troll	285	38	338	1,088	215	1,964	393
Total	\$10,723	\$7,826	\$8,092	\$14,187	\$17,094	\$57,921	\$11,584

Source: DIPAC, 2013.

Although contributions of DIPAC salmon to the common property fisheries were at all-time highs in 2011 and 2012, the value/volume of DIPAC salmon as a percentage of the total northern Southeast gillnet harvest fell below the 2007 and 2008 season levels (see Table 3.1 on page 10). This suggests that northern Southeast gillnet fishermen simultaneously benefitted from healthy returns of hatchery salmon and wild stock salmon in 2011 and 2012.

Figure 3.4 illustrates the total volume and ex-vessel value of DIPAC salmon harvested by the gillnet fleet as a percentage of the fleet's total harvest from northern Southeast inside waters (fishing districts 11 and 15). This comparison makes the assumption that the overwhelming majority of DIPAC-produced fish are harvested from these fisheries. Knowing that some portion of DIPAC salmon are harvested elsewhere and/or by other gear groups, the percentages presented in the chart below should be viewed as general indicators of DIPAC's production importance, not as concrete proportions.

Figure 3.4: Harvest Volume and Ex-Vessel Value of DIPAC Salmon as a Percentage of the Northern Southeast Commercial Gillnet Salmon Harvest (2001–2012)



Note: 2012 data is preliminary.
Source: DIPAC, 2013.

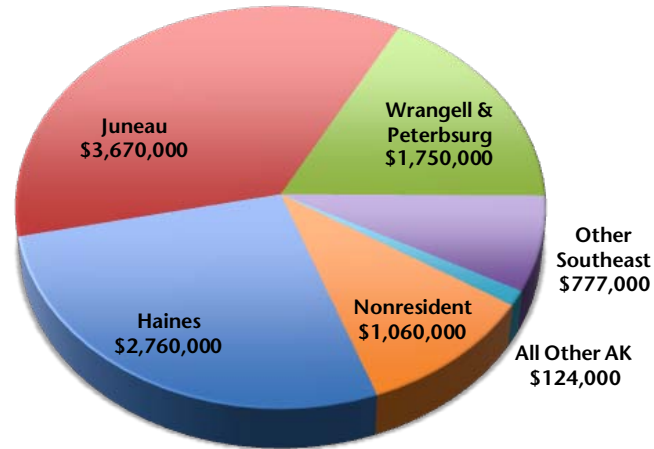
Geographic Distribution of Commercial Harvest

Commercial gillnetters harvested \$10.1 million per year worth of DIPAC salmon, on average, between 2008 and 2012. Ninety percent of the harvest value was caught by Alaska resident gillnetters (approximately \$9.1 million). Among Alaska residents, the majority of earnings went to residents of Juneau (\$3.7 million, or 36 percent) and Haines (\$2.8 million, or 27 percent). The remainder of Alaska resident harvest earnings went to residents of Wrangell and Petersburg (\$1.8 million combined); other Southeast Alaska communities (\$777,000); and all other Alaska communities (\$124,000). See Figure 3.5 on the following page for a pie chart of ex-vessel earnings from DIPAC salmon caught in common property fisheries by permit holders' residence.



Photo Credit: Juneau Empire.

Figure 3.5: Average Ex-Vessel Value of DIPAC Salmon Harvested in Common Property Fisheries in Northern Southeast, by Residency of Fishermen (2008–2012)



Source: McDowell Group estimates, based on CFEC, ADF&G, and DIPAC data.

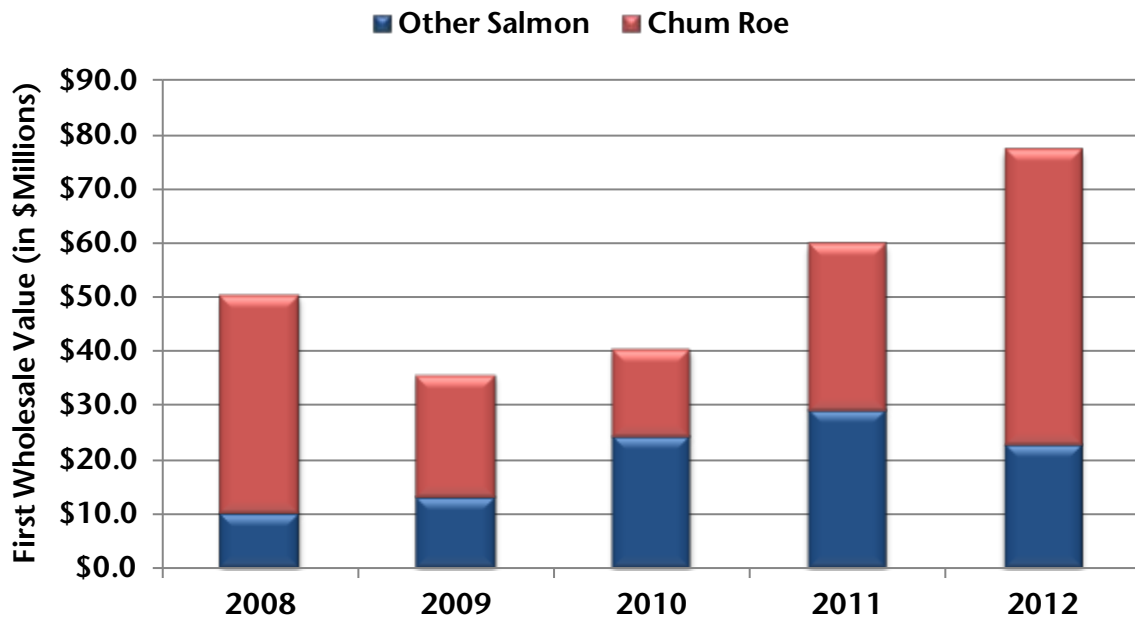
DIPAC Salmon and the Processing Sector

Southeast salmon hatcheries, including DIPAC, benefit regional processors by providing stable chum salmon returns. This is extremely important because wild-stock pink salmon returns fluctuate significantly during even and odd years, especially in northern Southeast Alaska. Hatchery-bred chum salmon act as a financial ballast for processors and fishermen, making the “down” pink years less dramatic than would otherwise be the case. Chum and pink salmon are major components of the region’s seafood portfolio, as the two salmon species account for over half of the first wholesale value of all seafood species caught and processed in Southeast Alaska.

Between 2008 and 2012, the cumulative first wholesale value of DIPAC salmon is estimated to be \$263 million (average over \$50 million per year). The 2011 and 2012 seasons were particularly valuable; the first wholesale value of DIPAC salmon was \$60.1 million in 2011 and \$77.0 million in 2012.

Less the cost of fish, processors earned a gross margin of \$144 million on DIPAC fish during the five-year study period. Estimates of the first wholesale value derived from DIPAC salmon in 2012 are based on preliminary data; however, the 2012 season will certainly rank as the most valuable season to date.

Figure 4.1: First Wholesale Value of DIPAC Salmon, with Chum Roe Shown Separately (2008–2012)



Note: Includes common property and cost recovery harvests. 2012 data is preliminary.
Source: DIPAC, 2013.

As evidenced in Figure 4.1, DIPAC chum salmon are primarily harvested for their roe. In 2012, the average wholesale price for Southeast chum roe was \$16.95 per pound.³ This marks a 71 percent increase in wholesale chum roe prices since 2009.

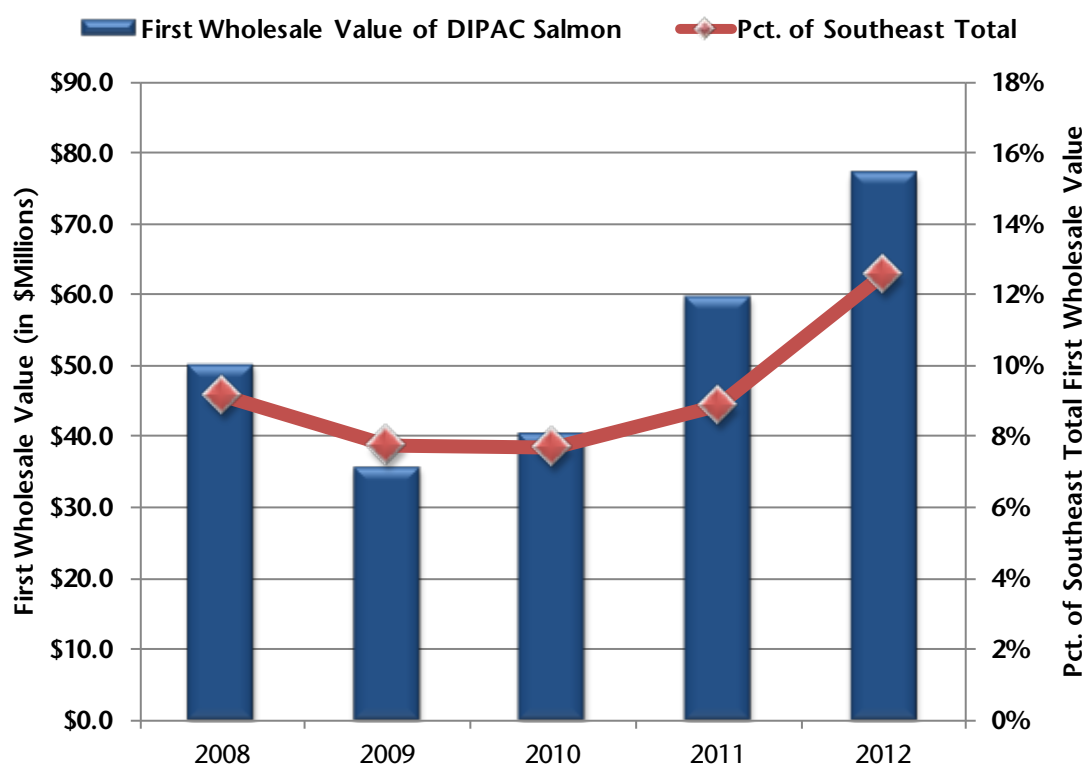
³ Data relates to the weighted average wholesale value of ikura and green roe, according to data released in the Alaska Salmon Price Report (trimester series for 2012).

Estimates of first wholesale value and gross margin are made by applying a wholesale/ex-vessel ratio to the ex-vessel value of DIPAC salmon. Thus, if the typical Southeast chum salmon is worth \$7 in ex-vessel terms and the processed products (roe and meat) made from that fish are worth \$15.40 in first wholesale terms, then the ratio is 2.20. This ratio varies slightly from year to year (depending on pricing, product mix, and roe recovery rates). The ratio varies widely depending on the salmon species. Chinook salmon have the smallest wholesale/ex-vessel ratio because the processor has less processing to do for troll caught fish, which are delivered dressed.

A processor's actual profitability depends on a number of factors outside of wholesale price, including cost of raw product, labor costs, labor productivity, and sales volume. Indeed, wholesale data suggest the price and pace of fresh/frozen chum salmon sales slowed in 2012.

It is estimated that DIPAC salmon typically accounts for 8 to 14 percent of the total Southeast Alaska first wholesale value. DIPAC salmon made up a larger share of the total value in 2012, as pink salmon harvests fell due to 2012 being a "down" pink year and strong returns of DIPAC chum salmon.

Figure 4.2: First Wholesale Value of DIPAC Salmon and Percent of Total Southeast Value (2008–2012)



Note: 2012 data is preliminary.

Source: McDowell Group estimates, based on ADF&G and DIPAC data, 2013.

Most DIPAC chum salmon caught in common property fisheries are sold to processing plants in Juneau and Haines. These include the Ocean Beauty plant in Excursion Inlet, Alaska Glacier Seafoods in Auke Bay, and Taku Smokeries in downtown Juneau. Other plants, such as Silver Bay Seafoods in Sitka and Rocky Pass Seafoods in Kake, also tender salmon from northern Southeast districts. Together, these plants employ hundreds of people in year-round and seasonal jobs.

DIPAC salmon are key for regional processing plants according to Alaska Glacier Seafoods Vice President Jim Erickson, "DIPAC salmon caught in common property fisheries is a substantial part of our business. We employ 130 people in the summer and without DIPAC we wouldn't be very busy. They've allowed us to expand and being able to count on that supply has also allowed us to do value-added processing right here in Juneau. DIPAC's salmon caught in the common property fishery help keep our plant running at capacity for six to eight weeks during the summer."

Hank Baumgart, owner and president of Icy Strait Seafoods and Taku Smokeries, acknowledged the crucial part DIPAC salmon play in their operation. "Without DIPAC salmon, we probably wouldn't exist in nearly the same size as we do today. DIPAC salmon make up 70 to 80 percent of our salmon supply."

Cost recovery fish are sold to the highest bidding processor. So while DIPAC salmon have a larger impact on processing operations in Juneau and Excursion Inlet, the hatchery also benefits processors in other Southeast communities.



Photo Courtesy of Taku Smokeries.

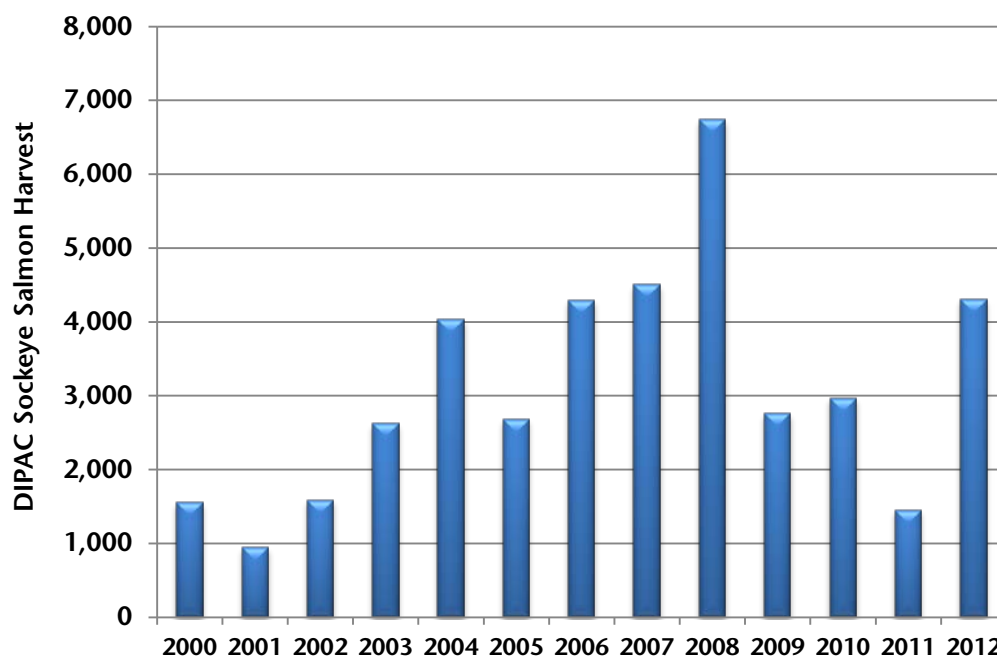
DIPAC Salmon in Sport and Personal Use Fisheries

In addition to DIPAC's importance to area commercial fisheries, sport and personal use harvests of DIPAC salmon make a significant contribution to the Juneau and Skagway economies. Resident anglers spend money on boats, fishing gear, fuel, and supplies, while non-resident anglers often hire local charter fishing companies that also source many supplies locally. Most charter boat owners and employees reside in Juneau and all charter boat workers contribute to the Juneau economy when they spend their earnings in the community.

Personal-Use Fisheries for DIPAC Salmon: Sweetheart Creek Sockeye

DIPAC's Snettisham hatchery supports a sizeable personal use sockeye fishery. Snettisham sockeye are harvested primarily at Sweetheart Creek, though a small number are also harvested at Snettisham and in the Stikine and Taku Rivers. A portion of sockeye fry from the hatchery is released annually into Sweetheart Lake (500,000 fry were released there in 2012). Sockeye returns to the lake support the popular personal use fishery in Sweetheart Creek, where residents use castnets and dipnets to catch returning sockeye that school beneath three waterfalls. The total number of sockeye harvested at Sweetheart Creek varies from year to year, averaging 3,112 between 2000 and 2012. Sweetheart Creek permits, which are only available to Alaska residents, allow for a maximum harvest of 25 fish per day. Permit holders harvested an average of 16.4 fish per permit between 2000 and 2012, with an average of 189 permits issued annually.

Figure 5.1: Annual Personal Use Harvest of Snettisham Hatchery Sockeye Salmon at Sweetheart Creek (2000–2012)



Source: ADF&G and DIPAC.

Sport Harvest of DIPAC Salmon

A combined annual average of 12,300 DIPAC salmon (chinook, coho, and chum) were harvested in the Juneau and Skagway-area sport fisheries between 2000 and 2012. Coho account for the largest percentage of the DIPAC sport harvest, averaging 48 percent of the total harvest over the past five years (2008 to 2012). In that time, the coho sport harvest ranged from a high of 6,813 in 2011 to a low of 2,327 in 2012. In 2011, the coho harvest accounted for almost one-quarter (24 percent) of all coho caught in the Juneau-area sport harvest.

Chinook also make up a significant portion of DIPAC fish harvested in Juneau and Skagway area sport fisheries. During the last five years of available harvest data, chinook accounted for 19 percent of the Juneau-area and Skagway-area sport harvest combined. Chinook accounted for 18 percent of the Juneau-area sport harvest alone (see Table 5.1).

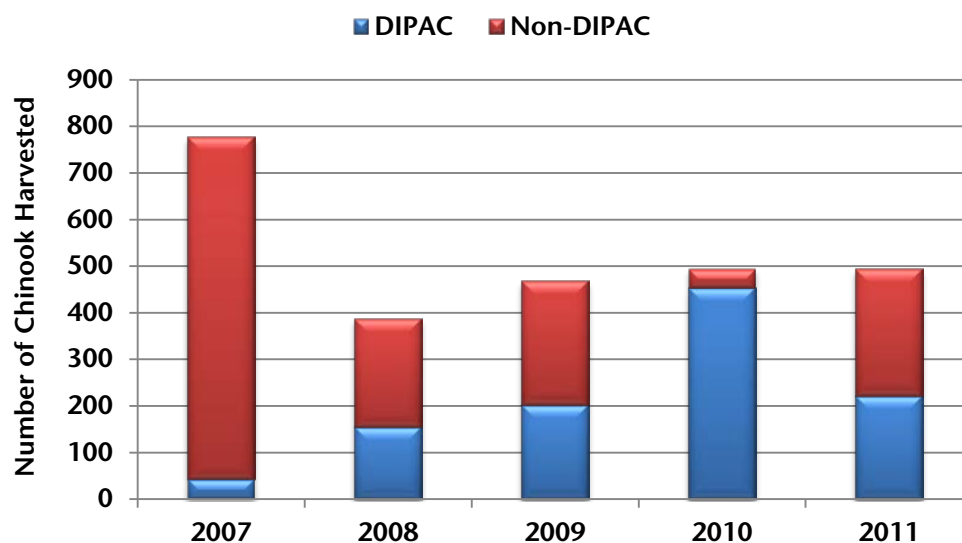
Table 5.1: Juneau-Area Sport Harvest of DIPAC Chinook and Coho Salmon (2007–2011)

Species	2007	2008	2009	2010	2011	Percent of Total Juneau-Area Sport Harvest (2007-2011)
Chinook	1,750	2,093	2,404	1,839	981	18.1%
Coho	2,030	4,329	4,052	4,131	6,813	16.9%
Total	3,780	6,422	6,456	5,970	7,794	17.1%

Source: ADF&G and DIPAC.

The majority of the DIPAC sport harvest occurs in the Juneau area. However, DIPAC fish also play a prominent role in the Skagway sport fishery for chinook. Between 2007 and 2011, an average of 41 percent of all sport-caught chinook from Skagway charter and individual sport fishing were DIPAC fish.

Figure 5.2 Skagway-Area Sport Harvest of Chinook Salmon (2007–2011)



Source: ADF&G and DIPAC.

CHARTER FLEET HARVEST OF DIPAC SALMON

DIPAC salmon help support the Juneau and Skagway charter fishing industries. A sizeable sport fishing charter fleet operates in the Juneau area. An estimated 45 sport fishing vessels offloaded salmon at Auke Bay and Juneau locations in 2011.⁴ These Juneau-area charter vessels accommodated 10,483 anglers on 2,492 trips in 2011. In Skagway, four vessels associated with four businesses offloaded in 2011. In Skagway, the four charter fishing vessels hosted 317 trips that accommodated a total of 1,138 anglers in 2011.

In the Juneau area, the charter fishing fleet kept 490 chinook salmon in 2011 and released an additional 869. They also caught 6,598 coho. The charter fishing fleet in Skagway kept 125 chinook and released an additional 687. DIPAC salmon contributed to the Juneau and Skagway-area charter business: the Juneau charter fishing harvest included an estimated 70 DIPAC chinook and 1,600 DIPAC coho salmon, with an additional 125 DIPAC chinook that were released. In Skagway, an estimated total of 55 chinook were kept and an additional 300 were released. These 2011 figures represent about 15 percent of the Juneau charter fleet harvest and 45 percent of the Skagway harvest.



Photo Courtesy of Lost in Alaska Adventures, Juneau, Alaska

Overall, in 2011 in Southeast a majority of charter fishing angler days were associated with non-residents (96.2 percent), while 1.9 percent were associated with Alaska residents⁵. The remaining 1.9 percent of angler days were crew or complementary trips, or associated with unknown residency.

The majority of Juneau non-resident visitors (94 percent) arrived via cruise ships in 2011.⁶ These numbers illustrate that non-resident cruise ship passengers make up a significant portion of charter sport fishing clients in Juneau. While cruise ship passengers do indeed make up the largest portion of charter fishing clients, the proportion of non-resident independent travelers is also increasing (to approximately 20 percent of total clients by some estimates).⁷

A sample of charter fishing operations in Juneau revealed the businesses generally charge approximately \$180 to \$200 per client for a half-day (4 hour) trip, and between \$300 and \$400 for a full-day trip (a few businesses researched charge closer to \$250 per hour for each client for full-day trips with five or more clients). Skagway prices were typically slightly lower than in Juneau, at \$150 per client for half-day and \$250 to \$275 per client for a full-day trip. Pricing does not include purchase of a fishing license (\$20 for a one-day non-resident license and \$10 for a non-resident king salmon stamp), tips, or other on-board charges.

Clients spent an estimated \$12.3 million on charter fishing opportunities in Juneau and Skagway for trips targeting salmon (primarily chinook and coho) in 2011. Over the last five years, an estimated 17.1 percent of fish caught in the sport fishery were DIPAC fish. Based on this proportion, an estimated \$2.1 million in client

⁴ ADFG logbook data and personal comm.

⁵ ADF&G logbook data

⁶ McDowell Group Alaska Visitor Statistics Program.

⁷ pers. comm.

fees in 2011 can be related to the harvest of DIPAC salmon. The majority of these dollars come from non-residents. Juneau-area charter businesses represent the largest portion of that DIPAC-related revenue (versus Skagway's smaller fleet), grossing an estimated \$1.8 million in 2011.

Charter fishing, like commercial fishing, is a powerful economic driver in Southeast Alaska as it brings new money into the economy and allows visitors the unforgettable experience of hooking an Alaska salmon.

When anglers catch fish, the Southeast economy benefits and it's good for Alaska tourism. Pictures and stories of successful salmon fishing trips are often distributed widely between friends and family members of visitors. This type of word of mouth advertising is an effective way of convincing people to vacation in Alaska.



Photo Courtesy of Moore Charters, Juneau, Alaska

JUNEAU-AREA SALMON DERBIES

Two annual salmon derbies are hosted in Juneau: the Golden North Salmon Derby, which occurs for three days in August and the Spring King Salmon Derby, which takes place for the month of May. Since 1953, the Golden North Salmon Derby has generated funding for college scholarships for local high school graduates.



Photo Courtesy of Golden North Salmon Derby.

Fish caught in the derby are sold to generate scholarship funds for the Territorial Sportsmen Scholarship Fund. To date, 256 scholarships have been awarded, totaling \$1.5 million.

The annual Spring King Salmon Derby, sponsored by the Central Council of the Tlingit and Haida Indian Tribes of Alaska, began in 1996. Like the Golden North Salmon Derby, the spring derby benefits a scholarship fund: the *Alumni Scholarship Assistance Program* provides scholarships to Tlingit & Haida tribal members who are pursuing higher education. Since 1998, the scholarship program has provided funds to over 1,000 students. Annual awards generally range between \$200 and \$500 per student.

Employment and Spending by DIPAC

During the five-year study period, DIPAC employed an average of 80 workers each year. The majority of these workers are seasonal employees, as DIPAC's year-round staff fills roughly 30 positions. DIPAC employed an average of 42 workers per month during the study period. The hatchery employs a wide range of people in diverse positions; there are career employees who work in operational, management, and administrative positions. DIPAC also has numerous entry-level positions where people can gain skills in seasonal jobs related to marine biology, aquaculture, customer service, and communications.



DIPAC spends just over two-thirds of its budget within Alaska. From 2008 to 2012, DIPAC's operational spending totaled \$27.3 million and averaged \$5.5 million. The budget increased significantly in 2011 and 2012 due to the construction of a new storage facility and a new raceway facility. DIPAC spent a total of \$15.4 million within the state of Alaska, in addition to wages, salaries, and benefits paid to employees. This spending obviously allows DIPAC to fulfill its mission of enhancing regional salmon returns, but it also creates jobs within Alaska. Estimates of secondary economic impacts related directly to DIPAC operations can be found on page 31.

Table 6.1: DIPAC Employment (2008–2012)

	2008	2009	2010	2011	2012	2008-2012 Average
January	26	26	26	26	28	26
February	31	30	36	35	38	34
March	39	29	37	37	41	37
April	39	45	38	40	45	41
May	53	51	53	58	53	54
June	56	53	52	61	58	56
July	58	54	57	60	53	56
August	56	57	55	63	58	58
September	47	51	44	51	45	48
October	39	33	34	41	40	37
November	28	29	31	30	27	29
December	29	27	28	28	27	28
Monthly Avg.	42	40	41	44	43	42
Total Workers	80	72	75	93	81	80

Source: DIPAC, 2013.

Fisheries Business Tax

As with all salmon commercially harvested and processed in Southeast Alaska, DIPAC salmon are subject to a 3 percent State of Alaska Fisheries Business Tax. Half of the tax revenue is deposited into the State's General Fund while the other half goes to the borough or incorporated city government where the fish was processed.

From 1990 to 2012, Southeast commercial salmon fishermen and processors paid an estimated \$68.0 million in total fisheries business tax. The tax collected on DIPAC salmon accounted for roughly \$6.3 million of this total value, including fisheries business taxes paid on DIPAC cost recovery fish.

During the past five seasons (2008-2012), fisheries business tax receipts from DIPAC salmon have increased as larger returns and higher prices have increased overall ex-vessel values. In the past five years, DIPAC salmon resulted in \$3.6 million in fisheries business tax revenue.

Table 7.1: Estimated Fisheries Business Tax Receipts Resulting from DIPAC Salmon (2008-2012)

	2008	2009	2010	2011	2012	Total
Fisheries Business Tax (FBT)						
FBT to State of Alaska General Fund	\$331,000	\$231,000	\$284,000	\$424,000	\$524,000	\$1,795,000
FBT to Local Gov. in Southeast Alaska	331,000	231,000	284,000	424,000	524,000	1,795,000
Total FBT	\$662,000	\$463,000	\$569,000	\$847,000	\$1,048,000	\$3,589,000

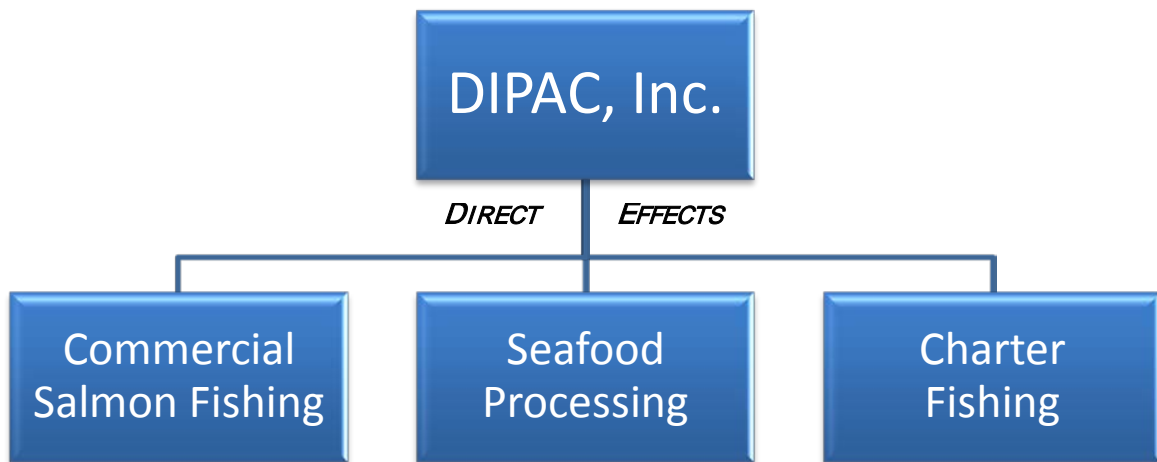
Source: McDowell Group estimates, based on ADF&G and DIPAC data.

DIPAC salmon also account for significant contributions to property and sales taxes, both directly and indirectly. DIPAC spent over \$15 million with Alaskan businesses and paid out \$11.9 million in labor income during the last five years. Most of this money is spent in northern Southeast Alaska. This spending and labor income creates a significant amount of sales tax and property tax within Juneau.

Economic Impact of DIPAC Production and Operations

DIPAC's salmon hatcheries create jobs directly in several different economic sectors, as the diagram below illustrates. These sectors, along with DIPAC itself, generate secondary economic impacts as the businesses and workers that rely on DIPAC salmon spend money within Alaska's economy.

For this section, economic modeling was used to provide estimates of the number of jobs attributable to DIPAC. As DIPAC salmon-related dollars flow through the economy, income is created for workers in a wide variety of businesses. In some cases that income is a substantial portion of a worker's income and in other cases it is just a small portion. For example, a commercial fisherman (who might be very dependent on DIPAC salmon for his livelihood) may hire a local diesel mechanic for engine repairs, purchase fuel from a local supplier, and buy groceries from the local market. In this way money originally generated by DIPAC flows through the economy, touching workers in virtually every sector. Modeling is used to develop estimates of annual equivalent employment, providing a measure of employment that can be compared to other industries or the economy overall. It is important to note that the total number of workers earning some part of their income from DIPAC salmon is far larger than the annual average.



From 2008 to 2012, it is estimated that DIPAC salmon and hatchery operations created 575 annual average jobs for 1,235 workers who earned \$25.7 million in labor income per year (see Table 8.1). For every DIPAC employee, there were 15 more Alaska workers connected to DIPAC salmon and business operations.

DIPAC salmon directly created 373 annual average jobs for 972 people per year, from 2008 to 2012. Most of these jobs were in commercial fisheries, seafood processing, or charter sport fishing. Employment was created for an additional 263 workers through indirect and induced impacts.⁸ It is estimated that DIPAC salmon generated direct, indirect, and induced economic output of \$78.5 million per year between 2008 and 2012.

⁸ Indirect impacts occur as a result of business spending related to DIPAC salmon or DIPAC operations. For example, indirect employment is created when DIPAC hires a local contractor or when a commercial fisherman pays a mechanic to overhaul their boat. Induced impacts occur as a result of direct and indirect workers spending their earnings (as consumers) within the study area's economy.

**Table 8.1: Economic Impact of DIPAC Salmon and Operations
on Alaska's Economy, Annual Averages (2008–2012)**

	Direct	Indirect & Induced	Total
Annual Average Employment	373	202	575
Number of Workers	972	263	1,235
Labor Income (in \$Millions)	\$16.7	\$8.9	\$25.7
Output (in \$Millions)	\$49.1	\$29.4	\$78.5

Note: Totals may not sum due to rounding.

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

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

1. How many jobs are created or affected as a result of DIPAC salmon and business operations?
2. How many people benefit from those jobs?
3. How much do workers employed in those jobs earn?
4. How much economic activity is generated through direct and secondary effects?

The distinction between average monthly employment per calendar year (annual average employment) 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 DIPAC. Figures for the estimated amount of economic activity, or output, generated are also shown. Generally, economic output is equal to sales revenue (less cost of goods sold in the retail sector) or payments for services rendered.

Economic Impact of Harvesting DIPAC Salmon in Commercial Fisheries

During the past five seasons, from 2008 to 2012, commercial fishermen averaged gross revenues (ex-vessel income) of \$11.6 million per year harvesting DIPAC salmon. Labor income (gross revenues less expenses) for permit holders and crew derived from harvesting DIPAC salmon is estimated to be \$7.4 million per year. DIPAC salmon generated commercial fishing jobs for 436 permit holders and crew, on average, per year during the five-year study period.

Converting seasonal jobs into average monthly employment totals reveals that DIPAC salmon harvests provided commercial fishermen with 178 average annual jobs for 436 workers. The majority of these jobs are filled by Southeast Alaska residents, particularly those of Juneau and Haines. DIPAC salmon created an estimated 81 additional year-round jobs through commercial fishermen's indirect and induced spending activity. In total, it is estimated that DIPAC salmon supported 259 year-round jobs employing 542 individuals in Southeast Alaska generating total labor income of \$10.8 million, during the 2008 to 2012 time period (See Table 8.2 on following page).

Table 8.2: Economic Impact on Alaska's Economy from Harvesting DIPAC Salmon in Commercial Fisheries, Annual Averages (2008–2012)

	Direct	Indirect & Induced	Total
Annual Average Employment	178	81	259
Number of Workers	436	106	542
Labor Income (in \$Millions)	\$7.4	\$3.4	\$10.8
Output (in \$Millions)	\$11.6	\$8.8	\$20.4

Note: Totals may not sum due to rounding. Direct processing output is equal to gross margin.
Source: McDowell Group estimates using IMPLAN, ADF&G, DOLWD, and DIPAC data.

Economic Impact from Processing DIPAC Salmon

During the past five seasons, from 2008 to 2012, it is estimated that Southeast processors earned average gross margins of \$28.7 million per year processing DIPAC salmon. For the purposes of this study, gross margin is equal to sales 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 the gross margin should not be confused with profit.

DIPAC accounts for a significant portion of Southeast Alaska's total ex-vessel value through salmon harvested in common property fisheries and salmon sold to processors from cost recovery operations. DIPAC salmon caught in common property fisheries and those sold to processors from cost recovery operations accounted for 9.3 percent of Southeast Alaska's total ex-vessel harvest value of all species, and 16.2 percent of the Southeast Alaska's total salmon harvest value, from 2008 to 2012.

Based on these data, it is estimated that DIPAC salmon running through seafood processing lines in Southeast Alaska directly created jobs and income for 518 workers per year who earned a combined total of \$6.4 million in labor income. These figures do not include commercial fishing employment utilizing DIPAC salmon or the activities of DIPAC itself (which are covered in other sections).

Table 8.3: Economic Impact of DIPAC Salmon Utilized by Seafood Processors on Alaska's Economy, Annual Averages (2008–2012)

	Direct	Indirect & Induced	Total
Annual Average Employment	139	62	201
Number of Workers	439	79	518
Labor Income (in \$Millions)	\$6.4	\$3.0	\$9.4
Output (in \$Millions)	\$28.7	\$12.4	\$41.1

Note: Totals may not sum due to rounding. Direct processing output is equal to gross margin.
Source: McDowell Group estimates using IMPLAN, ADF&G, DIPAC, and DOLWD data.

Direct employment and wages refers to workers employed by seafood processors, who are directly utilizing DIPAC 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 and proprietors 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).

The salmon processing sector generated indirect and induced employment for an estimated 79 additional workers who earned a projected \$3.0 million per year in labor income.

Economic Impact of DIPAC Salmon Caught in Sport and Personal-Use Fisheries

DIPAC salmon accounted for 17.1 percent of the chinook and coho harvest taken in sport fisheries during the study period. Sport fishing for salmon is very popular with Juneau residents and visitors. In 2011, a total of 4,934 Juneau residents bought sport fishing licenses and 11,621 nonresidents chartered a salmon fishing trip in the Juneau or Skagway area.

Most sport fishermen, whether resident or nonresidents, spend a good deal of money on charters, gear, licenses, moorage, boats, maintenance, and food/beverages. DIPAC chinook and coho add to the number of available fish, and therefore create jobs when sport fishermen spend money fishing for them.

Table 8.4: Economic Impact of Sport Fishing for DIPAC Salmon, Annual Averages (2008–2012)

	Direct	Indirect & Induced	Total
Charter Fishing			
Annual Average Employment	15	9	24
Number of Workers	17	12	29
Labor Income (in \$Millions)	\$0.76	\$0.4	\$1.11
Output (in \$Millions)	\$2.11	\$1.1	\$3.22
Recreational Sport Fishing			
Annual Average Employment	-	13	13
Number of Workers	-	17	17
Labor Income (in \$Millions)	-	\$0.58	\$0.58
Output (in \$Millions)	-	\$1.66	\$1.66
Total Sport Fishing			
Annual Average Employment	15	22	37
Number of Workers	17	29	46
Labor Income (in \$Millions)	\$0.76	\$0.83	\$1.59
Output (in \$Millions)	\$2.11	\$2.77	\$4.88

Note: Totals may not sum due to rounding.

Source: McDowell Group estimates, based on IMPLAN, DIPAC, ADF&G, and personal communication with Charter fishermen.

It is estimated that the Juneau and Skagway charter fleet consists of roughly 50 boats. These boats grossed an estimated \$12.3 million from selling charter fishing trips targeting salmon in 2011. Based on the number of chinook and coho DIPAC contributed to the sport fishery, it is estimated that DIPAC salmon accounted for 15 annual average jobs, \$760,000 in labor income, and \$2.1 million in charter fishing sales. The total impact of

charter fishing for DIPAC salmon is estimated to be 24 annual average jobs and \$3.2 million of economic activity.

Recreational anglers catching DIPAC salmon are estimated to have created jobs for a total of 17 workers and \$1.7 million in economic activity per year during the study period. These jobs are created when anglers spend money in the regional economy related to sport fishing for salmon.

In total, sport fishing activity related to DIPAC salmon created an estimated 36 annual average jobs in the Juneau and Skagway area and \$1.7 million per year during the study period. While DIPAC salmon caught in sport and personal use fisheries may not generate as much total direct economic activity as those caught in commercial fisheries, they make important contributions to the region's quality of life and the quality of visitors' experience. These qualitative aspects are difficult to quantify, but the importance of sport fishing in the region is apparent. About 1-in-7 Juneau residents bought a sport fishing license in 2012, and more than double that number of summer visitors bought sport fishing licenses in Juneau and Skagway.

Economic Impact of DIPAC Business Operations

As the operator of three salmon hatcheries, DIPAC itself has a significant impact on the Southeast Alaska economy. DIPAC employs a peak of 80 workers each year and spends roughly \$5.5 million per year on operational costs.⁹ In addition, DIPAC has spent \$6.1 million during the past five years on capital improvement projects. That spending, and the spending of its workforce, creates secondary employment and income in Alaska's economy.

It is estimated that DIPAC business operations directly or indirectly created 79 annual average jobs for 129 workers who earned \$3.9 million per year in labor income (see Table 8.5). Over two-thirds of DIPAC's budget is spent within the state of Alaska, the majority of that spending occurs within Southeast Alaska. Construction projects to expand and support DIPAC operations have increased the economic impact in recent years. DIPAC's spending is estimated to have resulted in 37 additional year-round jobs and \$1.7 million in labor income within Alaska per year from 2008 to 2012, through indirect and induced impacts.



Table 8.5: Economic Impact of DIPAC Business Operations on Alaska Economy, Annual Averages (2008–2012)

	Direct	Indirect & Induced	Total
Annual Average Employment	42	37	79
Number of Workers	80	49	129
Labor Income (in \$Millions)	\$2.2	\$1.7	\$3.9
Economic Output (in \$Millions)	\$6.7	\$5.4	\$12.1

Note: Totals may not sum due to rounding.

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

⁹ Spending figure does not include debt service payments.

Economic Impact of DIPAC in 2012

Note: Data for 2012 is based on preliminary figures. Data for DIPAC contributions to sport fishing is not yet available, so averages from prior years sport fishing contributions are used in any totals.

The average annual economic impact of DIPAC during the 2008 to 2012 time period is substantial, but the impact of DIPAC in 2012 was the largest on record. High salmon prices coinciding with the second-largest return and the largest common property contribution ever of DIPAC chum salmon led to higher gross earnings for commercial fishermen, larger cost recovery revenues for DIPAC, and bigger gross margins for processors.

It is estimated that DIPAC salmon caught in common property fisheries generated jobs for 480 commercial fishermen in 2012, who earned \$11.0 million in labor income. Including multiplier effects, DIPAC salmon caught by commercial fishermen created 284 annual average jobs and \$15.0 million in labor income in 2012.

DIPAC salmon caught during 2012 in common property fisheries and cost recovery fisheries were estimated to be worth \$77.0 million in first wholesale terms, based on preliminary harvest and price data. This is well above the 2008 to 2012 average of \$52.6 million. It is estimated that DIPAC salmon led to jobs for 658 seafood processing workers, or 205 processing jobs on an annual average basis, in 2012.

In addition, DIPAC spent \$5.2 million on capital improvement projects in 2012 to expand and improve operations. These capital projects employed an estimated 35 construction workers (on an annual average employment basis), earning \$2.1 million in labor income. Even though DIPAC's total budget increased in 2012 due to the capital projects, DIPAC was able to decrease its operational budget by over \$300,000.

Table 8.6: Economic Impact of DIPAC Salmon on Alaska Economy, 2012

	Direct	Indirect & Induced	Total
Annual Average Employment	464	254	718
Number of Workers	1,239	338	1,577
Labor Income (in \$Millions)	\$23.3	\$11.1	\$34.4
Economic Output (in \$Millions)	\$71.4	\$38.2	\$109.6

Note: Economic estimates for 2012 are based on preliminary harvest and price information. Totals may not sum due to rounding.

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

Based on preliminary data, DIPAC salmon generated an estimated 718 annual average jobs and \$34.4 million in labor income as a result of hatchery fish returning in 2012. DIPAC salmon and business operations created over \$100 million of total economic output in 2012.

Return on Investment in DIPAC Salmon

Alaska residents and the State of Alaska have received an excellent return on investment in salmon hatcheries, and DIPAC is no exception. DIPAC is a private, non-profit, or PNP salmon hatchery operation that produces salmon for the benefit of Alaska residents and maintains a cost recovery program to sustain its operations. Unlike hatcheries that are designated as regional associations, DIPAC does not receive salmon enhancement tax revenue. Those funds are directed towards NSRAA in Sitka and SSRAA in Ketchikan. Although DIPAC is a PNP hatchery, the State has provided grant funding, loan funding, and awarded the corporation state contracts to manage/operate state-owned facilities and programs.

Since 1980, the State of Alaska has awarded \$3.2 million in grants, paid out \$7.8 million for service contracts, and loaned \$23.4 million to DIPAC for capital and operating projects. DIPAC has relied primarily on subsidized loans from the State of Alaska to fund capital projects during the organization's 37-year history. DIPAC salmon have contributed nearly as much money to the State of Alaska, through Fisheries Business Tax (FBT) revenues, than the State has granted DIPAC since 1979.

Table 9.1: Economic Return to Alaska Economy from Funding DIPAC with State Funds

External DIPAC Funding by Source since 1980	
State of Alaska Grants	\$3.2 million
- Net Funding from State of Alaska (less contributions from FBT)	<\$0.1 million
Enhancement Taxes and Self-Assessments (paid by fishermen)	\$9.5 million
Loans received from FERLF ¹ for DIPAC-owned facilities	\$23.4 million
- Total Principal Repaid to State of Alaska	\$23.4 million
- Total Interest Repaid to State of Alaska	\$19.1 million
Value of DIPAC Salmon (1979 to 2012)	
Total First Wholesale Value	\$482 million
Total Gross Margin for Processors ²	\$269 million
Total Ex-Vessel Value for Fishermen	\$105 million
Fisheries Business Tax (FBT) Paid to State of Alaska	\$3.2 million
Fisheries Business Tax (FBT) Paid to Local Southeast Governments	\$3.2 million
Economic Return on External DIPAC Funding Source	
Return to Fishermen since 1979 (ex-vessel value per \$1 of net State grant funding)	\$3,969
Return to Processors since 1979 (gross margin per \$1 of net State grant funding)	\$10,168
Return to Industry since 1979 (first wholesale value per \$1 of net State grant funding)	\$18,208

¹ Fisheries Enhancement Revolving Loan Fund, administered by DCCED.

² 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 DIPAC data.

An investment by the State of Alaska of \$3.2 million in grant funding and \$23.4 million in loan funding (in nominal terms) has resulted in the following benefits for the Alaska economy.

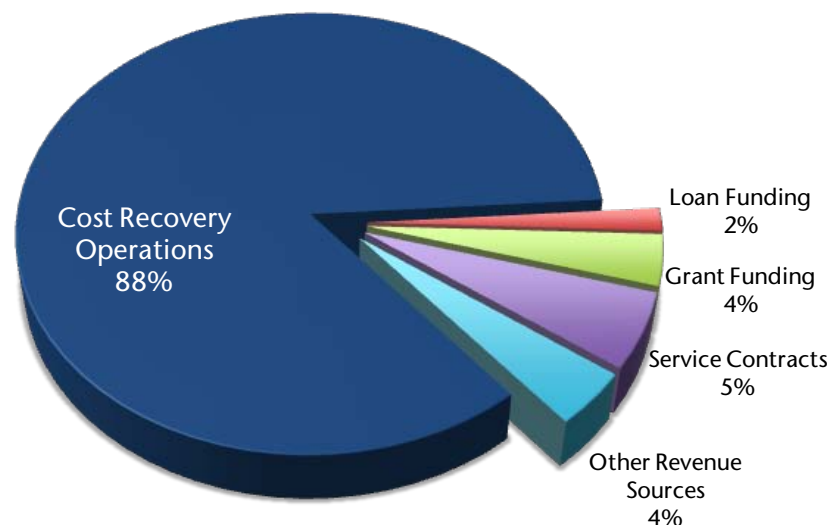
- Commercial fishermen have earned an estimated total of \$105 million catching DIPAC salmon in common property fisheries since 1979.
- Regional processors have received gross margins¹⁰ of \$269 million from selling DIPAC salmon since 1979.
- The first wholesale value of DIPAC salmon processed during this time totals \$482 million.
- DIPAC salmon and the efforts of Alaska's commercial seafood industry have generated fisheries businesses taxes of \$6.3 million for the State of Alaska and local governments.
- DIPAC has repaid all of its \$23.4 million in loans, plus \$19.1 million in interest, to the State of Alaska. Further, DIPAC allows ADF&G to save money by performing contractual services more efficiently due to crossover with other hatchery operations.

DIPAC Funding Sources

DIPAC hatcheries are primarily funded through cost recovery operations where processors submit bids for access to salmon caught in cost recovery fisheries. Processors then hire purse seiners to harvest the salmon. This system maximizes the financial return for cost recovery salmon and incentivizes efficiency.

Cost recovery revenue accounted for 88 percent of DIPAC funding from 2008 to 2012 (Figure 9.1). DIPAC relied on grant and loan funding for only 6 percent of its funding during the past five years. Contract services accounted for another 5 percent. DIPAC maintains contractual service contracts with the State of Alaska, National Marine Fisheries Service, and US-Canada Transboundary River (TBR) Panel. Investment income, tourism revenue and other miscellaneous revenue sources accounted for 4 percent of total funding during the past five fiscal years.

Figure 9.1: DIPAC Funding Sources, Fiscal Years 2008-2012



Source: DIPAC, 2013.

¹⁰ 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).

Chum Salmon Market Overview

Over 95 percent of DIPAC salmon caught in commercial fisheries are chum salmon. Chum salmon also makes up the vast majority of cost recovery revenues; therefore, chum is the focus of this salmon market overview.

Chum Roe Markets

Alaska chum salmon roe is a valuable export product and an important component of wholesale value for Alaska's commercial seafood industry. Roe makes up 40 percent of the stateside first wholesale value of chum salmon in recent years and is particularly critical in Southeast Alaska (the state's top chum-producing region). Roe markets are extremely important for DIPAC, as nearly all the chum salmon caught in cost recovery efforts are mature fish with higher quality roe but lower quality meat.

Chum roe prices increased in 2012, finishing at their highest point in recent history. According to preliminary data from the Alaska Salmon Price Report, Southeast Alaska chum roe sold for an average of \$16.95/lb in 2012. This average price includes ikura and green roe products. The most recent data covering roe sales during September 2012 - December 2012 show the average price of Southeast chum roe reached \$19.70/lb.

DIPAC and the businesses that utilize their chum salmon have benefitted from several trends in recent years; all contributing to rising prices for chum roe:

- Japanese Hokkaido chum production declined in 2010 and 2011
- March 2011 tsunami, which damaged Japanese salmon hatchery facilities and production
- Rebuilding from the tsunami led to a strong yen in 2011 and 2012, improving the buying power of Japanese importers
- Demand for salmon roe has increased in Eastern Europe and former-Soviet bloc countries, providing an additional competing buyer in a market that has long been dominated by Japanese buyers

CHUM PRODUCTION IN JAPAN AND KOREA

Japan's chum production will likely take several more years to recover from the destruction caused by the 2011 tsunami. A total of 32 hatcheries in the Iwate and Miyagi prefectures were damaged by the tsunami. The number of salmon fry released in the spring of 2012 was down 32 percent in the Iwate prefecture and down 26 percent in the Miyagi prefecture compared to the spring of 2010. Across both prefectures, there were 158 million less chum fry released in 2012, compared to 2010. Hatcheries in the Fukushima prefecture could not be surveyed due to the nuclear accident at the Fukushima Daiichi nuclear plant.¹¹

Even before the tsunami, chum return rates to Hokkaido hatcheries were generally below peak returns of the mid 2000's and return rates for Korean hatcheries were well below historical averages.¹² It has been

¹¹ Ito, Fumio. North Pacific Anadromous Fish Commission Newsletter, No. 32 (July 2012).

¹² Miyakoshi, Y., et al. "Current status of hatchery and naturally spawning chum salmon in Hokkaido," 2010 presentation to State of the Salmon conference.

suggested that warmer surface water temperatures along migration routes could be having an impact on the return rate of hatchery-bred chum salmon in Japan.¹³

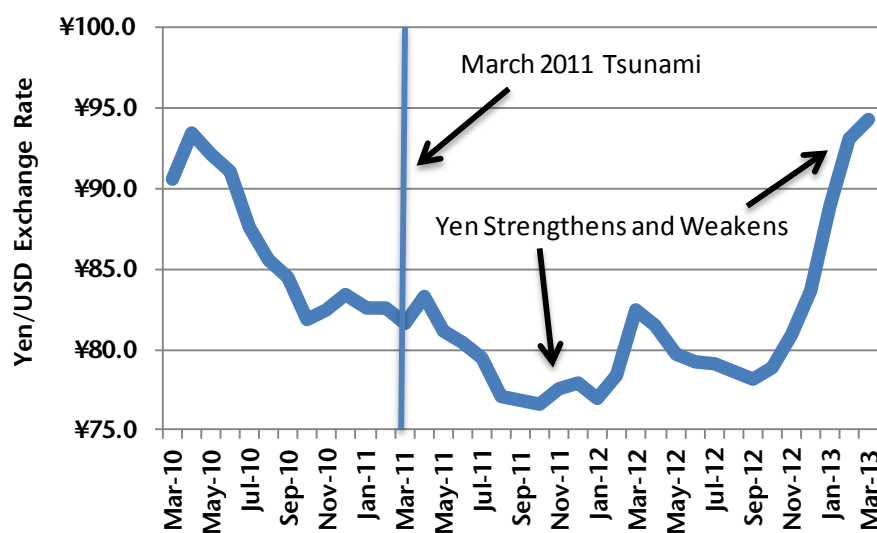
South Korea released more than 15 million chum salmon fry in 2010 and 2011, something that had not happened in back-to-back years since 2000 and 2001.¹⁴ Assuming normal return rates, it is likely South Korea's chum harvest will increase in 2013 and beyond.

Based on this evidence, Japanese chum production is expected to recover in coming years and Korean chum production is likely to increase as well (though Korean chum production is very small compared to Japan and Alaska). Unless climate change has a profound effect on survival rates for Asian chum salmon, the 2011 and 2012 harvest of hatchery chums could represent a low-point for Asian chum salmon production.

JAPANESE CURRENCY VALUATIONS

The Japanese yen strengthened versus the U.S. dollar (and most other world currencies) following the 2011 tsunami, as the country began the rebuilding process. This made imported goods cheaper from the Japanese perspective and provided support for prices of imported goods. In other words, this was a favorable situation for American seafood exporters selling to Japanese buyers because they were able to get more dollars for their product even if the price did not increase in yen terms. However, the dollar has appreciated significantly versus the yen in the past six months. Currently, the yen is actually weaker than it was prior to the tsunami. If this trend does not reverse, exporting seafood to Japan will be relatively less attractive in 2013, compared to the 2011 and 2012 seasons.

Figure 10.1: Japanese Yen/USD Currency Valuation, March 2010 – March 2013



Source: Average monthly ask price, OANDA.

While the strength of the Japanese yen is an important factor for chum roe prices, the price Alaska processors receive for chum roe is probably more dependent on supply, demand, and roe quality. Chum roe, known as

¹³ Nasagawa, T., Azumaya, T. "Fluctuation of Japanese chum salmon returning rate related to sea surface temperatures along spawning migration route." North Pacific Anadromous Fish Commission Technical Report No. 8:28, 2012.

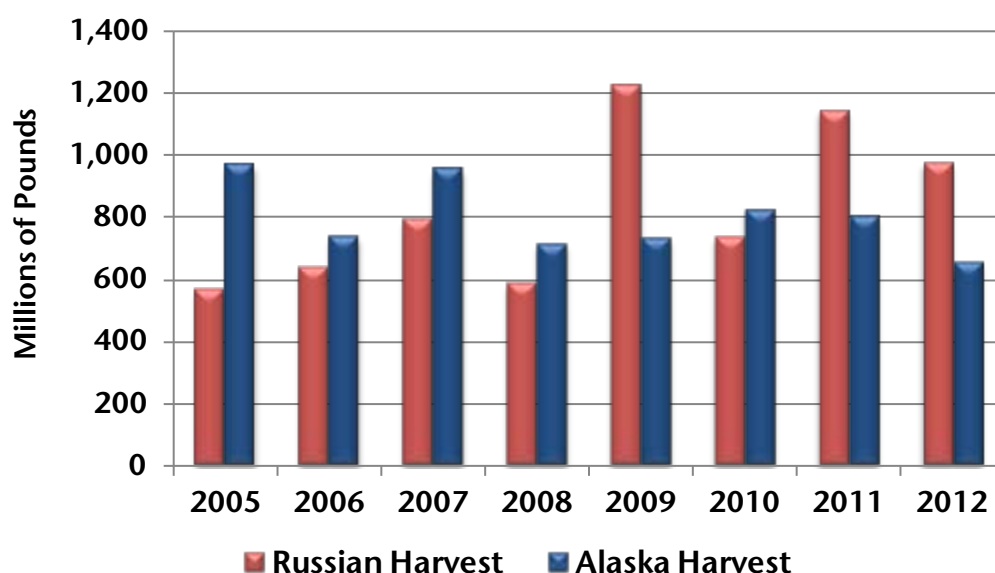
¹⁴ Park, Y., Eui Hong, K. North Pacific Anadromous Fish Commission Newsletter, No. 33 (January 2013).

ikura in Japan, is common fare at special occasions and holiday celebrations in Japan. Therefore, chum production in Japan, Russia, and Korea is a major consideration.

SUPPLY AND DEMAND FOR RUSSIAN SALMON ROE

Russian salmon production has increased substantially in recent years. The largest increase has come from pink salmon, although chum harvests are trending up as well. This increased production is primarily due to increased hatchery production of pink salmon (and chum salmon, to a lesser extent) within Russia's Far East. In 2010, Russian hatchery managers stated that Russia is planning to build 23 new hatcheries that would increase the country's hatchery production by 66 percent or 680 million fry.¹⁵

Figure 10.2: Russian and Alaska Salmon Production, (2005-2012)



Note: 2011 and 2012 Russian data is preliminary, 2012 Alaska data is preliminary.
Source: ADF&G, FAO, Russian Federal Fisheries Agency, and TINRO.

Increased Russian salmon production has had an interesting impact on world markets for salmon roe. Russia harvested an enormous run of pink salmon in 2009; over 1 billion pounds. Following the 2009 season the price of salmon roe fell in Russia leading to an increase in consumption and demand for salmon roe. As in Japan, salmon roe and caviar are cultural staples and expected fare during many holidays or special occasions. The 2009 season allowed more Russians and Eastern Europeans to reconnect with salmon roe, and there has been a definite carry-through in demand.

The growth in demand for salmon roe following Russia's massive 2009 pink harvest is reflected in exports of Alaska salmon roe. In 2010, exports of Alaska salmon roe to Russian and the Ukraine exceeded \$80 million, up from just \$17.5 million in 2008. Exports of salmon roe have since decreased, but remain well above levels seen prior to 2009. The fact that Alaska is able to export so much salmon roe to a country harvesting so much salmon speaks well to the quality and marketability of Alaska salmon roe.

¹⁵ "Growing Risks from Hatchery Fish," Phys.org News, May 14, 2012.

Like Alaska, Russia's pink salmon abundance cycle favors odd-numbered years. Since 2009, odd-year Russian pink salmon harvests have been 2 to 2.5 times larger than even-year harvests.

Going forward, it seems likely that Russia will continue to produce significant volumes of pink and chum salmon. The preliminary forecast for 2013 is for 313,000 metric tons (or 689 million pounds); however, these preliminary forecasts have proven conservative in recent years.¹⁶ For example, the 2012 forecast in the Sakhalin region was 90,000 metric tons, but actual production ended up being about 130,000 metric tons.¹⁷ It is possible the actual 2013 harvest could exceed 450,000 metric tons, though scientists do not believe it will exceed the 2009 or 2011 harvest (of over 500,000 metric tons) based on preliminary estimates.

Although salmon production is certainly trending up in Russia, the federal government has set a goal of increasing consumption of domestic seafood and the country appears to be making headway in this regard. Therefore, it is likely that more Russian salmon caught in the Far East will find its way into western Russian markets. Currently, most of Russia's salmon is exported to China and Japan, with relatively small amounts "going west" despite the fact that Russian consumption is sufficient to make the country Norway's largest salmon export market.

It is important to consider the role of logistical challenges in discussing growth prospects for Russian salmon markets, both domestic and import. Russia is incredibly vast. It stretches across 11 time zones with little infrastructure connecting the west, where over 90 percent of the population resides, with the Far East, where salmon production occurs but less than 10 percent of the population lives.

SOUTHEAST ALASKA CHUM ROE PRICES

The Alaska Salmon Price Report contains data on first wholesale volume and value of Alaska salmon products. The report is published on a trimester basis, along with annual reports on production and average prices. Unfortunately, the report does not separate sales of green roe versus ikura, but the report does provide some visibility on historical prices for salmon roe. Chum roe prices have increased significantly in 2012, and the total sales value nearly doubled compared to the prior year.

Table 10.1: First Wholesale Price and Sales of Southeast Alaska Chum Roe, (2008-2012)

Year	Jan-Apr	May-Aug	Sep-Dec	Avg. Annual Price	Est. Annual Sales
2008	\$11.25	\$16.76	\$18.44	\$17.86	\$40,462,891
2009	15.90	7.86	12.21	9.93	28,506,379
2010	11.79	11.89	11.65	10.35	34,216,635
2011	14.45	12.96	14.74	13.85	47,336,466
2012	16.46	14.84	19.70	16.95	83,690,535

Source: Alaska Salmon Price Report (Alaska Department of Revenue).

¹⁶ <http://irsolo.ru/uchenye-rekomenduyut-vylovit-v-tixom-okeane-v-2013-g-menshe-lososya/>

¹⁷ <http://www.sakhalin.biz/news/business/80173/>

ROE MARKET SUMMARY

Competing chum production has declined in the wake of the 2011 Japanese tsunami. In addition, demand for salmon roe has increased in Russia and Eastern Europe. Although chum supply is expected to eventually increase in Japan, as well as in Russia and Korea, it takes a long time to (re)build hatcheries, implement programs, and increase production. Furthermore, the farmed salmon industry does not supply the roe market as it is not economically viable to bring farmed salmon to sexual maturity.

According to a recent Japanese roe market report from Minato-Tsukiji.com, Alaska suppliers' selling prices settled at \$25.00 to \$27.00 per pound (C&F) for top grade, flavored chum ikura products in 2012. This was an increase of 20 percent over the previous year. Prices for frozen green chum roe increased 30 to 40 percent to \$16.00 to \$16.50 per pound (C&F). Prices for pink and sockeye salmon roe also increased in 2012, gaining 30 to 50 percent. Other reports from Minato-Tsukiji suggest inventories remain at relatively low levels, but sales volumes have declined given higher prices. Top grade Alaska ikura currently sells for JPY 4,500 per kilogram; 20 to 30 percent lower than similar grade ikura from Japanese fisheries.



While the long-to-medium term outlook for chum roe is favorable, due to Japanese chum production probably being several years away from a full recovery, the market for the upcoming season could be softer. Salmon roe prices increased substantially in 2012, but the yen has weakened considerably versus the dollar in recent months. It is likely that prices will be flat to lower in 2013, barring a major decrease in chum roe production. Japanese consumers are very comfortable using a wide variety of seafood products: roe, fish meat, and shellfish. Their ability to substitute makes them more sensitive to price increase on staple products. High prices will not lead to all Japanese roe consumers abandoning the product, but it has already impacted sales volumes, which has a ripple effect back to processors in Alaska.

Chum Meat Product Markets

Until 2012, rising wholesale prices for chum salmon meat products had been the driving factor behind increasing ex-vessel prices for chum salmon. However, wholesale prices for frozen H/G chum salmon declined sharply following the 2012 season.

Entering the 2012 season, frozen H&G chum salmon carried over from the 2011 harvest sold for an average of \$2.01/lb during the first trimester of 2012. By the last trimester of 2012, the first wholesale price for frozen H&G chum salmon had fallen 40 percent to \$1.18/lb. More recent price information from industry sources suggests the price of chum meat products has continued to decline in the first three months of 2013. Frozen H&G product with good meat color is selling for \$1.00 to \$1.20 while pale-colored product is selling for only \$0.70 to \$0.80/lb.

Table 10.2: First Wholesale Price and Sales of Alaska H&G Frozen Chum Salmon, (2008-2012)

Year	Jan-Apr	May-Aug	Sep-Dec	Avg. Annual Price	Est. Annual Sales
2007	\$1.09	\$0.89	\$0.91	\$0.92	\$51,824,294
2008	1.04	1.10	1.17	1.12	63,511,921
2009	1.30	1.17	1.28	1.23	80,491,723
2010	1.37	1.60	1.63	1.59	111,391,101
2011	1.78	1.87	1.78	1.83	93,645,831
2012	2.01	1.40	1.18	1.37	94,558,691

Source: Alaska Salmon Price Report (Alaska Department of Revenue).

Despite lower prices, the total first wholesale value of frozen H&G Alaska chum salmon finished slightly higher in 2012 compared to the prior year. At public meetings held during the Alaska Seafood Marketing Institute's All Hands meeting in November 2012, several processing companies noted they were having difficulty selling chum salmon directly to domestic markets (without offering product at a steep discount). Data from the Alaska Salmon Price Report supports these statements.

Although the total first wholesale value of frozen H&G chum in 2012 was nearly equal to 2011, the 2012 harvest was much larger. ASPR production data and comments from processors suggest that in early 2013 packers continue to hold a significant amount of frozen H&G chum in inventory.

Production of farmed salmon and wild salmon species has increased significantly since 2008. Based on preliminary data for 2012, it is estimated that the global wild and farmed salmon supply grew at an annual rate of 5.2 percent between 2008 and 2012. Preliminary figures indicate farmed salmon production increased 27.7 percent from 2010 to 2012 as the industry recovered from the Chilean ISA epidemic. With so much more salmon available, eventually frozen chum salmon prices had to stop climbing.

Farmed salmon compete with frozen pink and chum salmon in many markets where price is a primary concern. However, there is a break-even point associated with farmed salmon and events occurring within the past 18 months suggest that most farmed salmon sold during that time has been close to that break-even price. Consider the following:

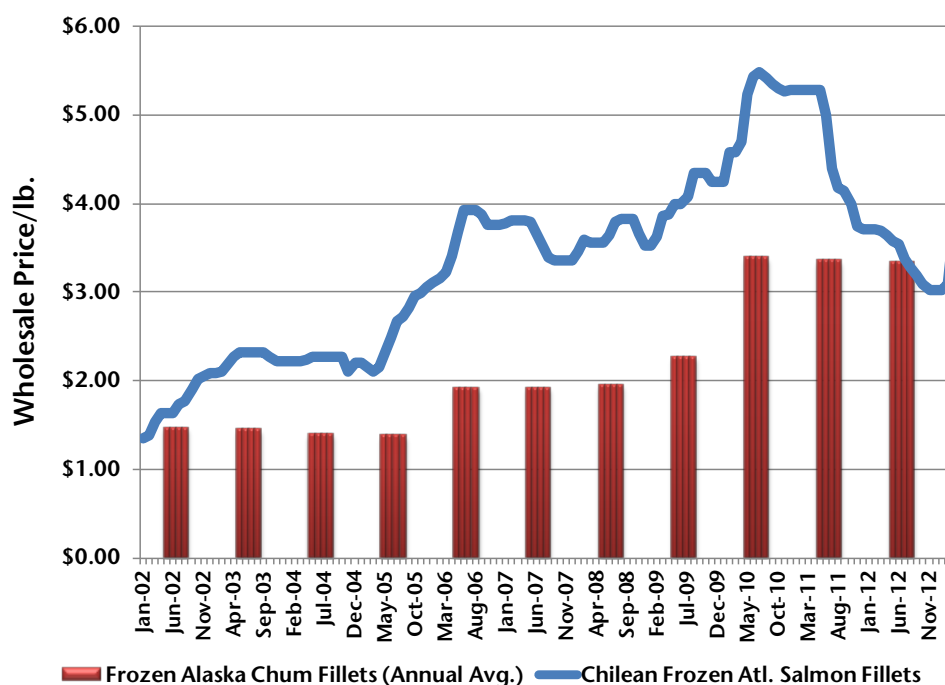
- In January 2013, it was reported by the Chilean fisheries ministry that the country's farmed salmon sector was having cash flow problems due to low salmon prices.
- Last October, AquaChile (one of the largest farmed salmon producers in Chile) reported that Chilean banks were reluctant to provide credit for salmon farming companies and several companies have been consolidated or sold off in recent months.
- Several companies, including Marine Harvest (the world's largest farmed salmon producer), have announced they are planning on either cutting back production or maintain it at 2012 levels.
- Farmed salmon industry representatives have predicted supply change from between -1 and +3 percent in 2013 (after posting double-digit increases in 2011 and 2012).

These developments suggest that farmed salmon prices seen during the last half of 2011 and most of 2012 are not sustainable for producers. Farmed salmon prices have increased in the last month, and comments by farmed salmon companies indicate they will take a more passive production approach in 2013 and 2014 to avoid oversupplying the market. While the focus of Chilean producers in 2011 and 2012 was to rapidly increase production following the ISA virus outbreak that decimated production in 2009 and 2010, the focus going forward will likely be on balancing supply and demand. As producers consolidate, such a goal becomes easier to accomplish.

Salmon farmers' biggest operating cost is feed. It accounts for 40 to 50 percent of the cost of raising a salmon to maturity. Salmon feed contains fishmeal and fish oil, made from small pelagic fish such as anchovies or sardines. Greater demand for salmon feed has increased harvest pressure on these species, driving up the price of fishmeal and fish oil.

Regardless, frozen pink and chum salmon fillets should continue to find demand as an alternative to farmed salmon. In fact, the price of farmed salmon fillets and chum salmon fillets has converged in recent years (see Figure 10.3). Farmed salmon prices may act as a price ceiling, dictating how high frozen pink/chum prices can rise in the near-term, but farmed salmon prices can also provide price support in the form of a "floor" on prevailing commodity value. An aging population in the U.S. market (becoming more health conscious) and last summer's drought could also support demand for pink/chum salmon.

Figure 10.3: Historical Prices for Chilean Farmed Salmon and Alaska Chum Salmon, January 2002 – March 2013



Source: Alaska Salmon Price Report (Alaska Department of Revenue) and Urner Barry.

Salmon burgers utilizing chum and pink salmon also contribute to demand for frozen chums. Many consumers may recognize Trident Seafoods Alaska salmon burgers, from their place in the frozen foods section at Costco. However, other packers also have their own salmon burger lines using Alaska chum salmon. No public data exists to pinpoint the pace of salmon burger sales, but reviews of salmon burgers

made by Trident Seafoods and Ocean Beauty's SeaPak brand have generally been very positive. The pre-cooked burgers can be prepared quickly, stored in a freezer for extended periods, and offer all the healthy benefits of eating wild salmon. These products could continue to add more value to pink and chum salmon in coming years.

Market Summary for Chum Meat Products

The long term outlook for frozen chum salmon meat products is favorable. Chum salmon, along with pink salmon, should find steady demand as a more affordable alternative to farmed salmon and continue to benefit from value-added products like salmon burgers in coming years. Rising costs and consolidation in the farmed salmon sector are good for chum salmon prices in the long run. Major farmed salmon companies are predicting flat to modest production growth in 2013 and 2014; a major shift from the double-digit percentage growth witnessed in 2011 and 2012. Additionally, more and more consumers are differentiating wild salmon from farmed species, which adds value to pink and chum salmon.

However, meat markets for chum salmon are currently in the midst of a reversal. The wholesale price of chum salmon has fallen roughly 50 percent from its high point during late 2011 and early 2012. Reports of larger than average inventories held by major Alaska processors represent another bearish signal for ex-vessel pricing in 2013. Farmed salmon prices have increased within the last month, but many importers have purchased filleted farmed product for less than \$3.50/lb during the past year making



Photo Credit: CTLE-Seafood.com.

chum salmon a tougher sell. While lower prices in the near term may be needed to “clear” inventory from the 2012 harvest, there is reason to be optimistic that prices for frozen chum can eventually return to levels seen in 2011 and early 2012.