STOCK ASSESSMENT AND FISHERY EVALUATION REPORT FOR THE GROUNDFISH FISHERIES OF THE GULF OF ALASKA AND BERING SEA/ALEUTIAN ISLANDS AREA:

ECONOMIC STATUS OF THE GROUNDFISH FISHERIES OFF ALASKA, 2017

by

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The authors of the Groundfish SAFE Economic Status Report invite users to provide feedback regarding the quality and usefulness of the Report and recommendations for improvement. AFSC's Economic and Social Sciences Research Program staff continually strive to improve the SAFE Economic Status Reports for Alaska Groundfish and BSAI Crab to incorporate additional analytical content and synthesis, improve online accessibility of public data in electronic formats, and otherwise improve the utility of the reports to users. We welcome any and all comments and suggestions for improvements to the SAFE Economic Status Reports. Please contact Ben Fissel at Ben.Fissel@noaa.gov with any comments or suggestions to improve the Economic SAFEs.

This report will be available at:
http://www.afsc.noaa.gov/refm/docs/2018/economic.pdf

Time series of data for the tables presented in this report (in CSV format) are available at:
http://www.afsc.noaa.gov/refm/Socioeconomics/SAFE/groundfish.php#data

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1. EXECUTIVE SUMMARY

The commercial FMP groundfish fisheries off Alaska had a total catch of 2.3 million metric tons (mt) in 2017 (including catch in federal and state waters) (Fig. 3.1 and Table 1), a decrease of 0.14% from 2016. Groundfish accounted for 81% of Alaska's 2017 total catch, which was less than typical because of higher than average Pacific salmon catch in 2017 (Table 3). In Alaska total catch in 2017 increased for Alaska pollock, sablefish, and Atka mackerel, with pollock catch at a decadal high. Total catch decreased or was stable for Pacific cod, flatfish and rockfish, with flatfish catches at a decadal low.

The aggregate ex-vessel value of the FMP groundfish fisheries off Alaska was $947 million, which was 47% of the ex-vessel value of all commercial fisheries off Alaska in 2017 (Table 3).[1] After adjustment for inflation, real ex-vessel value of FMP groundfish increased $60 million (Table 3), largely due to an aggregate real ex-vessel price increase of 7.1% to $0.194 per pound in 2017. The increase in the aggregate ex-vessel price was attributable to a rise in ex-vessel prices for most species, with the notable exception of pollock. Notable price increases were observed for Atka mackerel (42%), flatfish (21%), and Pacific cod (18%). Pollock ex-vessel prices showed little change, fallling 2.9% in the Bering Sea and Aleutian Islands (BSAI), and rising 4.5% in the Gulf of Alaska (GOA), and after recent declines prices remain fairly low (Tables 11 and 27). Among the other species that are the focus of the shoreside ex-vessel fisheries: The GOA arrowtooth ex-vessel price rose 27%, GOA Pacific ocean perch prices fell 4%, GOA sablefish prices rose 16%. For Alaska FMP groundfish in aggregate the change in catch was small relative to the change in price, which was the larger factor in determining the increase in ex-vessel value (Figures 5.6 and 5.10). For other fisheries in Alaska, salmon and halibut ex-vessel revenues increase, while shellfish revenue decreased (Table 3).

The gross value of the 2017 groundfish catch after primary processing (first wholesale) was $2.52 billion (Table 4), a increase of 3.4% in real terms from 2016. This change was primarily the result of an increase in the real aggregate 2017 first-wholesale price, up 5.6% to $1.2 per pound while aggregate production volumes decreased 1.4% to 959 thousand mt (Table 4). In the BSAI, aggregate first-wholesale value increased 6.1% and value was increasing for all species with the exception of pollock where aggregate value, price, and volume showed little change (Table 15). In the Gulf of Alaska, aggregate first-wholesale value increased only slightly (1.5%) (Table 31). First-wholesale value in the GOA was increasing for flatfish and sablefish with increases in both first-wholesale prices and production volume. The decrease in GOA cod value was the result of decreased production volume. The decrease in the value of GOA pollock was largely the result of a decrease in the average price of products.

The first-wholesale value of Alaska's FMP groundfish fisheries accounted for 52% of Alaska's total first-wholesale value from commercial fisheries (Table 4). First-wholesale value of Alaska's non-FMP groundfish fisheries totaled $2.34 billion, most of which ($1.9 billion) came from Pacific salmon. Pacific salmon value increased 47% as a result of the typical increase in salmon production that happens in odd years. Pacific halibut fisheries, which are concentrated in the Gulf of Alaska, saw a

[1] The data required to estimate net benefits to either the participants in fisheries or the Nation, such as cost or quota value (where applicable) data, are not available. Unless otherwise noted 'value' should be interpreted as gross revenue.

decrease in production in 2017 after steady declines over the last decade. First-wholesale value in the Pacific halibut fisheries decreased $3.7 million to $137 million in 2017.

The groundfish fisheries off Alaska are an important segment of the U.S. fishing industry. In 2016, it accounted for 51% of the weight of total U.S. domestic landings and 17% of the ex-vessel value of total U.S. domestic landings (Fisheries of the United States, 2016). Alaska fisheries as a whole (including salmon, halibut, herring, and shellfish) accounted for 58% of the weight of total U.S. domestic landings and 33% of the ex-vessel value of total U.S. domestic landings.

NOAA Fisheries collects only limited data on employment in the fisheries off Alaska. The most direct measure available is the number of 'crew weeks' on at-sea processing vessels and catcher vessels of FMP groundfish. These data indicate that in 2017 crew weeks for both sectors totaled 157,726 with the majority of them (119,861) occurring in the BSAI groundfish fishery (Tables 23, 39, 24, and 40). In the BSAI, the months with the highest employment correspond with peak of the pollock seasons in February-March and July-September. In the Gulf of Alaska, crew weeks peak February-May with the catcher vessel hook and line fisheries targeting sablefish and Pacific cod. Relative to 2016, annual crew weeks in Alaska decreased in 2017 by 1.9%, in part, as a result of a drop in catcher vessel crew weeks in the GOA.

Alaska's FMP groundfish fisheries have six major species (complexes); Alaska pollock, Pacific cod, sablefish, Atka mackerel, the flatfish complex, and the rockfish complex, plus Pacific halibut (which is not an FMP groundfish).[2] The fisheries for these species (complexes) are distributed across two regions: the Bering Sea & Aleutian Islands and the Gulf of Alaska. Each region can be broadly divided into two sectors: catcher vessels which deliver their harvest to shoreside processors, and the at-sea processing sector, whose processed product sells directly to the first-wholesale market. Catcher vessels account for a higher proportion of the ex-vessel value of groundfish landings than total catch because a higher share of their revenues come from high-priced species such as sablefish. The ex-vessel value of the at-sea sector is imputed from observed first-wholesale value to exclude the value added by at-sea processing. The following gives a summary of the economic status of the six FMP groundfish species' (complexes) fisheries in 2017.

Alaska pollock

Alaska pollock, the dominant species in terms of catch, accounted for 69% of FMP groundfish retained harvest. The majority of pollock is harvested in the BSAI (approximately 90%) where catch is divided between the shoreside and at-sea sectors. It also comprises a large share of the GOA shoreside revenues. Pollock is targeted exclusively with trawl gear. Pollock catches increased throughout Alaska's regions and sectors and catch levels in both the BSAI and GOA were at the highest level seen in recent history. Retained catch of pollock for all Alaska increased 1% to 1.5 million mt in 2017 (Table 2). This was the combined effect of a 0.51% increase in the BSAI retained catch and a 4.7% increase in the GOA. The ex-vessel value of the BSAI pollock fishery decreased 5.9% to $353 million despite the increase in retained catch as ex-vessel prices fell 6.3% to $0.12 per pound (Table 12). A decrease in the price of fillet products was likely a contributing factor in the ex-vessel price decrease. The ex-vessel value of the GOA pollock fishery increased 10% to $70 million as ex-vessel prices rose 4.8% to $0.087 per pound (Table 28).

[2] An FMP fishery is one where management, including total catch, is carried out under a federal Fishery Management Plan. Pacific halibut is not an FMP groundfish fishery and its total catch is set by the International Pacific Halibut Commission, though allocation of the catch among users is managed by the NPFMC and NMFS.

Pollock is an abundant whitefish with extensive global markets and is harvested at or very near the Total Allowable Catch (TAC). Hence changes in pollock production largely reflect changes in the annual TAC, which is related to the sustainability of the resource, for which the AFSC carries out extensive annual stock assessments. Pollock first-wholesale value in the BSAI increased 1% to $1.34 billion as the average at-sea first-wholesale price rose 5.6% to $1.33 and the average shoreside price fell 5% to $0.96 (Tables 15 and 16). In the GOA first-wholesale value decreased 9.1% to $96.7 million as the average first-wholesale price fell 12% to $0.56 (Tables 31 and 32). Wholesale pollock prices can play a significant role in determining annual revenue and influence the mix of products produced for the wholesale market. Pollock has three primary product forms: fillets, surimi, and roe, whose share of pollock total first-wholesale value was 85.1% in the BSAI and 58.9% in the GOA (GOA processors produce a greater share of H&G products). In the BSAI at-sea sector prices were decreasing for most product forms except for roe and surimi and the increase in first-wholesale value was largely attributable to the increased price and production of surimi. In the BSAI shoreside sector prices were decreasing for most product forms except for roe (notably the surimi price decreased as well) which largely accounted for the decrease in first-wholesale value. Similarly, decreases in all product prices except for roe offset the increased production in the GOA resulting in a decrease in value. First-wholesale value in the pollock fishery remains above the 10 year average, though not at the peak in 2012 when prices were higher.

Pacific cod

The fisheries for Pacific cod are the second largest by volume in Alaska with a retained catch of 298 thousand mt in 2017, a decrease of 7.1% from 2016 (Table 2). Pacific cod is harvested in the BSAI and the GOA regions by the shoreside and at-sea sectors, by various fleets using different gear types. The largest fishery is located the BSAI at-sea sector, which is primarily prosecuted by the longline catcher/processor fleet, although fleets such as Amendment 80 also harvest Pacific cod in the BSAI at-sea sector. Fisheries in the shoreside sector utilize trawl, hook-and-line, and pot gear types. In the GOA Pacific cod is mostly harvested by the shoreside sector where catch is carried out using hook-and-line, jig, trawl, and pot gear. Like pollock, cod is typically harvested at or very near the TAC. There was a prominent decrease in the GOA retained catch of 24% to 48 thousand mt as poor fishing conditions from low abundance resulted in roughly 75% of the TAC being harvested. The GOA Pacific cod TAC for 2018 was reduce approximately 80% as the level of the stock remains low following adverse environmental conditions and poor recruitment. In the BSAI catch levels of Pacific cod decreased 3% to 250 thousand mt, however catches remained strong relative to the TAC and were above their ten year average.

In the BSAI ex-vessel value of the Pacific cod fishery increased 14% to $178 million as ex-vessel prices rose 17% to $0.32 per pound (Tables 11 and 12). In the GOA, the decrease in catch resulted in a 13% decrease in ex-vessel value to $70 million despite an ex-vessel price rise of 14% to $0.33 per pound (Tables 27 and 28). The increase in ex-vessel prices in 2017 value mirrored similar increases the first-wholesale prices as global supplies of cod have become more constrained.

Pacific cod first-wholesale value in the BSAI increased 11.9% to $434.7 million with increased value in both the at-sea and shoreside sectors as the average at-sea first-wholesale price rose 19% to $1.56 and the average shoreside price rose 16% to $1.89 with rising prices for fillet and H&G products (Tables 15 and 16).

Pacific cod is processed into a number of different product forms for wholesale markets, the two most important of which are fillets and H&G. The at-sea sector produces mostly H&G products and the shoreside sector produces fillets, H&G, and other product forms. Cod products face staunch competition in global markets which is also supplied by sizable catches from the Barents Sea. In the GOA the first-wholesale price for cod fillets fell 11% while H&G prices increased 30% helping to buttress the reduction in value in the GOA from reduced catch. In the BSAI first-wholesale prices increased for fillets and H&G. Strong demand and continued constraints on supply in 2017 and 2018 have put upward pressure on 2017 cod prices, particularly starting in late 2017.

Sablefish

Sablefish is primarily harvested by the GOA shoreside sector which typically accounts for upwards of 90% of the annual catch. It is also caught by the BSAI shoreside and GOA at-sea sectors. Most sablefish is caught using the hook-and-line gear type. As a valuable premium high-priced whitefish, sablefish is an important source of revenues for GOA catcher vessels and catches are at or near the TAC. Since the mid-2000s, decreasing biomass has ratcheted down the TAC, however in 2016 this trend started to reverse. In 2017 sablefish retained catch increased 17% to 11.5 thousand mt (Table 2).

In the GOA retained catch increased 11% to 10 thousand mt. Sablefish ex-vessel value in the GOA increased 29% to $175 million with increases in both catch and ex-vessel price which rose 16% to $5.2 million (Tables 27 and 28). Ex-vessel value in the BSAI increased as well with an increase in retained catch even though prices fell (Tables 11 and 12). Persistent declines in catch through recent years may have been disruptive to revenue growth in the sablefish fishery, but strong prices have maintained value in the fishery as catches have declined. In 2017 ex-vessel prices increased with corresponding wholesale prices where strong demand and depleted inventories have pushed up prices.

Sablefish first-wholesale value in the GOA increased 18.3% to $111.3 million as the average first-wholesale price rose 12% to $8.95. In the BSAI first-wholesale value increased 56.2% to $12.5 million with increased value in the shoreside sectors as production increased with catch but the average at-sea first-wholesale price fell 7.5% to $7.16 (Tables 15 and 16). At the first-wholesale market level sablefish is primarily processed into the head and gut product form. Most sablefish produced is exported and Japan is the primary export market, but in recent years there has been strong demand for sablefish in the U.S. and foreign demand outside of Japan, including Europe, China and Southeast Asia. U.S. exports as a share of U.S. production has declined over time indicating increased domestic consumption.

Flatfish species complex

The flatfish complex is comprised of a number of different species. The species targeted vary substantially by region. In the BSAI the primary target species are yellowfin sole, rock sole, flathead sole, and arrowtooth flounder, which are mostly fished by catcher/processors in the Amendment 80 fleet. In the BSAI the yellowfin sole fishery is the largest of the flatfish fisheries. In the BSAI retained catch across all species decreased 6%, to 199 thousand mt. Decreased catch occured for yellowfin sole (2%), rock sole (22%), flathead sole (10%), arrowtooth (38%), and Kamchatka flounder (8%), while catch increased for Greenland turbot (26%) and other flatfish (25%). Catches in 2017 were comparable to the average catch level since 2003. Decreases in the BSAI flatfish catch may be associated with increases in the Atka mackerel TAC and catch as Amendment 80 vessels prioritize the more highly valued Atka mackerel over flatfish.

In the GOA, arrowtooth is the primary target species, though other flatfish (e.g., flathead sole and rex sole) are caught in smaller quantities. GOA flatfish are caught by the western and central gulf trawl fleets which are comprised of both shoreside catcher vessels and at-sea catcher/processors. In the GOA retained catch for all flatfish species increased 18%. This change was the result of a 40% increase in arrowtooth catch, with catches of other flatfish species in the GOA decreasing. Arrowtooth, the largest flatfish fishery in the GOA, can show considerable year over year catch variability, in part because of regulatory changes.[3] However, 2017 catches were above to the average catch level since 2003.

Flatfish are primarily processed into the H&G and whole fish product forms and changes in production largely reflect changes in catch. Processed products are primarily exported to China and South Korea, though a significant share of this product is re-processed into fillets and re-exported to North American and European markets. First-wholesale value in the BSAI flatfish fisheries increased 15% with a 22% increase in price.[4] Yellowfin sole value rose 18% with a 19% increase in price. Increasing prices for other species in the BSAI flatfish fisheries resulted in increasing value despite decreases in production from reduced catch. First-wholesale value in the GOA flatfish fisheries increased 71% with a 24% increase in price. Arrowtooth value rose 139% with a 40% increase in price. Demand for flatfish in general through 2017 and 2018 has remained stable throughout European and North American markets and there are signs of growth in Asian markets. The strong demand and low inventories that have put upward pressure on flatfish prices.

Rockfish species complex

The rockfish fisheries target a diverse set of species which can vary by region and sector. By volume, the majority of rockfish (70%) is caught in the BSAI, which is largely attributable to the sizable BSAI fisheries for Pacific ocean perch (which is also the largest rockfish fishery in the GOA). The other five major species (dusky, rougheye, northern, shortraker, and thornyhead) are predominantly caught in the GOA, though most species are caught in both regions. Pacific ocean perch and northern rockfish are the largest of the rockfish fisheries, accounting for roughly 75% and 10% of the total Alaska rockfish revenues respectively.

In the BSAI rockfish are caught by at-sea catcher/processors while in the GOA catch is distributed between the shoreside and at-sea sectors. Rockfish retained catch in the BSAI increased 0.3% to 35.5 thousand mt with all species showing small increases in catch (Table 9). Rockfish retained catch in the GOA fell 12.4% to 27 thousand mt with a small decrease in Pacific ocean perch and moderate decreases for other rockfish species (Table 25). The decrease in GOA catch was concentrated in the shoreside sector. GOA ex-vessel prices fell 1% and ex-vessel value fell 13% (Tables 27 and 28).

First-wholesale value in the BSAI increased 21% to $42 million with a 22% increase in prices and stable production volumes. These changes were the result of price increases for both Pacific ocean perch (23%) and northern rockfish (18%). First-wholesale value in the GOA decreased 6% to 35$ million with a 17% increase in prices as production volumes fell correspondingly with the decrease in catch. These changes were the result of the reduction in production volume associtaed

[3] In 2014, Amendment 95 (regulations to reduce GOA halibut PSC limits) implemented changes to the accounting of halibut PSC sideboard limits for Amendment 80 vessels that allowed the fleet to increase their groundfish catch, mostly arrowtooth flounder. Also, Amendment 95 revised halibut PSC limit apportionments used by trawl catcher vessels from May 15 through June 30 that extended the deep-water species fishery allowing for an increase in arrowtooth flounder catch for this fleet (for details see `http://alaskafisheries.noaa.gov/frules/79fr9625.pdf`).

[4] Because BSAI flatfish are primarily targeted by catcher/processor vessels there is not an substantive ex-vessel market for them.

with the decreased catch and which was offset by increases in prices for Pacific ocean perch (19%) and dusky rockfish (14%). The majority of rockfish produced are exported, primarily to Asian markets, some of which is re-processed (e.g., as fillets) and re-exported to domestic and international markets.

Atka Mackerel

Atka mackerel is predominantly caught in the BSAI, primarily in the Aleutian Islands, and almost exclusively by the Amendment 80 Fleet.[5] The catch of Atka mackerel in 2017 increased 18% to 66 thousand t. This level of catch is the highest since 2010 after significant reductions in the TAC in 2013 and 2014. The lower catch was due to area closures for Steller sea lions and survey-based changes in the spatial apportionment of TAC. Recent increases in TAC reflect the continued health of the stock and expanded fishing opportunities in the Aleutian Islands.

First-wholesale value in 2017 increased 67% to $125 million with a 35% increase in prices and increased production volumes corresponding to the increase in catch. Approximately 95% of the Atka mackerel production volume is processed as H&G, while the remainder is mostly sold as whole fish. Most of the Atka mackerel produced is exported to Asia where it undergoes secondary processing into products like surimi, salted-and-split and other consumable product forms. Foreign demand for Atka mackerel as an input to secondary surimi processing abroad has been strong as catch from other sources such Japan has been declining inrecent years.

1.1. Report Card Metrics for the Alaska Commercial Groundfish Fisheries off Alaska 1993-2017

The purpose of the report card metrics is to give a broad overview of the economic health of Alaska's FMP groundfish fisheries (Figure 1.1). The metrics cover the years 1993-2017 to help elucidate trends and provide historical context to the current state of the fishing industry. In general, these metrics focus on FMP groundfish fisheries, which are also the focus of this economic status report. As a result, halibut and salmon are not well represented by these metrics (except that the share of shoreside value for the top 5 ports does include salmon and halibut). The economic report card includes 9 items[6]:

1) Real first-wholesale revenue[7] index which measures changes in the first-wholesale revenue produced by all FMP groundfish species in Alaska using 2017 as the base year (value=100).

2) Real first-wholesale price index, which measures changes in first wholesale prices produced from all FMP groundfish species in Alaska using 2017 as the base year (value=100).

3) Production volume divided by total catch, where total catch is inclusive of discards and PSC. This metric approximates a recovery rate of product relative to total extractions across all FMP groundfish species.

4) The effective global share of Alaska pollock and cod catch, defined as the average shares of global catch volume weighted by Alaska first-wholesale revenue shares. This metric demonstrates how

[5]Because Atka mackerel is only targeted by at-sea catcher/processor vessel there is not an effective ex-vessel market for it. Though ex-vessel statistics are computed for national reporting purposes.

[6]Metrics denoted as "real" indicate that they are adjusted for inflation using the GDP chain-type price index https://research.stlouisfed.org/fred2/series/GDPCTPI.

[7]The revenue from the sale of fish products after primary processing.

large the Alaska pollock and cod fisheries are relative to the global supply of these species which provides information as to the potential influence of changes in Alaska catches on global prices for these species.

5) Real effective exchange rate index, which is an average of foreign currencies to U.S. dollar exchange rate weighted by fisheries exports to each country.[8] This metric provides information about how exchange rates are impacting Alaska FMP groundfish producers across all of their export partners.

6) Ratio of ex-vessel over first-wholesale revenues. This revenue share is a function of a number of different factors including the value added from processing, bargaining power, global prices, and processing and harvesting costs.

7) Real first wholesale revenue per fishing week, where fishing weeks are defined as the number of vessels active in each week of the year, and is a productivity-related metric that can be thought of as revenue per unit effort.

8) Alaska resident share of FMP groundfish shoreside ex-vessel value, where residency is determined by the owner address of delivering vessels. This metric measures the share of gross FMP groundfish revenues staying in Alaska versus those going to vessel owners in other states.

Real First wholesale value remains relatively high due to catch and increases in production per-unit-catch while real prices remain low (panels 1,2, and 3). High global pollock and cod production and exchange rates have put downward pressure on prices in recent years (panels 4 and 5). Globally, Alaska has a significant effective share of pollock and cod (approximately 40%). The effective real exchange rate index peaked in 2015, and has remained high through 2017. The strength of the dollar has put downward pressure on Alaska fish product prices. The ratio of ex-vessel to wholesale revenues dropped significantly in 2016 as a result of low ex-vessel prices, particularly for pollock but rebounded somewhat in 2017 with stronger ex-vessel prices (panel 6). Revenue per-unit-effort remained fairly high through 2017 (panel 7). Share of shoreside revenue to AK residents is higher relative to the mid-2000s (panel 8), due to Alaska resident's share of revenue in Pacific cod, which increased from approximately 40% in 2003-2008 to approximately 53% in 2017; sablefish, which increased from 53% in 2003-2008 to approximately 63% in 2017; and pollock which increased from 5% in 2003-2008 to 10% in 2017.

[8] Increases in this index indicate that exports are more expensive for foreign buyers which puts downward pressure on prices received by Alaska producers.

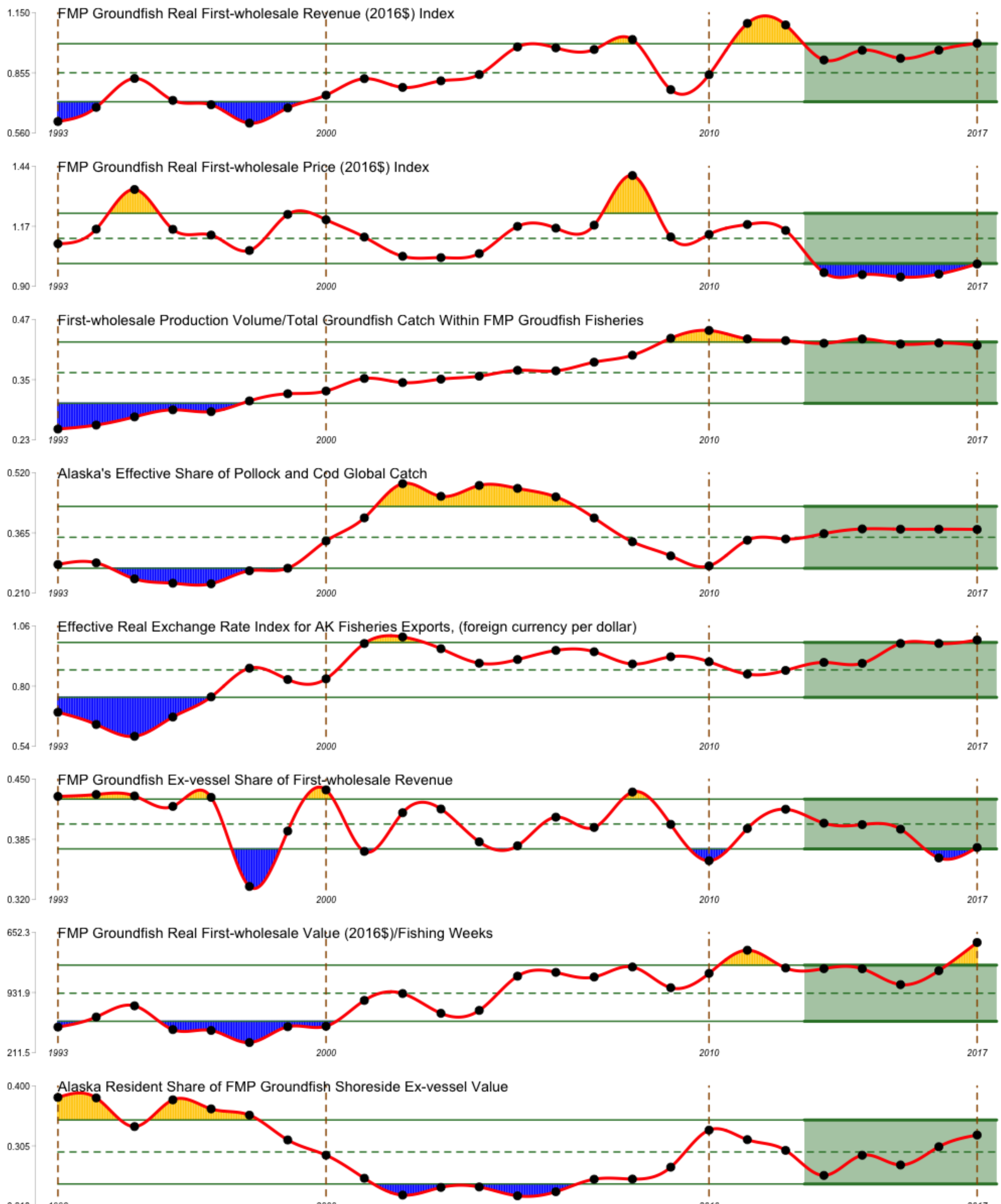

Figure 1.1: Economic Report Card Metrics.

1.1.1 Economic Summary of the commercial groundfish fisheries in 2016-17

These following summaries were prepared for the Groundfish Plan Team Meeting (Nov. 2018). The information below are excerpts from the introductions in the BSAI and GOA Groundfish Plan Team reports. Some values may differ slightly from those found in the rest of the report.

The ex-vessel value of all Alaska domestic fish and shellfish catch, which includes the amount paid to harvesters for fish caught, and the estimated value of pre-processed fish species that are caught by catcher/processors, increased from $1,752 million in 2016 to $2,007 million in 2017. The first wholesale value of 2017 groundfish catch after primary processing was $2,518 million. The 2017 total groundfish catch decreased by 0.2%, and the total first-wholesale value of groundfish catch increased by 3%, relative to 2016.

The groundfish fisheries accounted for the largest share (47%) of the ex-vessel value of all commercial fisheries off Alaska with a total value of $947 million, while the Pacific salmon (*Oncorhynchus spp.*) fishery was second with $744 million or 37% of the total Alaska ex-vessel value. The value of the shellfish fishery amounted to $183 million or 9% of the total for Alaska and exceeded the value of Pacific halibut (*Hippoglossus stenolepis*) with $117 million or 6% of the total for Alaska.

The Economic SAFE report (appendix bound separately) contains detailed information about economic aspects of the groundfish fisheries, including figures and tables, economic performance indices, catch share fishery indicators, product price projections and ex-vessel price projections, a summary of the Alaskan community participation in fisheries, an Amendment 80 fishery economic data report (EDR) summary, an updated Amendment 91 fishery economic data report (EDR) and vessel master survey summary, market profiles for the most commercially valuable species, a summary of the relevant research being undertaken by the Economic and Social Sciences Research Program (ESSRP) at the Alaska Fisheries Science Center (AFSC), and a list of recent publications by ESSRP analysts. Data tables are organized into four relatively distinct sections: (1) All Alaska, (2) BSAI, (3) GOA, and (4) Pacific halibut. Additionally, flatfish and rockfish data are incorporated into the main data tables (rather than in the appendices as was done prior to 2017). The figures and tables in the report provide estimates of total groundfish catch, groundfish discards and discard rates, prohibited species catch (PSC) and PSC rates, the ex-vessel value of the groundfish catch, the ex-vessel value of the catch in other Alaska fisheries, the gross product value of the resulting groundfish seafood products, the number and sizes of vessels that participated in the groundfish fisheries off Alaska, vessel activity, and employment. Appendices contain fisheries export data from the Census Bureau, and employment data from the Alaska Dept. of Labor. Generally, the data presented in this report cover 2013 - 2017, but limited catch and ex-vessel value data are reported for earlier years to illustrate the rapid development of the domestic groundfish fishery in the 1980s and to provide a more complete historical perspective on catch. The data behind the tables from this and past Economic SAFE reports are available online at:

www.afsc.noaa.gov/refm/Socioeconomics/SAFE.

Summary of the ex-vessel and first wholesale changes in Bering Sea revenues

According to data reported in the 2018 Economic SAFE report, the total ex-vessel value of BSAI groundfish increased 6 percent from $695 million in 2016 to $738 million in 2017 (Figure 1.2), and first-wholesale revenues from the processing and production of groundfish in the Bering Sea and Aleutian Islands (BSAI) increased by 5% between 2016 ($2,066 million) and 2017 ($2,151 million)

(Figure 1.3). At the same time, the total quantity of groundfish products from the BSAI decreased from 838 thousand metric tons to 824 thousand metric tons, a 2% decrease. These changes in the BSAI differed from those in the GOA where wholesale revenue was constant; there was a 4% year-to-year increase in first-wholesale revenues from Alaska groundfish fisheries overall.

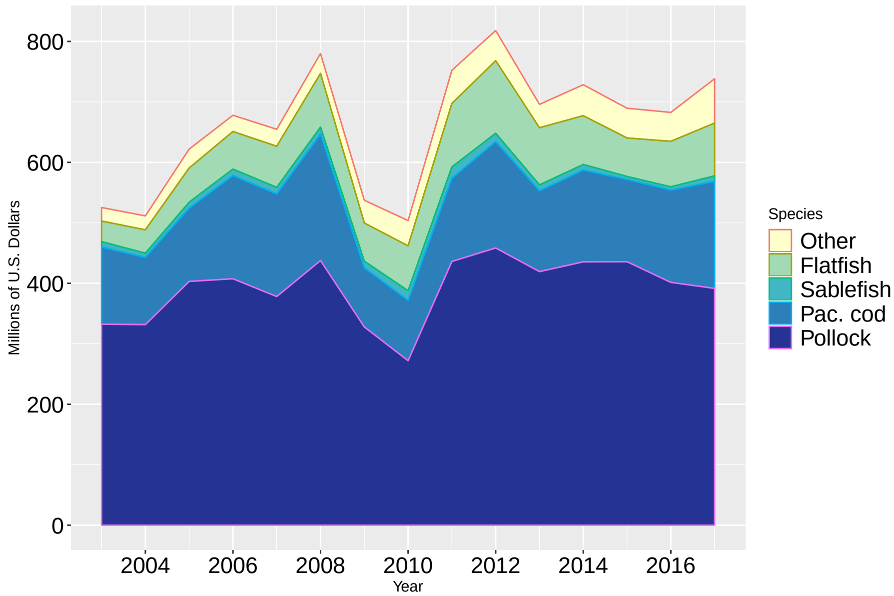

Figure 1.2: Real ex-vessel value of the groundfish catch in the domestic commercial fisheries in the BSAI area by species, 2003-2017 (base year = 2017).

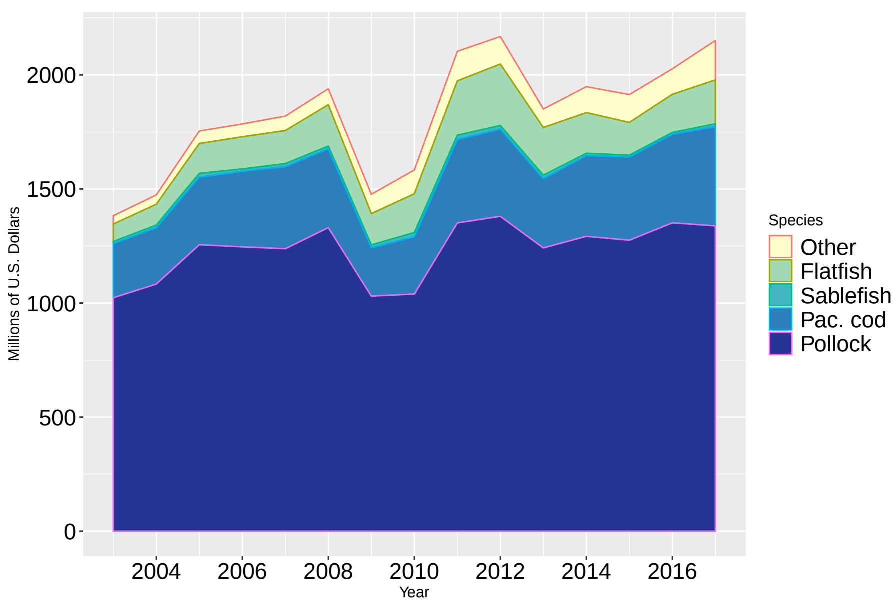

Figure 1.3: Real gross product value of the groundfish catch in the BSAI area by species, 2003-2017 (base year = 2017).

Decomposition of the change in first-wholesale revenues from 2016-17 in the BSAI

The following brief analysis summarizes the overall *nominal* revenue changes that occurred between 2016-17 in the quantity produced and revenue generated from BSAI groundfish and how revenues

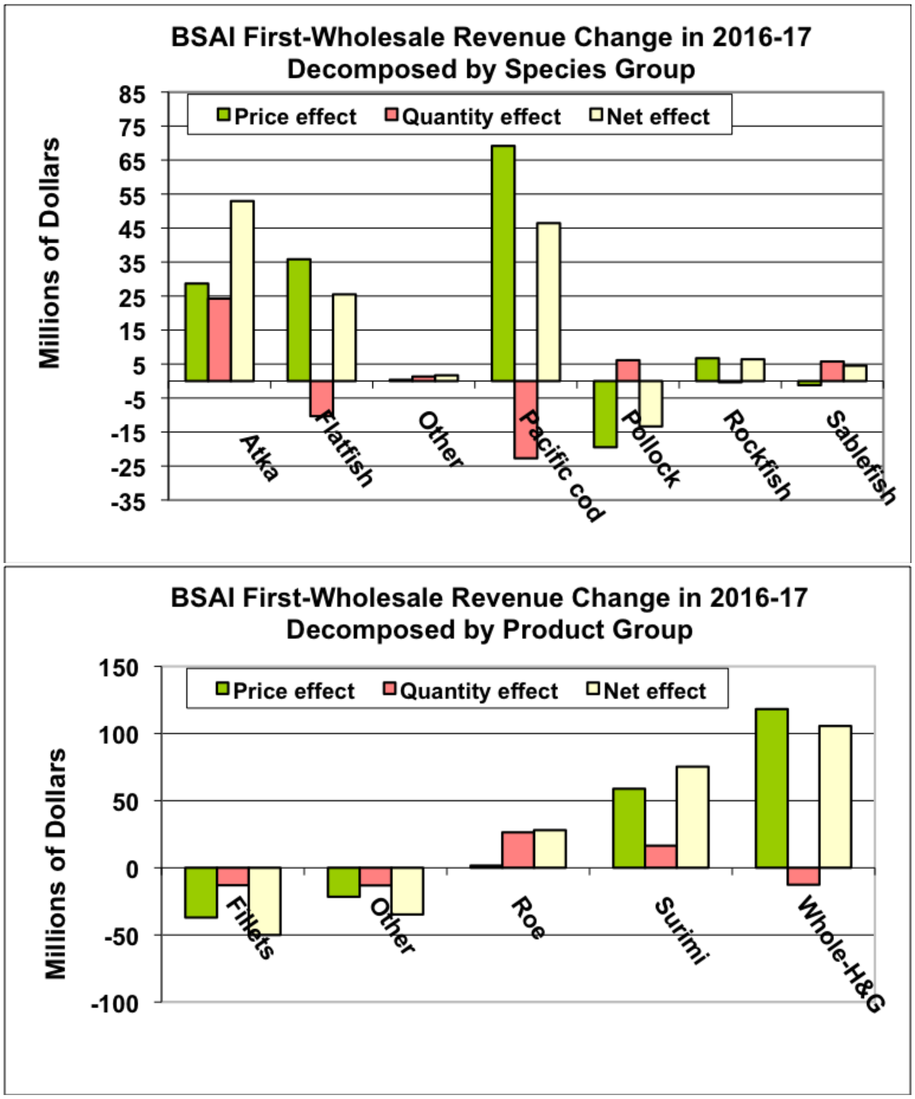

Figure 1.4: Decomposition of the change in first-wholesale revenues from 2016-17 in the BSAI area. **Notes:** The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due to the change in the first-wholesale price index (current dollars per metric ton) for each group. The quantity effect refers to the change in revenues due to the change in production (in metric tons) for each group. The net effect is the sum of price and quantity effects. Year-to-year changes in the total quantity of first-wholesale groundfish products include changes in total catch and the mix of product types (e.g., fillet vs. surimi).

have been impacted by changes in quantity or prices of each species and product group. These values are not adjusted for inflation, so enable a simple comparison of how changes in the price and quantity for each group combine to produce revenues.

By BSAI species group, negative price effects and smaller positive quantity effects resulted in a negative net effect of about $13 million for pollock. For Pacific cod, a large positive price effect combined with a smaller negative quantity effect, resulting in a $46 million net increase in first-wholesale revenues for Pacific cod from the BSAI for 2016-17 (Figure 1.4). There was a positive price effect and small negative quantity effect for rockfish, resulting in a net positive effect of $7 million. Atka mackerel had a positive price effect of $29 million and a positive quantity effect of $24 million, combining for a net positive effect of $53 million. Sablefish had a negative price effect of $1 million and a positive quantity effect of $6 million, combining for a net positive effect of $5 million. ”Other” experienced a net revenue increase of $2 million.

By product group, large negative price effects coupled with smaller negative quantity effects in the fillets category resulted in a negative net effect of $50 million in the BSAI first-wholesale revenue decomposition for 2016-17. For surimi, large positive price effects coupled with smaller positive quantity effects resulted in a large positive net effect of $75 million. For roe, small positive price effects coupled with larger positive quantity effects to result in a positive net effect of $28 million. For whole fish and head & gut, a large positive price effect combined with a much smaller negative quantity effect to produce a net positive effect of $124 million while for ‘other’ products a negative price effect combined with a negative quantity effect for a net negative effect of $35 million.

In summary, the changes in first-wholesale revenues from the BSAI groundfish fisheries increased from 2016-17 due in large part to positive price effects for flatfish and pollock, and positive quantity effects for Pacific cod. In comparison, first-wholesale revenues decreased from 2016-17 in the GOA. The main drivers of this GOA decline was a negative net revenue effect for pollock and Pacific cod being offset by positive net effects for sablefish and flatfish.

Summary of the ex-vessel and first wholesale changes in Gulf of Alaska revenues

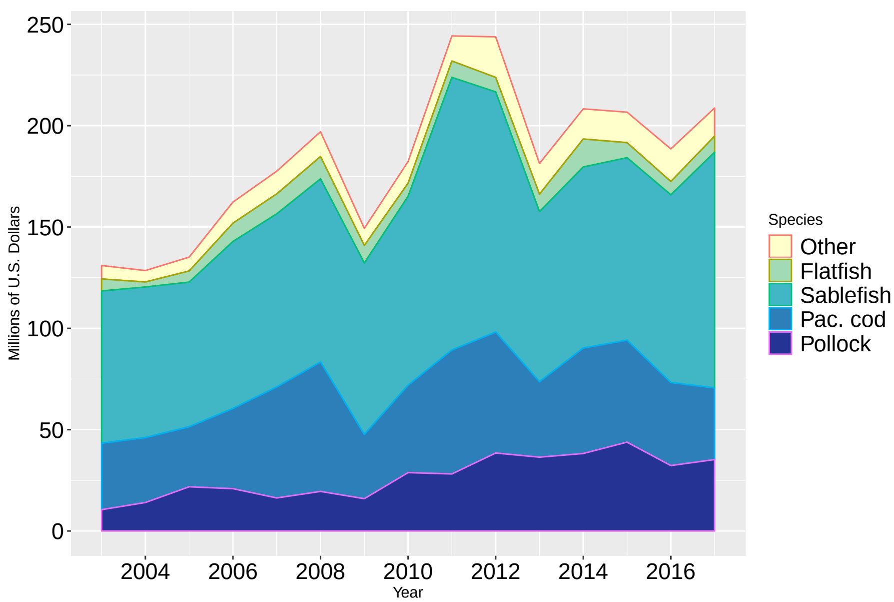

Figure 1.5: Real ex-vessel value of the groundfish catch in the domestic commercial fisheries in the GOA area by species, 2003-2017 (base year = 2017).

The following brief analysis summarizes the overall changes that occurred between 2016-17 in the quantity produced and revenue generated from GOA groundfish. According to data reported in the 2018 Economic SAFE report, the ex-vessel value of GOA groundfish increased from $192 million in 2016 to $209 million in 2017 (Figure 1.5), and first-wholesale revenues from the processing and production of groundfish in the Gulf of Alaska (GOA) were relatively flat between 2016 ($368 million) and 2017 ($367 million) (Figure 1.6). At the same time, the total quantity of groundfish products from the GOA slightly increased from 135 thousand metric tons to 137 thousand metric tons, a 1% increase. The changes in first-wholesale revenues from processing and production in the

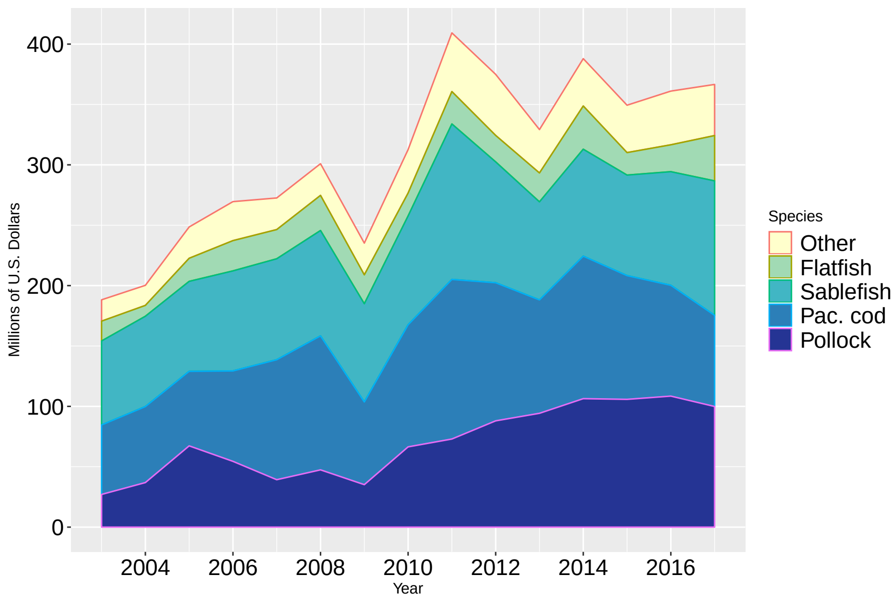

Figure 1.6: Real gross product value of the groundfish catch in the GOA area by species, 2003-2017 (base year = 2017).

GOA differ from those in the BSAI, which saw a 2% year-to-year increase in groundfish products and 4% decrease in first-wholesale value.

By species group, negative quantity effects were only slightly offset by small positive price effects for Pacific cod, resulting in a $16 million net decrease in first-wholesale revenues from the GOA for 2016-17 (Figure 1.7). Further, negative price effects and a small positive quantity effect resulted in a $9 million negative net effect for pollock. The Pacific cod and pollock net effects were countered by positive price and quantity effects for sablefish and flatfish resulting in positive net effects of $17 million and $15 million, respectively. For rockfish, negative price and positive quantity effects mostly canceled each other out, resulting in a small negative net effect of less than $1 million.

By product group, a very large positive price effect coupled with a small positive quantity effect in the whole and head and gut (whole-H&G) category resulted in a positive net effect of $35 million in the GOA first-wholesale revenue decomposition for 2016-17, while negative price and quantity effects in the fillets and surimi categories resulted in a negative net effect of $30 million combined.

In summary, first-wholesale revenues from the GOA groundfish fisheries increased by about $6 million from 2016-17. The main drivers of this was a positive net revenue effect for sablefish and flatfish being offset by negative net effects for Pacific cod and pollock. In comparison, first-wholesale revenues increased by $124 million from 2016-17 in the BSAI due in large part to positive price and quantity effects for Atka mackerel and a strong positive price effect for Pacific cod.

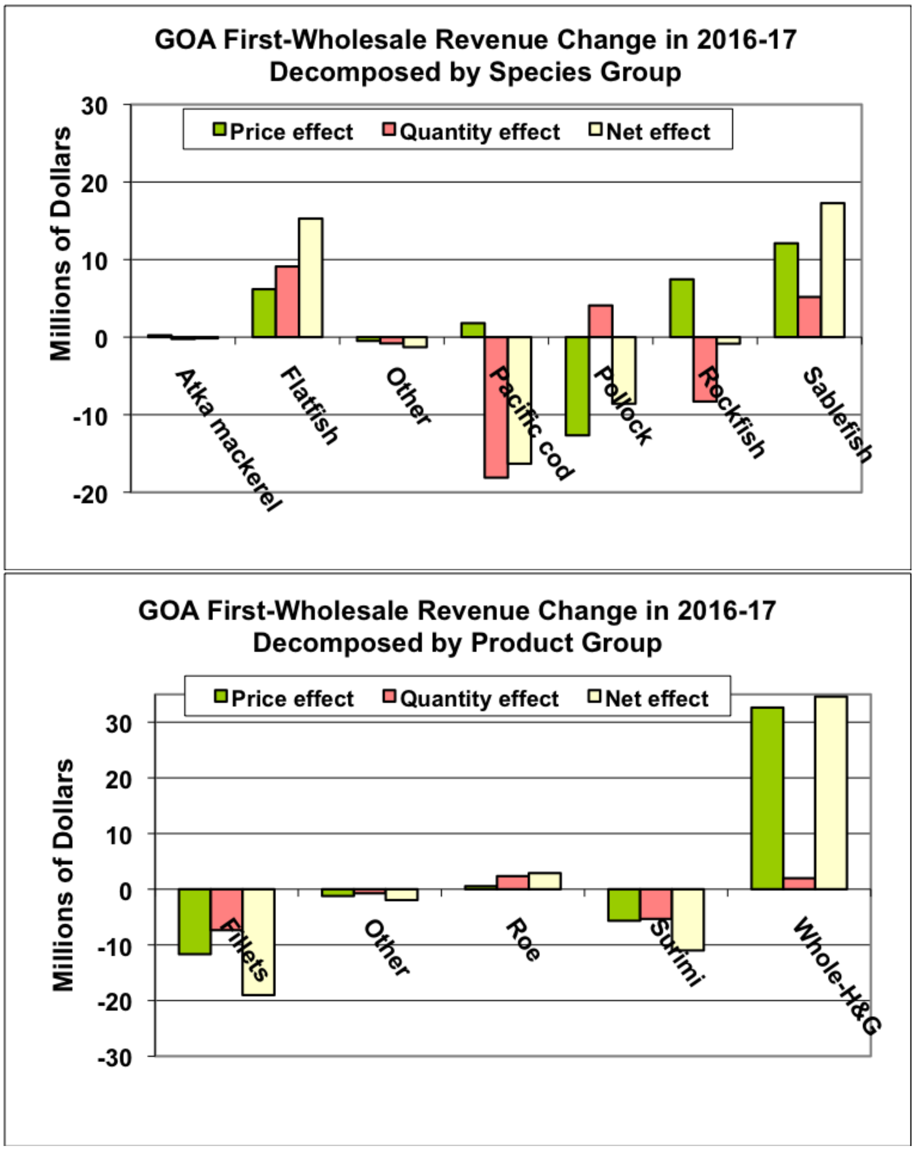

Figure 1.7: Decomposition of the change in first-wholesale revenues from 2016-17 in the GOA area. **Notes:** The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due to the change in the first-wholesale price index (current dollars per metric ton) for each group. The quantity effect refers to the change in revenues due to the change in production (in metric tons) for each group. The net effect is the sum of price and quantity effects. Year-to-year changes in the total quantity of first-wholesale groundfish products include changes in total catch and the mix of product types (e.g., fillet vs. surimi).

2. OVERVIEW OF ECONOMIC STATUS REPORT, 2017

2.1. Introduction

This report presents the economic status of groundfish fisheries off Alaska in terms of economic activity and outputs using estimates of catch, discards, prohibited-species catch (PSC), ex-vessel prices and value (i.e., revenue), effort (as measured by the size and level of activity of the groundfish fleet), and the first wholesale production volume and gross value of (i.e., F.O.B. Alaska revenue from) processed products.[1] The catch, ex-vessel value, fleet size and activity data reported here reflect the fishing industry activities that are accounted for in the groundfish landings and production reports, North Pacific groundfish and halibut observer data, and the State of Alaska Commercial Operator's Annual Reports. Catch data in this report are sourced from the NMFS Alaska Regional Office (AKRO) catch-accounting system (CAS), which is used for in-season monitoring groundfish and PSC quotas. The data descriptions, qualifications, and limitations noted in this overview of the fisheries and the footnotes to the tables are critical to understanding the information in this report. This report updates last year's report (Fissel *et al.* 2017) and is intended to serve as a reference document for those involved in making decisions with respect to conservation, management, and use of Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI) groundfish fishery resources.

In addition to catch that is counted against a federal Total Allowable Catch (TAC) quota (i.e., managed under a federal Fishery Management Plan (FMP)), estimates provided in some of the following tables may include catch from other Alaska groundfish fisheries (as indicated by the footnotes). The distinction between catch managed under a federal FMP and catch managed by the State of Alaska is not merely a geographical distinction between catch occurring in the U.S. Exclusive Economic Zone (EEZ) and catch occurring in Alaska state waters (3-mile limit). The State of Alaska maintains authority over some rockfish fisheries in the EEZ of the GOA, for example, and parallel fisheries occurring within state waters are managed under federal FMPs. It is not always possible, depending on the data source(s) from which a particular estimate is derived, to definitively identify a unit of catch, or associated units of measure, such as revenue or price, as being part of a federal FMP or otherwise. Users are encouraged to consult table footnotes for clarification on coverage in individual tables with respect to federally-managed and state-managed catch. Additionally, unless explicitly indicated, phrases such as "groundfish fisheries off Alaska" or "Alaska groundfish", as used in this report, should not be construed to precisely include or exclude any category of state or federally managed fishery or to refer to any specific geographic area. These and similar phrases may describe groundfish from both Alaska state waters and the federal EEZ off Alaska, groundfish managed only under federal FMPs, or managed under the authority of both NMFS and the state of Alaska.

The BSAI and GOA groundfish fisheries are widely considered to be among the best managed fisheries in the world. These fisheries produce high levels of catch, ex-vessel revenue, processed product revenue, exports, employment, and other measures of economic activity while maintaining ecological sustainability of the fish stocks. However, the data required to estimate the success of these policies with respect to net benefits to either the participants in these fisheries or the Nation, such

[1] F.O.B. refers to the value (or price) excluding transportation costs. The acronym, F.O.B. stands for "Free On Board".

as cost or quota value data (where applicable), are not available for many of the fisheries. Fishery economists began discussing the potential for rent dissipation in fisheries managed with open-access catch policies long ago (Scott 1954, Gordon 1955). The North Pacific region has gradually moved away from such management, as discussed by Holland (2000), and instituted catch share programs in many of its fisheries. Six of the sixteen catch-share programs currently in operation throughout the U.S. operate in the North Pacific, accounting for approximately 75% of Alaska's groundfish landings. By allocating the catch to individuals, cooperatives, communities, or other entities, catch share programs are intended to promote sustainability and increase economic benefits. Research on North Pacific fisheries has examined some of these issues after program implementation (e.g., Feltlhoven 2002, Homans and Wilen 2005, Wilen and Richardson 2008, Abbott et al. 2010, Fell and Haynie 2011, Torres and Felthoven 2014, Abbott et al. 2015).

There is considerable uncertainty concerning the future conditions of stocks, the resulting quotas, and potential changes to the fishery management regimes for the BSAI and GOA groundfish fisheries. The management tools used to allocate the catch between various user groups can significantly affect the economic health of the fishery as a whole or segments of the fishery. Changes in fishery management measures are expected to result from continued concerns with: 1) the catch of prohibited species; 2) the discard and utilization of groundfish catch; 3) the effects of the groundfish fisheries on marine mammals and sea birds; 4) other effects of the groundfish fisheries on the ecosystem and habitat; 5) the allocations of groundfish quotas among user groups; 6) maintaining sustainable fisheries and fishing communities that allow for new entrants into the fisheries; and 7) the response of the fisheries and ecosystem to climatic trends.

The remainder of this report is structured as follows: Section 2.2 gives a verbal description and important information for understanding the economic data tables in Section 4. Section 5 examines the economic performance of the North Pacific groundfish fisheries through market indices.

2.2. Description of the Economic Data Tables

2.2.1 Groundfish and Prohibited Species Catch Data Description

Data Sources

Total catch estimates in the groundfish fisheries off Alaska are generated by NMFS from data collected through an extensive fishery observer program and from information provided through required industry reports of harvest and at-sea discards. The North Pacific Observer Program (Observer Program), based at the NMFS Alaska Fisheries Science Center (AFSC), has had a vital role in the management of North Pacific groundfish fisheries since the lat 1980s. Observer data are collected by NMFS-trained observers and provide scientific information for managing the groundfish fisheries and minimizing bycatch. Industry-reported data consists of catch and processed product amounts that are electronically recorded and submitted to NMFS through the Interagency Electronic Reporting System, known as eLandings. Observer information and industry reports are integrated into a NMFS application called the Alaska Catch Accounting System (CAS), which is used directly in managing fisheries.

The primary purpose of the CAS is to provide estimates of total catch for FMP species (including prohibited species) in the groundfish and halibut fisheries and allow the in-season monitoring of catch against the TACs and PSC limits. The harvest of groundfish in Federal waters are governed under fishery management plans (FMPs) that are specific to the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) regions. The groundfish TACs are established and monitored in terms of total catch, which is the sum of retained and discarded catch. In addition, the FMPs describe policy for setting bycatch limits for some species, such as halibut and salmon, whose retention is prohibited in the groundfish fisheries; bycatch of these species is referred to as Prohibited Species Catch (PSC).

In the CAS, at-sea sample and census data collected by observers are used to create discard and PSC rates (a ratio of the estimated discarded catch to the estimated total catch in sampled hauls). For trips that are unobserved, the discard and PSC rates are applied to industry-supplied landings of retained catch. Expanding on the observer data that are available, the extrapolation from observed vessels to unobserved vessels is based on varying levels of aggregated data. Data are matched based on processing sector (e.g., catcher/processor or catcher vessel), week, target fishery, gear, and federal reporting area. Further detail on the estimation procedure is available in Cahalan et al. (2014). With the exception of Pacific halibut PSC, all estimated at-sea discard is assumed to have 100% mortality. Halibut mortality rates are updated every three years based on the estimated condition of halibut sampled by observers (Williams 2012). These rates are applied to the total estimated halibut discards (for a gear type, FMP area (GOA or BSAI), fishery, and year).

Groundfish Catch Tables

The catch presented throughout these tables is total catch which includes retained and discarded catch. Catch data are sourced from the NMFS Alaska Region Office Catch Accounting System (CAS). Catch for all Alaska including state and federal catches is displayed in Table 1. Retained catch for just FMP-managed groundfish are provided in Table 3 presents catch data by area (BSAI and GOA), gear (trawl, hook and line–used in this report to include longlines and jigs–and pot gear), vessel type (catcher vessels and catcher/processor vessels), and species (complex). Tables 9 and 25 provide additional information for the BSAI and GOA, respectively, with aggregation of gear types and species specific catch data for flatfish and rockfish. Tables 10 and 26 provide estimates of total catch by species, gear, and target species for the BSAI and GOA, respectively. In general, the species or species group accounting for the largest proportion of retained catch on the trip or haul is considered the target species, with two exceptions. A target of pelagic pollock is assigned only if 95% or more of the total catch is pollock. In the BSAI, if flatfish species (flathead, rock, and yellowfin sole, and other flatfish) represent the largest amount of retained catch, then a target of yellowfin sole is assigned if this species represents at least 70% of the combined flatfish retained catch; otherwise, the flatfish species accounting for the greatest amount of retained flatfish catch is assigned as the target. Beginning in 2011, Kamchatka flounder was broken out from arrowtooth flounder in the BSAI. As such, the "other flatfish", and/or arrowtooth flounder target categories may not be directly comparable between 2011 and prior years in the historical catch data available online.

Groundfish Discards and Discard Rates

Discarded catch is the unretained catch of species that a vessel is legally able to target and retain. Discards are included in a vessel's total catch. Discards can occur for various reasons and in a variety of ways such as discarding of non-targets species, fish falling off of processing conveyor belts, dumping of large portions of nets before bringing them on-board the vessel, dumping fish from the decks, size sorting by crewmen, and quality-control. In each target fishery the discard rates can be high for non-target species. For the most common species (e.g. pollock and cod) retention requirements can reduce the amount of discards for these species. The discard rate is the percent of total catch of a species that is discarded. Details on discard estimation can be found in Cahalan *et al.* (2014). The discards in the groundfish fisheries have received significant management attention by NMFS, the Council, Congress, and the public at large. Table 5 presents CAS estimates of discarded groundfish catch and discard rates (calculated as the percent of total catch that is discarded) by gear, area, and species for years 2013-2017.

Prohibited-Species Catch

Prohibited-species catch (PSC) is the catch of species that a vessel is prohibited from targeting and retaining due to their economic value to users outside the FMP groundfish fisheries. These species include Pacific halibut, king and tanner crab (*Chionoecetes*, *Lithodes*, and *Paralithodes spp.*), Pacific salmon (*Oncorhynchus spp.*), and Pacific herring (*Clupea pallasi*). Monitoring and minimizing the amount PSC in the Alaska groundfish fisheries has historically been an issue that has received significant management attention. The retention of these species was prohibited first in the foreign groundfish fisheries to ensure that groundfish fishermen had no incentive to target these species. Estimates of PSC for 2013-2017 are summarized by area and gear in Table 6.

The at-sea observer program was developed for the foreign fleets and then extended to the domestic fishery. The observer program, managed by the Fisheries Monitoring and Analysis Division (FMA) of the Alaska Fisheries Science Center, resulted in fundamental changes in the nature of the PSC problem. First, by providing estimates of total groundfish catch and non-groundfish PSC by species, it reduced the concern that total fishing mortality was being vastly underestimated due to fish that were discarded at sea. Second, it made it possible to establish, monitor, and enforce the groundfish quotas in terms of total catch as opposed to only retained catch. Third, it made it possible to implement and enforce PSC quotas for the non-groundfish species that by regulation had to be discarded at sea. Finally, it provided extensive information that managers and the industry could use to assess methods to reduce PSC and PSC mortality. In summary, the observer program provided fishery managers with the information and tools necessary to prevent PSC from adversely affecting the stocks of the PSC species. An example of how this program is being used is the Bering Sea pollock fishery, which became completely observed in 2011. As a result, salmon PSC estimates in the Bering Sea are a census rather than a sample and since 2011, there has been a fixed "hard cap" in the fishery.[2] The information from the observer program helps identify the types of information and management measures that are required to reduce PSC to the extent practicable, as is required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

2.2.2 Ex-Vessel Prices and Value

The ex-vessel market is the transaction of catch delivered by vessels to processors. In general, ex-vessel prices are derived from Commercial Operator Annual Report (COAR) buying reports. Some catcher-vessels minimally processes (e.g., head-and-gut) the catch prior to delivery to the processor. The value of this on-board processing is discounted from the ex-vessel price so that it represents the round-weight (unprocessed) prices of the retained catch. Ex-vessel value is calculated by multiplying ex-vessel prices by retained catch. For the at-sea sector much of catch is both caught and processed for first-wholesale distribution by a single entity and as such a true "ex-vessel" market does not exist. For national accounting purposes the "ex-vessel" value of the at-sea sector

[2]These rules for salmon bycatch management were put in place through Amendment 91 to the BSAI FMP. For details see `https://www.federalregister.gov/documents/2010/08/30/2010-20618/fisheries-of-the-exclusive-economic-zone-off-alaska-chinook-salmon-bycatch-management-in-the-bering`

are calculated by applying COAR buying prices for the corresponding species (group), region, and gear-type of the retained catch. For a subset of fisheries that are prosecuted primarily by the at-sea catcher/processor fleet, and for which COAR buying data are sparse, we impute prices as a percentage (40%) of the estimated wholesale value per round weight. This percentage reflects the long-term average of the ratio ex-vessel prices to head-and-gut (H&G) processed-product prices for species (primarily Pacific cod) that are well represented in COAR buying and production reports. Ex-vessel prices and value include post-season adjustments.

Tables 3 contains data on the real ex-vessel catch of groundfish and non-groundfish species in Alaska, adjusted to 2017 dollars by applying the Personal Consumption Expenditure Index (`https://research.stlouisfed.org/fred2/series/PCEPI`) to account for effects of inflation on fishermen's revenue. Table 7 provides estimates of ex-vessel value by residency (Alaska compared to the rest of the U.S., labeled 'Other') of primary vessel owners, area, and species. Residency of primary vessel owners are determined from the CAS combined with State of Alaska groundfish fish ticket data and vessel registration data, the latter of which includes the stated residency of the primary vessel owner. Residents of Alaska and of other states, particularly Washington and Oregon, are active participants in the BSAI and GOA groundfish fisheries. For the BSAI and GOA combined, 73% of the 2017 ex-vessel value was accounted for by vessels with primary owners who indicated that they were not residents of Alaska.

Tables 11 and 27 contains estimated ex-vessel prices that are used with estimates of retained catch to calculate ex-vessel values (gross revenues) for the BSAI and GOA, respectively. Prices in these tables may include data from both federally-managed and state-managed fisheries. Estimates of ex-vessel value by area, gear, type of vessel, and species are presented in Tables 12 and 28 for the BSAI and GOA, respectively. Table 13 presents estimates of ex-vessel value of catch and value per vessel, vessel and permit counts, in the BSAI and the percent value of BSAI FMP groundfish and all BSAI fisheries by processor group. Table 13 provides these same data for the GOA.

2.2.3 First Wholesale Production, Prices and Value

The first wholesale market as the first sale of fisheries products after initial processing by a commercial processor with a Federal Processor Permit (FPP).[3] Groundfish first wholesale production data are sourced from at-sea and shoreside groundfish production reports. Product pricing and value reflect COAR product report price data appended to these production data per the AKFIN product pricing index. While groundfish production reports are a federal reporting requirement, there is typically no distinction made in this reporting between product derived from federally-managed catch and product derived from state-managed catch. Likewise, while COAR production reports include the area of processing, these data are insufficient for identifying the fishery inputs for units of finished production. As such, these tables reflect production volume and pricing from federal and some state-managed fisheries. Wholesale value and prices are given as F.O.B. (Free On Board) Alaska, indicating that transportation costs are not included in values and prices.

Table 4 reports estimates of the weight and first wholesale value of processed products from catch in the groundfish and non-groundfish commercial fisheries of Alaska. Estimates of first wholesale production weight of the processed products sourced from catch of groundfish are presented by species, product form, sector, and type of processor in Table 14 for the BSAI and Table 30 for

[3] An FPP is required for all processors receiving and/or processing groundfish harvested in Federal waters.

the GOA. First-wholesale value (gross revenue) is presented in Tables 15 and 31 for the BSAI and GOA, respectively. Product price-per-pound estimates are presented in Tables 16 and 32, and estimates of total first wholesale product value per round metric ton of retained catch are reported in Table 17 and for the BSAI and GOA, respectively. For these tables we source the round weight of retained catch from CAS data rather than using product recovery rates to derive round weights from production data.

Tables 18 and 34 present number of processors, gross product value and value per processor, and percent value of BSAI FMP groundfish of processed groundfish by processing fleet for the BSAI and GOA, respectively. Data in these tables are summarized from COAR product reporting, and no distinction is made between state-managed and federally-managed groundfish sources of production.

2.2.4 Effort (Fleet Size, Weeks of Fishing, Crew Weeks)

Data on measures of fishing capacity and effort in federally-managed Alaska groundfish fisheries, including fleet size, duration of fishing, and levels of harvesting and processing employment are sourced from catch accounting data, ADF&G groundfish fish tickets, North Pacific groundfish observer data, and at-sea groundfish production reports.

The numbers of vessels that landed groundfish are depicted in Fig. 3.6 by gear type. Vessel participation by area, vessel type, and target are shown in Tables 8. Number of vessels, average and median length, and average and median capacity (registered net tonnage) of vessels by vessel type, and gear are shown in Tables 19 and 35.

Tables 21 and 37 provide estimates of vessel weeks for catcher vessels in the BSAI and GOA, respectively, stratified by length class, area, gear, and target fishery. Tables 22 and 38 provide the same stratification of vessel weeks for catcher/processors in the BSAI and GOA, respectively. Vessel weeks are apportioned by catch volume in cases where a vessel is identified with activity in multiple gears, areas, and/or targets in a given week.

Catcher vessel crew weeks are sourced from ADF&G fish tickets/eLandings, which include data on the number of licensed crew working aboard vessels by month and area shown in Tables 23 and 39, in the BSAI and GOA, respectively. At-sea production reports provide these information for motherships and catcher/processors shown in Tables 24 and 40 for the BSAI and GOA, respectively. A single crew week represents one crew member aboard one vessel for a week. Crew weeks are apportioned by catch volume in cases where a vessel is identified with activity in multiple areas in a given week. These data do not include employment levels in the shoreside and inshore processing sectors. Future versions of this report may include reporting of harvest crew employment in the catcher vessel sector, data which are now collected in groundfish landing reports.

2.2.5 Economic Data Tables for the Commercial Pacific Halibut Fishery

Pacific halibut fisheries in Alaska is managed jointly by the NMFS, the NPFMC, the state of Alaska and the International Pacific Halibut Commission (IPHC). The IPHC was established through a Convention between the United States and Canada to research the biology of Pacific halibut and conduct stock assessments which are used to establish catch levels in each country.[4] Under the

[4] `www.iphc.int/home.html`.

authority of NMFS, the NPFMC allocates the halibut resource among the user groups (commercial, recreational, and subsistence fisheries) and sets bycatch limits for fisheries with incidental halibut catch, while NMFS enforces U.S. regulations. The state of Alaska permits fishermen and assists in monitoring and reporting, particularly of recreational and subsistence harvests.[5] Since 1995 the commercial halibut fisheries off Alaska have been managed as a catch share fishery through the Individual Fisheries Quota (IFQ) program and the Community Development Quota (CDQ) program.

Prior to 2014 this report included only limited data on halibut because it is not an FMP managed species and the Alaska Fisheries Science Center does not conduct the Pacific halibut stock assessment. Beginning in 2014, economic data tables for Pacific halibut are included in this report to provide management and the public a consolidated source for economic information of fisheries activity for species harvested in the federal waters off Alaska. Economic data tables in Section 4 for Pacific halibut are provided separate from the FMP managed groundfish because of its unique management status. Moreover, halibut management units (e.g., areas) do not match the definitions used for FMP Groundfish making it infeasible to append halibut data directly to the economic data tables for the FMP groundfish.

The economic data in Tables H1-H10 are only for the commercial fishing sector. Tables H1-H2 display Pacific halibut commercial landings (net weight retained catch). Table H3 displays prohibited species catch (of non-halibut species) on commercial trips where was the halibut target species. Ex-vessel value and price are displayed by various management areas, vessel length and ports in Tables H4A-H6. First-wholesale production, value and prices by product type is displayed in Table H7. Fishing effort as measured by: vessel counts are displayed in Tables H8; days fishing are displayed in Table H9; crew weeks are displayed in Table H10.

2.2.6 Description of the Category "Other" in Data Tables

- TABLE 4: "Other" includes lingcod, non-crab shellfish (mussel, clam, scallop, shrimp), and various freshwater and anadromous finfish species other than federally managed groundfish, salmon, halibut, and herring (e.g., whitefish, trout, Arctic char).
- TABLE 10, 26: "Other flatfish" in the BSAI include Alaska Plaice and species within the BSAI other flatfish management complex, including starry flounder and dover, rex, butter, English, petrale, and sand sole.
- TABLE 6: "Other salmon" are non-Chinook salmon species (sockeye, coho, pink, chum). "Other King crab" are blue, golden (brown), and scarlet king crab species. "Other Tanner crab" are snow, grooved, and triangle Tanner crab species.
- TABLE 14, 15, 16, 30, 31, 32: "Other fillets" for pollock include fillets with skin and ribs; fillets with skin, no ribs; fillets with ribs, no skin; and skinless/boneless fillets. "Flat Other" includes BSAI Alaska Plaice and species within the BSAI other flatfish management complex (starry flounder and dover, rex, butter, english, petrale, and sand sole).
- TABLE 17, 33: "Other" species are primarily skate, squid, octopus, shark, and sculpin.

[5] http://www.adfg.alaska.gov/index.cfm?adfg=halibut.management.

2.2.7 Additional Notes

- Confidential values are excluded from the computation of aggregates (e.g. sums and averages) within a table. This is particularly important to remember for highly stratified tables, such as Tables 11, 12 14, 14, 16, 27, 28 30, 30, and 32. Care should be taken when comparing totals from tables containing values suppressed for confidentiality. In general, preference should be given to aggregate numbers from less stratified tables.

- Within the data tables, numbers that are smaller than the level of precision used within the table are printed as '0'. For example, if a table uses the one decimal place level of precision, then an actual value of '0.01' is presented in the table as '0'.

- The Personal Consumption Expenditures: chain-type price index `https://research.stlouisfed.org/fred2/series/PCEPI` was used to deflate the ex-vessel estimates reported in Tables 3. The PCE is used to adjust to fishermen's ex-vessel revenues to account for the change in general US consumption expenditures. The GDP: chain-type price index `https://research.stlouisfed.org/fred2/series/GDPCTPI` was used to deflate the first wholesale value estimates reported in Tables 4. The GDP price index is used to adjust to fishermen's wholesale production revenues to account for the change in general US production prices. The use of these indices began in 2014. Before 2014 this annual report used the Producer Price Index (PPI) for unprocessed and packaged fish was used for real adjustments (`http://data.bls.gov/cgi-bin/srgate`, using the series ID 'WPU0223').

- Estimates of U.S. imports and per-capita consumption of various fisheries products, previously published in Tables 54-56 of this report, are available in Fisheries of the United States (FUS), published annually by the NMFS Office of Science & Technology. The 2017 FUS is available at: `https://www.st.nmfs.noaa.gov/commercial-fisheries/fus/index`.

- Annual and monthly U.S. economic indicators (producer and consumer price indices), published in past years in Tables 57 and 58 are available from the U.S. Department of Labor Statistics at: `http://www.bls.gov/data/sa.htm`.

- Foreign exchange rates, which we've previously published in Tables 59 and 60, are available from the U.S. Federal Reserve Board (for all currencies except the Icelandic kronur) at: `www.federalreserve.gov`. Exchange rates for Iceland's kronur are available at: `www.oanda.com`.

- Observer coverage costs: In previous years, Table 51 provided estimates of the numbers of vessels and plants with observers, the numbers of observer-deployment days, and observer costs by year and type of operation. In 2013, the restructured observer program was implemented and more detailed treatment of observer cost estimates can be found in the Observer Annual Report at: `http://alaskafisheries.noaa.gov/fisheries/observer-program-reports`.

2.3. Request for Feedback

The data and estimates in this report are intended both to provide information that can be used to describe the Alaska groundfish fisheries and to provide the industry and others an opportunity to comment on the validity of these estimates. We hope that the industry and others will identify any data or estimates in this report that can be improved and provide the information and methods necessary to improve them for both past and future years. There are two reasons why it is important that such improvements be made. First, with better estimates, the report will be more successful in monitoring the economic performance of the fisheries and in identifying changes in economic performance that may be attributable to regulatory actions. Second, the estimates in this report often will be used as the basis for estimating the effects of proposed fishery management actions. Therefore, improved estimates in this report will allow more informed decisions by those involved in managing and conducting the Alaska groundfish fisheries. The industry and other stakeholders in these fisheries can further improve the usefulness of this report by suggesting other measures of economic performance that should be included in the report, or other ways of summarizing the data that are the basis for this report, and participating in voluntary survey efforts NMFS may undertake in the future to improve existing data shortages. Please contact Ben Fissel at `Ben.Fissel@noaa.gov` with any comments or suggestions to improve the Economic SAFEs.

2.4. Citations

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2.5. Acknowledgements

ESSRP wishes to thank the Alaska Fisheries Information Network (AKFIN) for database programming and data management services to support production of the Economic SAFE. Other parties who provided assistance or feedback in the assembly of this report or earlier versions include: Terry Hiatt, Ren Narita, Camille Kohler, Mike Fey (AKFIN); Jennifer Mondragon (NMFS Alaska Region Office, Sustainable Fisheries Division), Mary Furuness (NMFS Alaska Region Office, Sustainable Fisheries Division).

3. FIGURES REPORTING ECONOMIC DATA OF THE GROUNDFISH FISHERIES OFF ALASKA

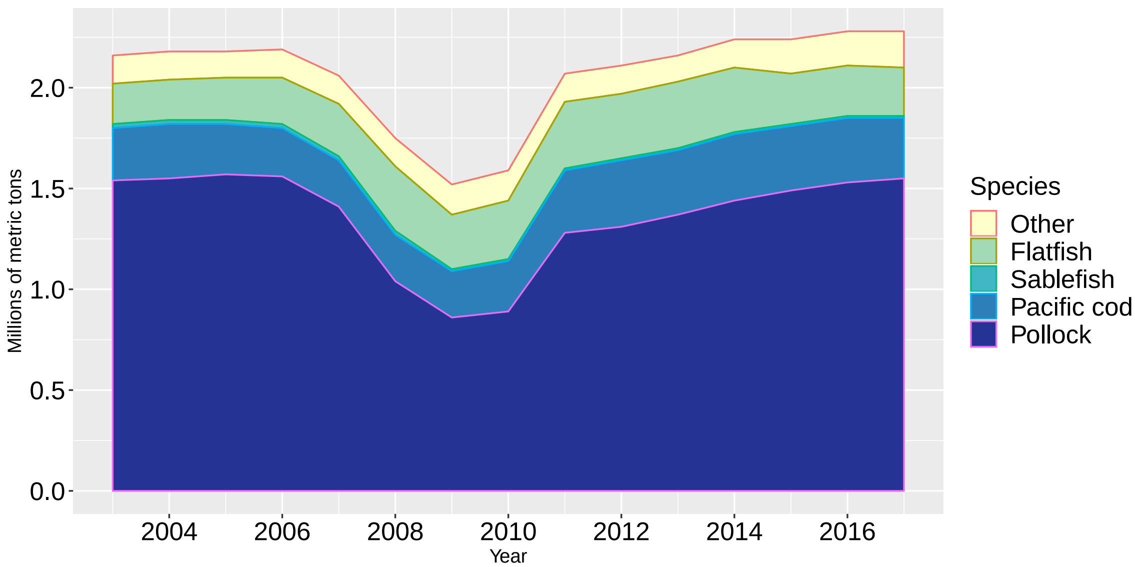

Figure 3.1: Groundfish catch in the commercial fisheries off Alaska by species, 2003-2017.

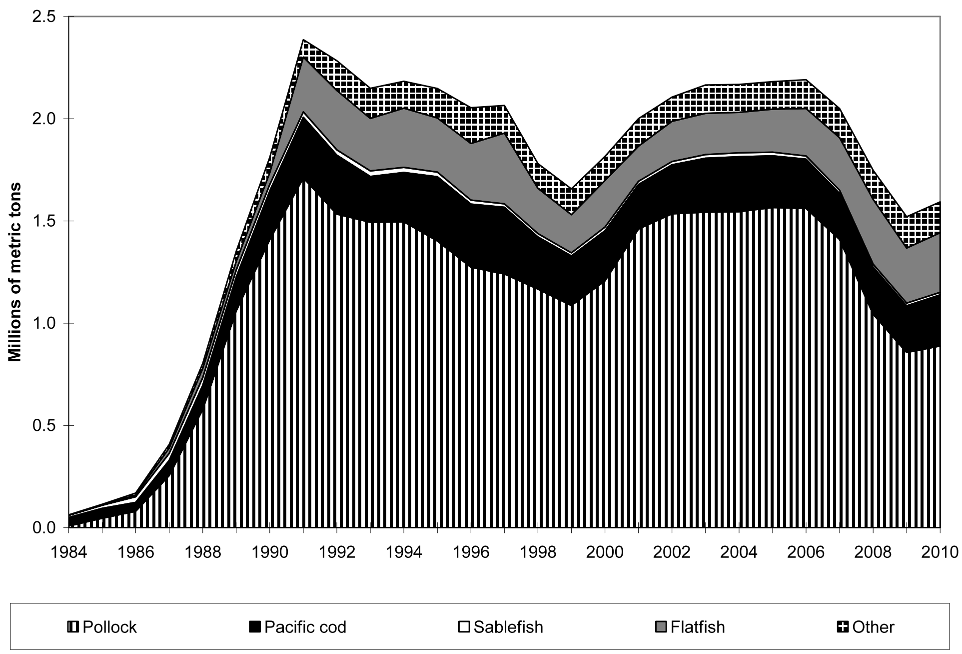

Figure 3.2: Groundfish catch in the commercial fisheries off Alaska by species, (1984-2010).
Notes: Catch for 2011 and onward are displayed in Figure 3.1.

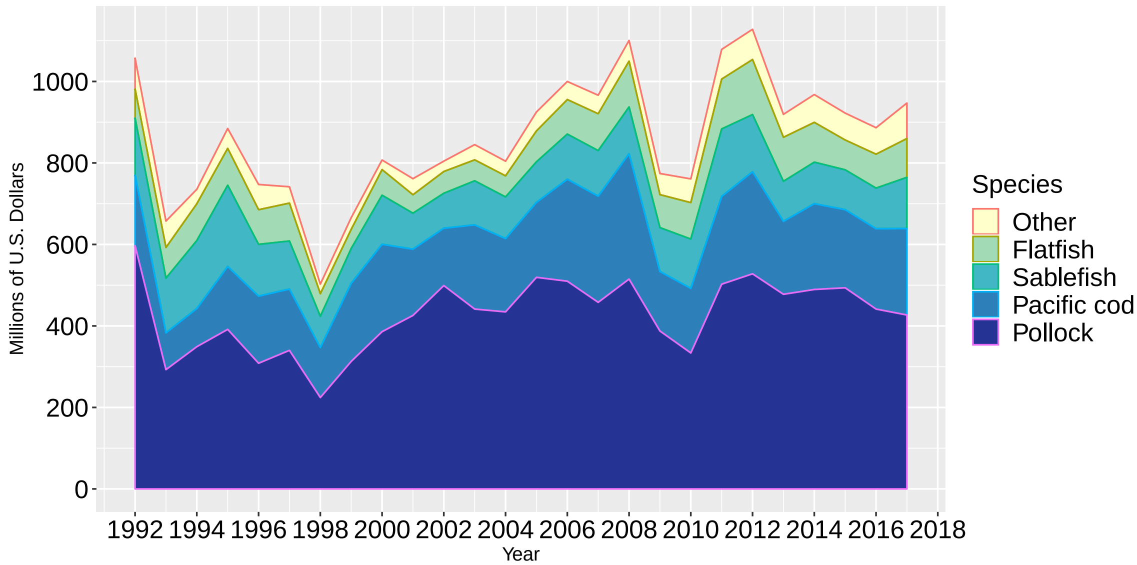

Figure 3.3: Real ex-vessel value of the groundfish catch in the commercial fisheries off Alaska by species, 1992-2017 (base year = 2017).

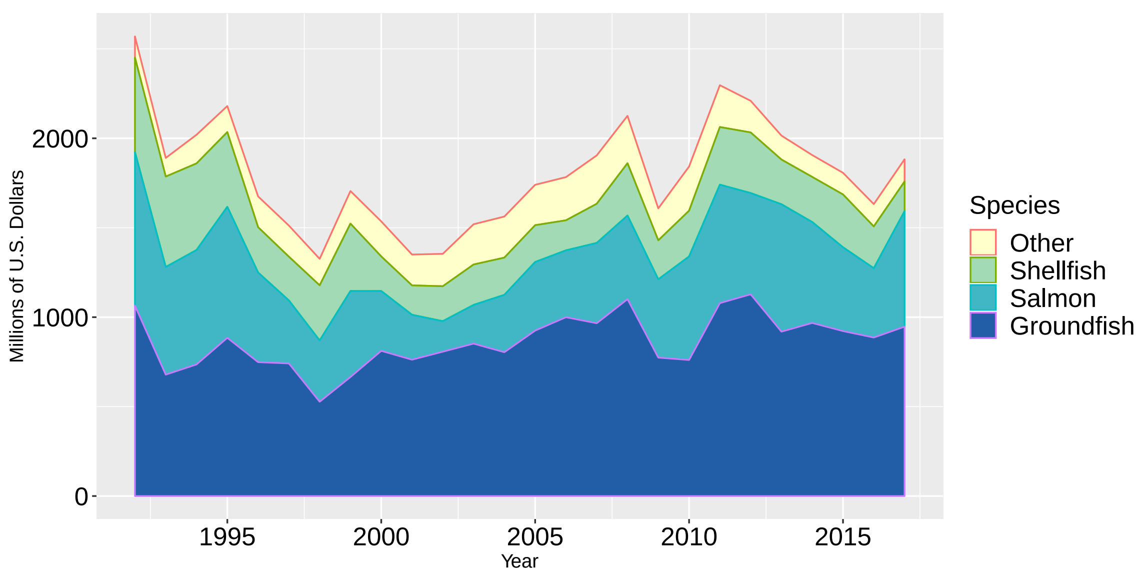

Figure 3.4: Real ex-vessel value of the domestic fish and shellfish catch off Alaska by species group, 1992-2017 (base year = 2017).

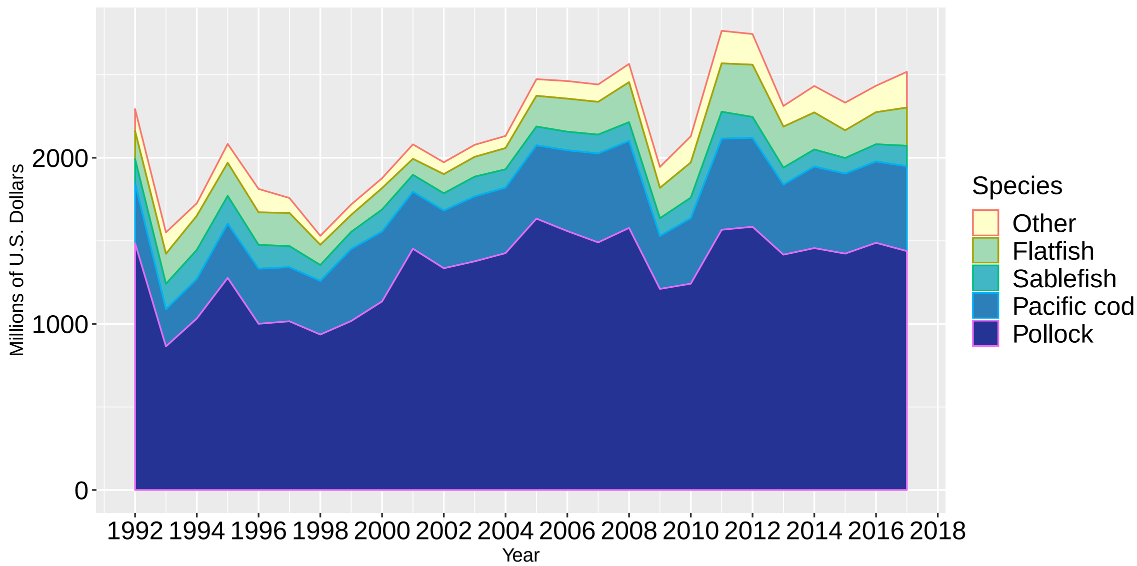

Figure 3.5: Real gross product value of the groundfish catch off Alaska by species, 1992-2017 (base year = 2017).

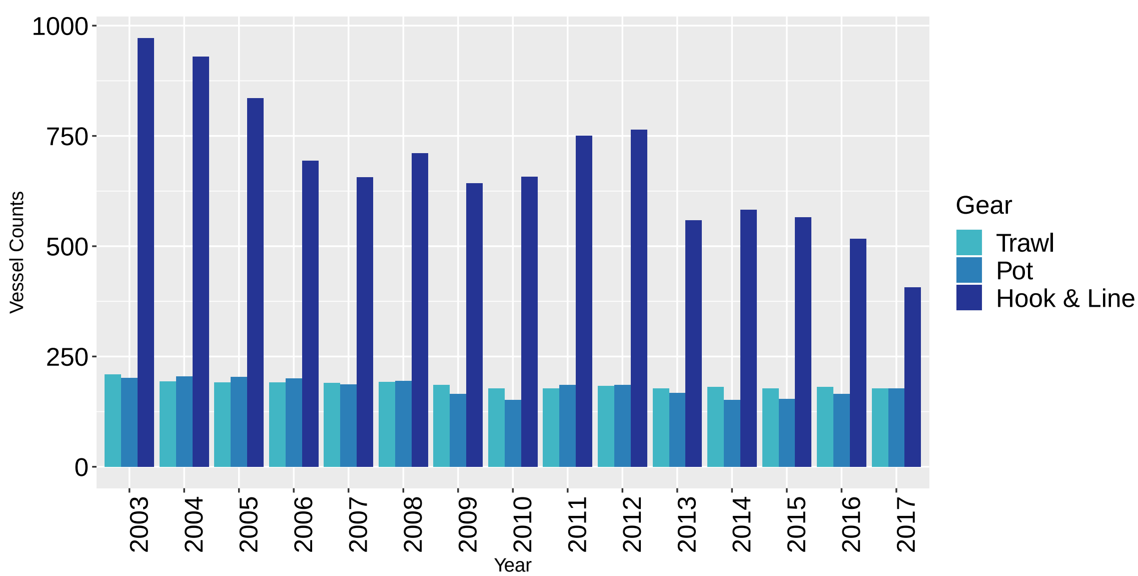

Figure 3.6: Number of vessels in the domestic fishery off Alaska by gear type, 2003-2017.

4. TABLES REPORTING ECONOMIC DATA OF THE GROUNDFISH FISHERIES OFF ALASKA

Table 1: Groundfish catch in the commercial fisheries off Alaska by area and species, 2008-2017 (1,000 metric tons, round weight).

	Year	Pollock	Sablefish	Pacific Cod	Flatfish	Rockfish	Atka Mackerel	Total
Bering Sea and Aleutian Islands	2008	991.9	2.0	171.0	270.0	21.7	58.1	1,545.7
	2009	812.5	2.0	175.8	226.3	19.5	72.8	1,337.1
	2010	811.7	1.8	171.9	253.3	23.5	68.6	1,354.6
	2011	1,200.4	1.7	220.1	285.9	28.2	51.8	1,818.4
	2012	1,206.3	1.9	251.0	291.2	28.1	47.8	1,857.9
	2013	1,273.8	1.7	250.3	297.2	34.9	23.2	1,914.6
	2014	1,300.2	1.1	249.3	276.1	36.1	31.0	1,928.5
	2015	1,323.2	0.6	242.1	219.2	39.6	53.3	1,914.2
	2016	1,354.9	0.9	260.9	225.2	36.9	54.5	1,969.3
	2017	1,361.0	1.7	253.1	211.1	38.4	64.4	1,969.4
Gulf of Alaska	2008	52.6	13.6	59.0	45.7	23.1	2.1	202.6
	2009	44.2	12.0	53.2	42.3	22.8	2.2	185.6
	2010	76.7	11.0	78.3	37.6	25.5	2.4	238.8
	2011	81.5	12.1	85.4	41.0	23.1	1.6	252.1
	2012	104.0	12.7	77.9	29.4	27.4	1.2	258.7
	2013	96.4	12.8	68.6	33.9	24.9	1.3	250.1
	2014	142.6	11.1	84.8	47.6	28.9	1.0	326.3
	2015	167.6	11.1	79.5	26.7	29.0	1.2	324.6
	2016	177.1	10.0	64.1	28.1	34.0	1.1	324.3
	2017	186.2	11.3	48.7	33.3	31.8	1.1	321.1
All Alaska	2008	1,044.4	15.7	230.0	315.7	44.8	60.2	1,748.3
	2009	856.8	14.0	229.0	268.6	42.3	75.0	1,522.7
	2010	888.4	12.8	250.2	290.9	49.0	71.1	1,593.3
	2011	1,281.9	13.8	305.5	327.0	51.3	53.4	2,070.5
	2012	1,310.2	14.7	328.9	320.6	55.5	49.0	2,116.6
	2013	1,370.2	14.5	318.9	331.0	59.9	24.5	2,164.7
	2014	1,442.9	12.3	334.2	323.6	64.9	32.0	2,254.8
	2015	1,490.8	11.7	321.5	245.9	68.7	54.5	2,238.8
	2016	1,532.1	10.9	325.0	253.3	70.9	55.6	2,293.7
	2017	1,547.1	13.0	301.8	244.4	70.2	65.5	2,290.5

Notes: The estimates are of total catch (i.e., retained and discarded catch). These estimates include catch from both federal and state of Alaska fisheries.

Source: NMFS Office of Science and Technology, Fisheries Statistics Division, Fisheries of the United States. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 2: Groundfish retained catch off Alaska by area, sector, and species, 2013-2017 (1,000 metric tons, round weight).

		Bering Sea and Aleutian Islands			Gulf of Alaska			All Alaska		
	Year	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total
Pollock	2013	660.83	606.22	1,267.05	92.76	1.04	93.80	753.59	607.25	1,360.85
	2014	668.49	616.20	1,284.69	139.45	1.52	140.97	807.94	617.72	1,425.66
	2015	687.14	626.45	1,313.59	165.08	1.08	166.16	852.22	627.53	1,479.75
	2016	703.95	641.77	1,345.71	175.49	0.57	176.06	879.44	642.33	1,521.77
	2017	710.38	642.24	1,352.62	183.26	1.07	184.33	893.64	643.31	1,536.95
Sablefish	2013	1.01	0.65	1.65	10.95	1.08	12.03	11.96	1.73	13.68
	2014	0.84	0.25	1.09	9.55	0.96	10.51	10.39	1.21	11.61
	2015	0.48	0.14	0.62	9.23	0.94	10.17	9.71	1.08	10.79
	2016	0.40	0.39	0.79	8.28	0.78	9.06	8.68	1.17	9.85
	2017	0.69	0.76	1.45	9.05	1.02	10.08	9.74	1.79	11.52
Pacific Cod	2013	71.12	172.39	243.51	59.05	4.73	63.78	130.17	177.12	307.30
	2014	79.00	165.39	244.38	72.27	7.15	79.43	151.27	172.54	323.81
	2015	68.34	170.58	238.92	71.06	6.36	77.41	139.40	176.93	316.33
	2016	85.95	171.64	257.59	57.87	5.20	63.08	143.82	176.84	320.66
	2017	87.74	162.10	249.84	41.84	6.10	47.94	129.57	168.20	297.77
Flatfish	2013	2.47	255.93	258.40	17.45	8.53	25.99	19.92	264.46	284.39
	2014	3.23	247.78	251.00	17.71	22.89	40.60	20.93	270.67	291.60
	2015	11.79	195.96	207.74	11.05	10.51	21.56	22.84	206.47	229.31
	2016	14.63	196.76	211.39	17.71	5.85	23.56	32.34	202.61	234.95
	2017	21.13	177.44	198.58	14.50	14.79	29.29	35.64	192.23	227.87

Continued on next page.

Table 2: Continued

		Bering Sea and Aleutian Islands			Gulf of Alaska			All Alaska		
	Year	Catcher Vessels	Catcher Proces-sors	Total	Catcher Vessels	Catcher Proces-sors	Total	Catcher Vessels	Catcher Proces-sors	Total
Rockfish	2013	0.27	31.43	31.70	10.66	11.35	22.01	10.93	42.78	53.71
	2014	0.46	31.85	32.31	11.80	13.99	25.79	12.25	45.85	58.10
	2015	3.11	34.40	37.52	12.28	14.41	26.69	15.39	48.82	64.21
	2016	2.54	32.79	35.33	15.12	15.64	30.75	17.65	48.43	66.08
	2017	2.52	32.97	35.49	11.28	15.61	26.89	13.80	48.58	62.38
Atka Mackerel	2013	0.06	20.75	20.81	0	0.77	0.77	0.06	21.52	21.59
	2014	0.10	27.77	27.87	0.01	0.92	0.92	0.11	28.69	28.79
	2015	3.21	49.26	52.47	0.03	0.84	0.87	3.25	50.10	53.34
	2016	3.68	50.38	54.06	0.35	0.39	0.75	4.04	50.77	54.81
	2017	4.57	59.48	64.05	0.13	0.52	0.65	4.70	60.00	64.70
All Groundfish	2013	736.13	1,095.03	1,831.16	193.60	27.68	221.28	929.73	1,122.71	2,052.44
	2014	753.02	1,097.43	1,850.45	252.70	47.66	300.36	1,005.72	1,145.09	2,150.81
	2015	775.67	1,084.56	1,860.22	270.61	34.36	304.98	1,046.28	1,118.92	2,165.20
	2016	811.59	1,100.54	1,912.13	276.29	28.63	304.93	1,087.89	1,129.17	2,217.06
	2017	827.92	1,084.37	1,912.29	261.05	39.40	300.44	1,088.97	1,123.77	2,212.73

Notes: The estimates are of retained catch (i.e., excludes discarded catch). All groundfish include additional species categories. These estimates include only catch counted against federal TACs. Includes FMP groundfish catch on halibut targets. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 3: Catch and real ex-vessel value of the commercial fisheries off Alaska by species group and area, 2013-2017; calculations based on COAR (1,000 metric tons and $ millions, base year = 2017).

		Bering Sea and Aleutian Islands		Gulf of Alaska		All Alaska	
	Species.group	Quantity	Value	Quantity	Value	Quantity	Value
2013	Groundfish	1,851.3	$ 729.3	223.4	$ 190.1	2,074.6	$ 919.3
	Salmon	52.0	$ 173.6	406.2	$ 583.9	458.3	$ 757.5
	Halibut	1.8	$ 17.5	8.6	$ 100.3	10.4	$ 117.8
	Herring	27.8	$ 5.5	9.0	$ 11.6	36.8	$ 17.1
	Shellfish	39.2	$ 259.5	3.6	$ 33.0	42.8	$ 292.5
	Other	-	$ -	1.2	$ 7.8	1.2	$ 7.8
	All Species	1,972.1	$ 1,185.3	652.1	$ 926.6	2,624.2	$ 2,111.9
2014	Groundfish	1,864.4	$ 752.6	303.7	$ 215.2	2,168.1	$ 967.8
	Salmon	88.2	$ 253.0	219.4	$ 348.7	307.6	$ 601.7
	Halibut	1.3	$ 16.3	6.5	$ 92.5	7.9	$ 108.8
	Herring	24.7	$ 1.9	18.4	$ 9.8	43.1	$ 11.7
	Shellfish	36.5	$ 252.9	4.3	$ 35.8	40.8	$ 288.7
	Other	-	$ -	1.1	$ 5.8	1.1	$ 5.8
	All Species	2,015.1	$ 1,276.7	553.4	$ 707.9	2,568.6	$ 1,984.5
2015	Groundfish	1,860.3	$ 709.7	308.0	$ 212.7	2,168.4	$ 922.4
	Salmon	102.8	$ 146.7	368.1	$ 320.7	470.9	$ 467.4
	Halibut	1.4	$ 18.2	6.8	$ 97.1	8.2	$ 115.3
	Herring	21.3	$ 1.9	9.4	$ 5.2	30.7	$ 7.1
	Shellfish	41.6	$ 269.8	3.6	$ 25.4	45.2	$ 295.2
	Other	-	$ -	1.3	$ 6.9	1.3	$ 6.9
	All Species	2,027.4	$ 1,146.3	697.3	$ 668.0	2,724.7	$ 1,814.3
2016	Groundfish	1,912.3	$ 694.6	307.6	$ 191.8	2,219.9	$ 886.5
	Salmon	110.1	$ 222.6	134.6	$ 233.7	244.8	$ 456.3
	Halibut	1.5	$ 19.9	6.9	$ 101.1	8.4	$ 121.0
	Herring	13.8	$ 1.8	9.6	$ 4.8	23.3	$ 6.6
	Shellfish	29.2	$ 250.7	3.1	$ 23.6	32.3	$ 274.2
	Other	-	$ -	1.2	$ 7.0	1.2	$ 7.0
	All Species	2,066.9	$ 1,189.6	462.9	$ 562.1	2,529.8	$ 1,751.7
2017	Groundfish	1,912.7	$ 738.3	301.8	$ 208.7	2,214.6	$ 947.0
	Salmon	115.4	$ 308.5	330.0	$ 435.1	445.4	$ 743.6
	Halibut	1.7	$ 19.3	7.7	$ 97.8	9.3	$ 117.1
	Herring	17.6	$ 2.4	13.3	$ 5.6	30.9	$ 8.0
	Shellfish	16.0	$ 161.4	2.7	$ 21.9	18.8	$ 183.2
	Other	-	$ -	1.0	$ 8.1	1.0	$ 8.1
	All Species	2,063.4	$ 1,229.8	656.5	$ 777.2	2,720.0	$ 2,007.0

Notes: These estimates include the value of catch from both federal and state of Alaska fisheries. The data have been adjusted to 2017 dollars by applying the Personal Consumption Expenditure Index at https://research.stlouisfed.org/fred2/series/PCEPI to account for affects of inflation on fishermen's revenue.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea Production Reports; ADF&G Commercial Operators Annual Reports (COAR); and NMFS Office of Science and Technology, Fisheries Statistics Division, Fisheries of the United States. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 4: Production and real gross value of groundfish and non-groundfish products in the commercial fisheries off Alaska by species group and area of processing, 2013-2017 (1,000 metric tons product weight and $ millions, base year = 2017).

		Bering Sea and Aleutian Islands		Gulf of Alaska		All Alaska	
	Species	Quantity	Value	Quantity	Value	Quantity	Value
2013	Groundfish	818.2	$ 1,962.5	99.4	$ 349.1	917.5	$ 2,311.6
	Salmon	34.7	$ 374.1	290.3	$ 1,539.0	325.1	$ 1,913.1
	Halibut	1.4	$ 18.6	7.5	$ 120.7	8.9	$ 139.3
	Herring	25.5	$ 26.5	11.6	$ 23.3	37.1	$ 49.8
	Crab	24.7	$ 345.7	3.0	$ 47.3	27.7	$ 393.0
	Other	0	$ 0.8	1.3	$ 27.1	1.3	$ 27.9
	All Species	904.6	$ 2,728.2	413.0	$ 2,106.5	1,317.6	$ 4,834.8
2014	Groundfish	843.8	$ 2,028.3	131.1	$ 403.8	974.9	$ 2,432.2
	Salmon	58.1	$ 468.3	176.8	$ 996.6	234.9	$ 1,465.0
	Halibut	0.6	$ 9.2	5.5	$ 105.2	6.2	$ 114.4
	Herring	19.5	$ 17.5	20.4	$ 25.3	39.9	$ 42.8
	Crab	23.2	$ 336.9	3.8	$ 60.6	27.0	$ 397.5
	Other	0	$ 0.5	1.2	$ 19.7	1.2	$ 20.2
	All Species	945.2	$ 2,860.8	338.9	$ 1,611.3	1,284.1	$ 4,472.1
2015	Groundfish	819.0	$ 1,971.7	126.0	$ 360.0	945.0	$ 2,331.7
	Salmon	70.9	$ 432.3	270.8	$ 1,067.2	341.7	$ 1,499.5
	Halibut	3.4	$ 22.2	6.1	$ 115.6	9.5	$ 137.8
	Herring	17.7	$ 19.1	10.1	$ 12.2	27.8	$ 31.4
	Crab	25.4	$ 331.3	3.9	$ 58.2	29.4	$ 389.5
	Other	0	$ 0.5	1.0	$ 18.1	1.0	$ 18.6
	All Species	936.5	$ 2,777.2	418.0	$ 1,631.3	1,354.4	$ 4,408.5
2016	Groundfish	838.2	$ 2,065.7	134.9	$ 368.0	973.1	$ 2,433.7
	Salmon	73.6	$ 531.1	130.3	$ 757.3	204.0	$ 1,288.4
	Halibut	2.4	$ 31.7	5.8	$ 109.9	8.2	$ 141.6
	Herring	10.2	$ 15.6	10.7	$ 13.3	20.9	$ 29.0
	Crab	18.0	$ 306.6	3.9	$ 63.0	22.0	$ 369.6
	Other	0	$ 0.3	1.1	$ 20.8	1.1	$ 21.1
	All Species	942.5	$ 2,951.0	286.7	$ 1,332.3	1,229.2	$ 4,283.3
2017	Groundfish	823.7	$ 2,150.9	136.8	$ 366.6	960.5	$ 2,517.5
	Salmon	74.6	$ 608.7	258.0	$ 1,282.8	332.7	$ 1,891.5
	Halibut	1.2	$ 22.5	6.3	$ 114.1	7.5	$ 136.6
	Herring	16.9	$ 14.6	14.2	$ 13.4	31.1	$ 28.0
	Crab	11.4	$ 223.0	1.7	$ 29.2	13.2	$ 252.2
	Other	*	$ *	2.1	$ 32.3	2.1	$ 32.3
	All Species	927.8	$ 3,019.7	419.1	$ 1,838.4	1,347.0	$ 4,858.1

Notes: These estimates include production resulting from catch in both federal and state of Alaska fisheries. The data have been adjusted to 2017 dollars by applying the GDP: chain-type price index at https://research.stlouisfed.org/fred2/series/GDPCTPI. to account for affects of inflation on processor's revenue. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5: Discards and discard rates for groundfish catch off Alaska by gear, and species, 2013-2017 (1,000 metric tons, round weight).

		Fixed		Trawl		All Gear	
	Year	Total Discards	Discard Rate	Total Discards	Discard Rate	Total Discards	Discard Rate
Pollock	2013	0.7	13	7.2	1	7.9	1
	2014	0.7	11	15.3	1	16.0	1
	2015	0.8	10	10.2	1	10.9	1
	2016	0.8	12	9.4	1	10.2	1
	2017	0.8	11	9.3	1	10.1	1
Sablefish	2013	0.8	6	0	5	0.8	6
	2014	0.5	5	0.1	8	0.6	5
	2015	0.7	6	0.2	17	0.9	7
	2016	0.9	9	0.2	14	1.0	10
	2017	0.8	7	0.6	28	1.4	11
Pacific Cod	2013	6.0	3	3.8	3	9.8	3
	2014	5.0	2	4.2	4	9.1	3
	2015	3.6	2	1.2	1	4.9	2
	2016	3.6	2	0.6	1	4.2	1
	2017	2.9	1	1.1	1	3.9	1
Flatfish	2013	3.5	82	28.3	9	31.8	10
	2014	3.9	82	18.6	6	22.5	7
	2015	3.8	76	10.3	4	14.1	6
	2016	3.2	76	12.9	5	16.1	6
	2017	2.9	70	12.1	5	15.1	6
Rockfish	2013	1.4	50	2.7	5	4.0	7
	2014	1.0	46	3.5	6	4.5	7
	2015	0.9	42	3.4	5	4.3	6
	2016	0.8	42	3.8	6	4.7	7
	2017	0.9	46	6.7	10	7.6	11
Atka Mackerel	2013	0	93	1.1	5	1.1	5
	2014	0	96	0.4	1	0.5	1
	2015	0	100	1.1	2	1.1	2
	2016	0	97	0.5	1	0.6	1
	2017	0	70	0.7	1	0.8	1
All Groundfish	2013	36.7	13	53.3	3	90.0	4
	2014	35.9	12	50.7	3	86.6	4
	2015	36.3	12	34.2	2	70.4	3
	2016	38.6	13	35.2	2	73.8	3
	2017	36.6	13	39.1	2	75.8	3

Notes: All groundfish and all gear may include additional species or gear types. There were substantial changes to the observer program in 2013 that could affect the comparability of 2013 and later years, to previous years. For details on discard estimation see Cahalan, J., J. Gasper, and J. Mondragon. 2014. Catch sampling and estimation in the federal groundfish fisheries off Alaska, 2015 edition. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-286, 46 p.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 6: Prohibited species catch (PSC) by species, area and gear, 2013-2017 (metric tons (t) or number in 1,000s).

		Year	Halibut (t)	Herring (t)	Chinook (1,000s)	Other Salmon (1,000s)	Red King Crab (1,000s)	Other King Crab (1,000s)	Bairdi (1,000s)	Other Tanner (1,000s)
Bering Sea and Aleutian Islands	Fixed	2013	538	0	*	-	107	2	247	33
		2014	456	-	0	-	145	5	593	105
		2015	326	0	0	0	182	32	633	138
		2016	225	*	0	0	27	16	315	43
		2017	193	0	0	0	35	77	357	168
	Trawl	2013	3,080	988	16	127	32	32	714	692
		2014	3,029	186	18	224	33	24	624	484
		2015	1,999	1,531	25	243	25	15	424	492
		2016	1,910	1,494	33	347	41	15	221	167
		2017	1,179	1,023	36	471	60	11	353	160
	All Gear	2013	3,618	988	16	127	140	35	961	725
		2014	3,485	186	18	224	178	29	1,217	590
		2015	2,324	1,531	25	243	207	48	1,057	630
		2016	2,135	1,494	33	347	68	31	536	210
		2017	1,373	1,023	36	471	95	88	710	327
Gulf of Alaska	Fixed	2013	15	-	-	-	0	0	570	-
		2014	11	-	-	-	-	0	133	0
		2015	22	-	-	-	0	0	128	-
		2016	44	-	-	-	0	0	63	0
		2017	15	-	-	-	-	0	4	0
	Trawl	2013	1,230	11	23	5	-	0	255	-
		2014	1,395	6	16	2	-	0	64	-
		2015	1,411	80	19	1	-	0	76	-
		2016	1,333	148	22	3	-	1	92	0
		2017	1,215	6	25	6	-	0	124	-
	All Gear	2013	1,245	11	23	5	0	0	824	-
		2014	1,405	6	16	2	-	0	198	0
		2015	1,433	80	19	1	0	0	204	-
		2016	1,377	148	22	3	0	1	155	0
		2017	1,230	6	25	6	-	0	129	0

Notes: These estimates include only catches counted against federal TACs. Totals may include additional categories. Totals include halibut mortality taken by Amendment 80 vessels under the Exempted Fishing Permit No. 2015-02. The estimates of halibut bycatch mortality are based on the IPHC discard mortality rates that were used for in-season management. The halibut IFQ program allows retention of halibut in the hook-and-line groundfish fisheries, making true halibut bycatch numbers unavailable for these fisheries. This is particularly a problem in the GOA for all hook-and-line fisheries and in the BSAI for the sablefish hook-and-line fishery. Therefore, estimates of halibut bycatch mortality are not included in this table for those fisheries. There were substantial changes to the observer program in 2013 that could affect the comparability of 2013 and later years, to previous years. Excludes PSC on halibut targets. Excludes PSC in state fisheries (sablefish and P. cod targets in state waters) For details on prohibited species catch estimation see Cahalan, J., J. Gasper, and J. Mondragon. 2014. Catch sampling and estimation in the federal groundfish fisheries off Alaska, 2015 edition. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-286, 46 p. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 7: Percentage of ex-vessel value of the groundfish catch off Alaska by area, residency, and species, 2013-2017; calculations based on COAR.

		Bering Sea and Aleutian Islands		Gulf of Alaska		All Alaska	
	Year	Alaska	Other	Alaska	Other	Alaska	Other
Pollock	2013	18 %	82 %	34 %	66 %	20 %	80 %
	2014	18 %	82 %	42 %	58 %	20 %	80 %
	2015	16 %	84 %	41 %	59 %	18 %	82 %
	2016	17 %	83 %	45 %	55 %	19 %	81 %
	2017	14 %	86 %	49 %	51 %	17 %	83 %
Sablefish	2013	45 %	55 %	55 %	45 %	54 %	46 %
	2014	34 %	66 %	56 %	44 %	55 %	45 %
	2015	36 %	64 %	56 %	44 %	55 %	45 %
	2016	32 %	68 %	59 %	41 %	58 %	42 %
	2017	38 %	62 %	61 %	39 %	59 %	41 %
Pacific Cod	2013	25 %	75 %	68 %	32 %	34 %	66 %
	2014	26 %	74 %	72 %	28 %	38 %	62 %
	2015	29 %	71 %	81 %	19 %	43 %	57 %
	2016	30 %	70 %	80 %	20 %	41 %	59 %
	2017	29 %	71 %	73 %	27 %	37 %	63 %
Flatfish	2013	10 %	90 %	34 %	66 %	12 %	88 %
	2014	10 %	90 %	24 %	76 %	12 %	88 %
	2015	12 %	88 %	32 %	68 %	14 %	86 %
	2016	10 %	90 %	48 %	52 %	13 %	87 %
	2017	12 %	88 %	42 %	58 %	14 %	86 %
Rockfish	2013	2 %	98 %	32 %	68 %	14 %	86 %
	2014	3 %	97 %	27 %	73 %	13 %	87 %
	2015	3 %	97 %	26 %	74 %	13 %	87 %
	2016	0 %	99 %	28 %	72 %	14 %	86 %
	2017	6 %	94 %	41 %	59 %	20 %	80 %
Atka Mackerel	2013	0 %	100 %	3 %	97 %	0 %	100 %
	2014	0 %	100 %	4 %	96 %	0 %	100 %
	2015	0 %	100 %	4 %	96 %	0 %	100 %
	2016	0 %	100 %	30 %	70 %	0 %	99 %
	2017	12 %	88 %	29 %	71 %	12 %	88 %
All Groundfish	2013	18 %	82 %	51 %	49 %	25 %	75 %
	2014	18 %	82 %	54 %	46 %	26 %	74 %
	2015	17 %	83 %	56 %	44 %	26 %	74 %
	2016	18 %	82 %	59 %	41 %	27 %	73 %
	2017	17 %	83 %	59 %	41 %	27 %	73 %

Notes: These estimates include only catches counted against federal TACs. Ex-vessel value is calculated using prices on Table 18. Please refer to Table 18 for a description of the price derivation. Catch delivered to motherships is classified by the residency of the owner of the mothership. All other catch is classified by the residence of the owner of the fishing vessel. All groundfish include additional species categories. For catch for which the residence is unknown, there are either no data or the data have been suppressed to preserve confidentiality. Values are not adjusted for inflation.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea Production Reports; ADF&G Commercial Operators Annual Reports (COAR); and CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 8: Number of vessels that caught groundfish off Alaska by area, vessel category, gear, and target, 2013-2017.

		Bering Sea and Aleutian Islands			Gulf of Alaska			All Alaska		
	Year	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total
Pollock	2013	87	34	121	68	3	71	136	35	171
	2014	87	34	121	70	2	72	138	34	172
	2015	87	33	120	64	1	65	131	33	164
	2016	88	33	121	70	-	70	137	33	170
	2017	88	31	119	67	-	67	134	31	165
Sablefish	2013	21	8	29	282	7	289	294	13	307
	2014	17	6	23	277	7	284	287	11	298
	2015	16	3	19	272	7	279	281	9	290
	2016	17	6	23	270	5	275	278	10	288
	2017	14	6	20	265	5	270	272	9	281
Pacific Cod	2013	125	50	175	344	6	350	431	51	482
	2014	109	47	156	331	10	341	422	49	471
	2015	100	49	149	371	11	382	451	52	503
	2016	110	52	162	347	11	358	435	53	488
	2017	125	45	170	237	9	246	328	45	373
Flatfish	2013	5	31	36	31	5	36	36	32	68
	2014	4	31	35	27	6	33	31	32	63
	2015	6	28	34	16	5	21	22	29	51
	2016	9	30	39	26	5	31	35	31	66
	2017	9	26	35	19	4	23	27	27	54

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Table 8: Continued

	Year	Bering Sea and Aleutian Islands			Gulf of Alaska			All Alaska		
		Catcher Vessels	Catcher Proces-sors	Total	Catcher Vessels	Catcher Proces-sors	Total	Catcher Vessels	Catcher Proces-sors	Total
Rockfish	2013	1	19	20	172	13	185	173	22	195
	2014	4	19	23	173	9	182	177	21	198
	2015	5	15	20	139	8	147	143	18	161
	2016	3	18	21	130	12	142	133	21	154
	2017	4	16	20	126	11	137	130	19	149
Atka Mackerel	2013	3	10	13	-	2	2	3	11	14
	2014	3	8	11	-	-	-	3	8	11
	2015	5	9	14	-	-	-	5	9	14
	2016	4	9	13	2	-	2	6	9	15
	2017	4	12	16	-	1	1	4	13	17
All Targets	2013	189	70	259	665	24	689	787	73	860
	2014	173	68	241	672	24	696	796	72	868
	2015	165	69	234	671	22	693	787	72	859
	2016	170	71	241	628	26	654	744	73	817
	2017	178	68	246	523	22	545	641	70	711

Notes: The target is determined based on vessel, week, catching mode, NMFS area, and gear. These estimates include only vessels that fished part of federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 9: Bering Sea & Aleutian Islands groundfish retained catch by vessel type, gear and species, 2013-2017 (1,000 metric tons, round weight).

		Catcher Vessels				Catcher Processors				Total			
	Year	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear
Pollock	2013	-	-	660.8	660.8	-	-	601.7	606.2	-	-	1,262.5	1,267.0
	2014	-	-	668.5	668.5	-	-	610.8	616.2	-	-	1,279.3	1,284.7
	2015	-	-	687.1	687.1	-	-	620.1	626.4	-	-	1,307.2	1,313.6
	2016	-	-	703.9	703.9	-	-	636.0	641.8	-	-	1,339.9	1,345.7
	2017	-	-	710.4	710.4	-	-	635.9	642.2	-	-	1,346.2	1,352.6
Pacific Cod	2013	1.0	27.0	43.0	71.1	122.0	6.8	43.6	172.4	123.1	33.8	86.6	243.5
	2014	2.2	34.8	42.0	79.0	122.4	7.6	35.4	165.4	124.6	42.4	77.4	244.4
	2015	0.8	29.9	37.7	68.3	127.9	8.0	34.7	170.5	128.7	37.8	72.4	238.9
	2016	0	39.4	46.5	85.9	126.9	7.6	37.1	171.6	126.9	47.0	83.6	257.5
	2017	0.1	43.1	44.5	87.7	124.3	5.8	31.9	162.1	124.4	49.0	76.5	249.8
Sablefish	2013	0.6	*	*	0.6	0.5	-	0.2	0.6	1.0	*	0.2	1.2
	2014	0.5	*	*	0.5	0.2	-	0.1	0.2	0.7	*	0.1	0.8
	2015	0.4	0.1	0	0.5	0.1	-	0	0.1	0.5	0.1	0	0.6
	2016	0.2	*	0	0.2	0.1	-	0.3	0.4	0.3	*	0.3	0.6
	2017	0.2	*	0	0.2	0.1	*	0.5	0.5	0.2	*	0.5	0.7
Atka Mackerel	2013	-	-	0.1	0.1	*	-	20.7	20.7	*	-	20.8	20.8
	2014	-	-	0.1	0.1	*	-	27.8	27.8	*	-	27.9	27.9
	2015	*	-	3.2	3.2	*	-	49.3	49.3	*	-	52.5	52.5
	2016	*	-	3.7	3.7	*	-	50.4	50.4	*	-	54.1	54.1
	2017	-	-	4.4	4.4	0	-	59.4	59.4	0	-	63.8	63.8
Yellowfin	2013	-	-	0.7	0.7	-	-	146.4	146.4	-	-	147.1	147.1
	2014	-	-	0.3	0.3	0	-	145.8	145.8	0	-	146.0	146.1
	2015	-	-	8.0	8.0	0	-	115.1	115.1	0	-	123.0	123.1
	2016	-	-	10.8	10.8	*	-	120.4	120.4	*	-	131.2	131.2
	2017	-	-	15.2	15.2	0.1	-	113.3	113.4	0.1	-	128.6	128.6
Rock Sole	2013	-	-	0.7	0.7	*	-	55.4	55.4	*	-	56.2	56.2
	2014	-	-	1.1	1.1	*	-	48.3	48.3	*	-	49.5	49.5
	2015	-	-	1.1	1.1	*	-	43.2	43.2	*	-	44.3	44.3
	2016	-	-	2.3	2.3	*	-	40.9	40.9	*	-	43.2	43.2
	2017	-	-	3.1	3.1	0	-	30.8	30.8	0	-	33.9	33.9

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Table 9: Continued

	Year	Catcher Vessels Hook And Line	Catcher Vessels Pot	Catcher Vessels Trawl	Catcher Vessels All Gear	Catcher Processors Hook And Line	Catcher Processors Pot	Catcher Processors Trawl	Catcher Processors All Gear	Total Hook And Line	Total Pot	Total Trawl	Total All Gear
Flathead Sole	2013	-	-	0.7	0.7	0	-	14.8	14.8	0	-	15.5	15.5
	2014	*	-	0.9	0.9	0	-	14.1	14.1	0	-	15.0	15.0
	2015	-	-	0.8	0.8	0	-	9.2	9.2	0	-	10.1	10.1
	2016	-	-	0.4	0.4	-	-	8.6	8.6	-	-	9.0	9.0
	2017	-	-	0.6	0.6	0	-	7.5	7.5	0	-	8.1	8.1
Arrowtooth	2013	-	-	0.2	0.2	0.1	-	16.6	16.7	0.1	-	16.8	16.9
	2014	*	-	0.2	0.2	0.1	-	16.4	16.5	0.1	-	16.6	16.7
	2015	*	-	0.3	0.3	0.1	-	9.1	9.2	0.1	-	9.3	9.4
	2016	*	-	0.2	0.2	0	-	8.8	8.8	0	-	9.0	9.0
	2017	*	-	0.1	0.1	0.2	-	5.2	5.4	0.2	-	5.3	5.6
Kamchatka Flounder	2013	-	-	*	*	0	-	7.0	7.0	0	-	7.0	7.0
	2014	-	-	*	*	0	-	5.9	5.9	0	-	5.9	5.9
	2015	-	-	0	0	0	-	4.6	4.6	0	-	4.6	4.6
	2016	-	-	0	0	0	-	4.5	4.5	0	-	4.5	4.5
	2017	-	-	0.1	0.1	0	-	4.1	4.1	0	-	4.1	4.2
Turbot	2013	*	-	0	0	0.6	-	0.8	1.4	0.6	-	0.8	1.4
	2014	*	-	0	0	0.6	-	0.7	1.4	0.6	-	0.7	1.4
	2015	*	-	0	0	1.1	-	1.0	2.0	1.1	-	1.0	2.1
	2016	*	-	0	0	0.9	-	1.2	2.1	0.9	-	1.2	2.1
	2017	-	-	0	0	0.9	-	1.8	2.7	0.9	-	1.8	2.7
Other Flatfish	2013	-	-	*	*	*	-	0	0	*	-	0	0
	2014	-	-	*	*	*	-	*	*	*	-	*	*
	2015	-	-	*	*	0	-	*	0	0	-	*	0
	2016	-	-	*	*	*	-	0	0	*	-	0	0
	2017	-	-	*	*	*	-	*	*	*	-	*	*
Pacific Ocean Perch	2013	-	-	0.2	0.2	0	-	28.6	28.6	0	-	28.9	28.9
	2014	*	-	0.4	0.4	0	-	29.0	29.0	0	-	29.4	29.4
	2015	*	-	2.8	2.8	0	-	27.2	27.2	0	-	30.0	30.0
	2016	*	-	2.3	2.3	*	-	28.0	28.0	*	-	30.3	30.3
	2017	-	-	2.3	2.3	0	-	28.0	28.0	0	-	30.3	30.3

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Table 9: Continued

	Year	Catcher Vessels				Catcher Processors				Total			
		Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear
Northern Rockfish	2013	*	-	0	0	0	-	1.7	1.7	0	-	1.7	1.7
	2014	-	-	0	0	0	-	1.9	1.9	0	-	1.9	1.9
	2015	-	-	0.2	0.2	0	-	6.5	6.6	0	-	6.7	6.7
	2016	*	-	0.2	0.2	0	-	4.0	4.0	0	-	4.2	4.2
	2017	-	-	0.2	0.2	0	-	4.2	4.2	0	-	4.4	4.4
Other Rockfish	2013	0	-	0	0	0.1	-	0.9	1.0	0.2	-	0.9	1.1
	2014	0	-	0	0	0.1	-	0.8	0.9	0.1	-	0.8	1.0
	2015	0	-	0.1	0.1	0.1	-	0.6	0.7	0.1	-	0.7	0.8
	2016	0	-	0	0.1	0	-	0.7	0.7	0.1	-	0.7	0.8
	2017	0	-	0	0	0	-	0.7	0.8	0.1	-	0.8	0.8
Other Groundfish	2013	0	-	0.3	0.4	5.7	-	1.9	7.7	5.7	-	2.2	8.0
	2014	0	-	0.8	0.9	6.6	-	1.6	8.2	6.6	-	2.5	9.1
	2015	0	-	1.5	1.6	6.6	-	1.1	7.8	6.6	-	2.7	9.4
	2016	0	-	0.4	0.4	5.1	-	1.7	6.8	5.1	-	2.0	7.3
	2017	*	-	0.8	0.9	7.7	-	1.7	9.4	7.7	-	2.5	10.3
All Groundfish	2013	1.7	-	707.0	735.7	133.6	-	954.6	1,094.9	135.2	-	1,661.5	1,830.6
	2014	2.7	-	714.7	752.3	135.4	-	954.4	1,097.4	138.1	-	1,669.0	1,849.7
	2015	1.2	-	744.5	775.7	142.3	-	934.2	1,084.5	143.4	-	1,678.7	1,860.1
	2016	0.3	-	771.6	811.4	138.9	-	953.9	1,100.4	139.2	-	1,725.5	1,911.8
	2017	0.3	-	783.8	827.3	139.6	-	938.4	1,083.9	139.9	-	1,722.2	1,911.2

Notes: The estimates are of retained catch (i.e., excludes discarded catch). All groundfish include additional species categories. These estimates include only catch counted against federal TACs. Includes FMP groundfish catch on halibut targets. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 10: Bering Sea & Aleutian Islands groundfish retained catch by species, gear, and target fishery, 2016-2017, (1,000 metric tons, round weight).

			Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Turbot	Yellowfin	Flat Other	Rockfish	Atka Mackerel	Other	All Species
Hook and Line	Catcher Processors	2016	Sablefish	*	0.1	*	-	-	-	-	*	-	-	*	-	-	0.1
			Pacific Cod	5.8	*	126.8	0	0	-	*	0.1	*	*	0	*	5.1	137.8
			Arrowtooth	-	*	-	*	*	-	-	-	-	-	*	-	-	*
			Turbot	0	0	0	*	*	-	-	0.9	-	-	0	-	*	1.0
			Rockfish	*	*	*	*	*	-	-	*	-	-	*	-	*	*
			Halibut	-	-	*	-	-	-	-	-	-	-	-	-	-	*
			All Targets	5.8	0.1	126.9	0	0	-	*	0.9	*	*	0	*	5.1	138.9
		2017	Sablefish	-	0.1	-	*	*	-	-	*	-	-	0	-	*	0.1
			Pacific Cod	6.4	0	124.3	0.2	0	0	0	0.1	0.1	*	0	0	7.7	138.8
			Turbot	*	*	*	*	*	-	-	0.8	-	-	*	-	*	0.8
			Halibut	-	-	*	-	-	-	-	-	-	-	-	-	-	*
			All Targets	6.4	0.1	124.3	0.2	0	0	0	0.9	0.1	*	0	0	7.7	139.6
	Catcher Vessels	2016	Sablefish	-	0.1	*	-	-	-	-	*	-	-	0	-	-	0.1
			Pacific Cod	-	-	*	*	-	-	-	-	-	-	*	*	*	*
			Halibut	*	0.1	0	*	-	-	-	*	-	-	0	-	0	0.1
			All Targets	*	0.2	0	*	-	-	-	*	-	-	0	*	0	0.3
		2017	Sablefish	-	0.1	*	-	-	-	-	-	-	-	0	-	-	0.1
			Pacific Cod	-	-	0.1	-	-	-	-	-	-	-	-	-	-	0.1
			Halibut	-	0.1	0	*	-	-	-	-	-	-	0	-	*	0.1
			All Targets	-	0.2	0.1	*	-	-	-	-	-	-	0	-	*	0.3
Pot	Catcher Processors	2016	Pacific Cod	0	-	7.6	-	-	-	-	-	*	-	-	-	0	7.6
			All Targets	0	-	7.6	-	-	-	-	-	*	-	-	-	0	7.6
		2017	Sablefish	-	*	*	*	*	-	-	*	-	-	*	-	-	*
			Pacific Cod	0	-	5.8	-	-	-	-	-	*	-	-	-	*	5.8
			All Targets	0	*	5.8	*	*	-	-	*	*	-	*	-	*	5.8
	Catcher Vessels	2016	Sablefish	-	*	-	-	-	-	-	-	-	-	-	-	-	*
			Pacific Cod	0	-	39.4	*	-	0	*	-	0	-	*	0	0.1	39.5
			All Targets	0	*	39.4	*	-	0	*	-	0	-	*	0	0.1	39.5
		2017	Sablefish	-	*	-	-	-	-	-	-	-	-	-	-	-	*
			Pacific Cod	0	*	43.1	*	-	0	0	-	0	*	0	0	0.1	43.2
			All Targets	0	*	43.1	*	-	0	0	-	0	*	0	0	0.1	43.2

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Table 10: Continued

			Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Turbot	Yellowfin	Flat Other	Rockfish	Atka Mackerel	Other	All Species
Trawl	Catcher Processors	2016	Pollock, Bottom	19.4	0	0.5	0.1	0.1	0.3	0.3	0	0.3	0.1	1.1	0	0.1	22.3
			Pollock, Pelagic	584.3	0	1.9	0.1	0	0.7	0.3	0	0.4	0.1	1.1	0	0.4	589.4
			Sablefish	0	0	-	0	0	0	-	*	-	0	0	*	-	0.1
			Pacific Cod	1.2	*	6.8	0.1	0.1	0	1.7	*	0.3	0.1	0.1	0.4	0	10.8
			Arrowtooth	1.0	0.1	0.3	3.6	0.8	0.3	0	0.5	*	0.4	0.3	0.3	0	7.6
			Kamchatka Flounder	0.8	0	0.1	0.9	2.2	*	0	0.1	*	0	0.2	0	0	4.2
			Flathead Sole	1.2	0	0.8	0.4	0.1	2.3	0.6	0.1	2.4	0.5	*	-	*	8.4
			Rock Sole	9.4	0	13.0	0.2	0	1.0	30.9	-	20.1	3.3	*	*	0.1	78.0
			Turbot	0.1	0	0	0.3	0.1	0.1	-	0.5	-	0	0	-	*	1.2
			Yellowfin	17.4	0	10.8	2.4	0.2	3.8	6.9	0	96.7	6.3	*	-	0.6	145.1
			Other Flatfish	0.1	0	0.1	0.1	0	0	0.1	0	0.3	0.7	0	-	*	1.5
			Rockfish	0.7	0	0.6	0.3	0.4	0	0	0	0	0	19.6	4.7	0.1	26.5
			Atka Mackerel	0.4	0	2.3	0.2	0.4	0	0	0	*	0	10.2	44.9	0.4	58.9
			All Targets	636.0	0.3	37.1	8.8	4.5	8.6	40.9	1.2	120.4	11.4	32.7	50.4	1.7	953.9
		2017	Pollock, Bottom	19.7	0	0.3	0.1	0	0.1	0.2	0	0.2	0	1.4	0	0.1	22.1
			Pollock, Pelagic	590.0	0	2.0	0	0	0.4	0.8	0	0.2	0	1.1	0	0.4	595.1
			Sablefish	*	*	*	*	*	*	*	*	*	*	*	-	-	*
			Pacific Cod	0.6	*	4.2	0	0	0	0.8	*	0.2	0.1	0	*	0	5.9
			Arrowtooth	0.5	0.1	0.3	1.8	0.4	0.3	0.1	0.2	0	0.2	0.1	*	0	3.8
			Kamchatka Flounder	0.2	0.1	0	0.5	2.4	0	*	0.3	*	0	0.1	0	*	3.6
			Flathead Sole	1.6	*	0.8	0.4	0.1	2.9	1.1	0.1	2.8	0.7	*	*	0	10.5
			Rock Sole	4.8	0	7.9	0.1	0	0.8	17.6	-	15.2	2.1	*	-	0.1	48.7
			Turbot	0.2	0.1	0	0.6	0.3	0.1	0	1.1	*	0.1	0.1	-	0	2.5
			Yellowfin	16.7	*	12.0	1.0	0.1	2.8	10.1	0	94.6	9.7	*	*	0.6	147.5
			Other Flatfish	0.1	0.1	0.1	0.2	0.1	0.1	0	0	0.1	0.5	0	-	*	1.4
			Rockfish	1.2	0.1	0.7	0.3	0.3	0	0	0	0	0	20.5	5.1	0.1	28.4
			Atka Mackerel	0.4	0	3.6	0.1	0.3	0	0	0	0	0	9.7	54.2	0.4	68.8
			All Targets	635.9	0.5	31.9	5.2	4.1	7.5	30.8	1.8	113.3	13.4	32.9	59.4	1.7	938.4

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Table 10: Continued

Gear	Sector	Year	Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Turbot	Yellowfin	Flat Other	Rockfish	Atka Mackerel	Other	All Species
Trawl	Catcher Vessels	2016	Pollock, Bottom	1.8	*	0	0	-	0	*	-	*	*	*	*	*	1.8
			Pollock, Pelagic	700.6	0	2.5	0	*	0.2	0.2	0	0	0.1	0.6	0	0.3	704.6
			Pacific Cod	0.5	*	42.0	0	0	0	0.2	-	0	0	0	0	0	42.8
			Flathead Sole	*	-	*	*	*	*	*	-	*	*	-	-	-	*
			Rock Sole	0.3	-	0.6	0	*	0	1.1	-	1.6	0.2	-	-	*	3.8
			Yellowfin	0.8	-	1.1	0.1	0	0.1	0.8	-	9.2	0.6	-	-	0	12.7
			Rockfish	0	*	0.1	0	0	*	*	-	-	*	1.4	0.5	*	1.9
			Atka Mackerel	0	*	0.2	0	*	*	0	-	*	*	0.6	3.2	0	4.0
			All Targets	703.9	0	46.5	0.2	0	0.4	2.3	0	10.8	0.9	2.5	3.7	0.4	771.6
		2017	Pollock, Bottom	11.3	0	0.7	0	*	0	0	*	0	0	0.1	*	0	12.1
			Pollock, Pelagic	696.4	0	3.0	0	*	0.3	0.3	0	0	0.1	0.6	0	0.5	701.3
			Pacific Cod	0.3	*	38.0	0	0	0	0.3	-	0.1	0	0	*	0.1	38.7
			Flathead Sole	*	-	*	*	*	*	*	-	*	*	-	-	*	*
			Rock Sole	0.2	-	0.3	-	*	0	0.7	-	0.9	0.2	-	-	0	2.3
			Yellowfin	1.9	*	2.2	0.1	0	0.2	1.8	*	14.3	1.7	-	-	0.1	22.3
			Other Flatfish	-	-	*	-	-	-	*	-	*	*	-	-	-	*
			Rockfish	0.2	*	0.1	*	*	*	*	*	-	*	1.5	0.3	*	1.9
			Atka Mackerel	0.1	*	0.3	0	0.1	*	0	*	*	*	0.4	4.2	0.1	5.1
			All Targets	710.4	0	44.5	0.1	0.1	0.6	3.1	0	15.2	2.0	2.5	4.4	0.8	783.8
All Gear	Catch Proc.	2016	All Targets	641.8	0.4	171.6	8.8	4.5	8.6	40.9	2.1	120.4	11.4	32.8	50.4	6.8	1,100.4
		2017	All Targets	642.2	0.5	162.1	5.4	4.1	7.5	30.8	2.7	113.4	13.4	32.9	59.4	9.4	1,083.9
	Catch Vess.	2016	All Targets	703.9	0.2	85.9	0.2	0	0.4	2.3	0	10.8	0.9	2.5	3.7	0.4	811.4
		2017	All Targets	710.4	0.2	87.7	0.1	0.1	0.6	3.1	0	15.2	2.0	2.5	4.4	0.9	827.3

Notes: Totals may include additional categories. The target is derived from an algorithm used to determine preponderance of catch, accounting for processor, trip, processing mode, NMFS area, and gear. These estimates include only catch counted against federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 11: Bering Sea & Aleutian Islands ex-vessel prices in the groundfish fisheries by gear, and species, 2013-2017; calculations based on COAR ($/lb, round weight).

		Shoreside			At Sea			All Sectors		
	Year	Fixed	Trawl	All Gear	Fixed	Trawl	All Gear	Fixed	Trawl	All Gear
Pollock	2013	0.092	0.149	0.149	0.092	0.155	0.154	0.092	0.152	0.152
	2014	0.097	0.155	0.155	0.097	0.148	0.148	0.097	0.151	0.151
	2015	0.170	0.154	0.154	0.170	0.134	0.134	0.170	0.142	0.143
	2016	0.134	0.139	0.139	0.020	0.117	0.117	0.020	0.127	0.126
	2017	0.015	0.137	0.137	0.015	0.105	0.104	0.015	0.119	0.118
Pacific Cod	2013	0.247	0.242	0.244	0.291	0.224	0.273	0.283	0.232	0.265
	2014	0.288	0.260	0.274	0.297	0.271	0.291	0.295	0.266	0.286
	2015	0.263	0.234	0.248	0.297	0.232	0.282	0.290	0.233	0.273
	2016	0.278	0.249	0.264	0.292	0.246	0.280	0.289	0.247	0.275
	2017	0.332	0.296	0.316	0.340	0.283	0.326	0.338	0.288	0.323
Sablefish	2013	2.838	*	2.838	2.838	1.173	2.361	2.838	1.173	2.650
	2014	4.001	*	4.001	4.001	1.317	3.379	4.001	1.317	3.856
	2015	3.720	1.278	3.720	3.720	1.278	3.268	3.720	1.278	3.613
	2016	4.010	1.193	3.978	4.010	1.193	2.032	4.010	1.193	3.016
	2017	3.980	1.172	3.834	3.980	1.172	1.875	3.980	1.172	2.759
Atka Mackerel	2013	0.017	0.327	0.326	0.017	0.327	0.327	0.017	0.327	0.327
	2014	0.341	0.353	0.352	*	0.353	0.353	0.341	0.353	0.353
	2015	0.279	0.257	0.257	*	0.257	0.257	0.279	0.257	0.257
	2016	0.016	0.253	0.243	*	0.253	0.253	0.016	0.253	0.253
	2017	0.015	0.356	0.353	0.015	0.356	0.356	0.015	0.356	0.356
Yellowfin	2013	0.015	0.156	0.156	*	0.156	0.156	0.015	0.156	0.156
	2014	*	0.126	0.126	0.131	0.126	0.126	0.131	0.126	0.126
	2015	0.003	0.129	0.129	0.003	0.129	0.129	0.003	0.129	0.129
	2016	0.014	0.147	0.139	*	0.147	0.147	0.014	0.147	0.147
	2017	0.015	0.176	0.156	0.015	0.176	0.176	0.015	0.176	0.176
Rock Sole	2013	*	0.150	0.150	*	0.150	0.150	*	0.150	0.150
	2014	*	0.153	0.153	*	0.153	0.153	*	0.153	0.153
	2015	*	0.146	0.146	*	0.146	0.146	*	0.146	0.146
	2016	*	0.167	0.167	*	0.167	0.167	*	0.167	0.167
	2017	0.015	0.194	0.194	0.015	0.194	0.194	0.015	0.194	0.194

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Table 11: Continued

	Year	Shoreside			At Sea			All Sectors		
		Fixed	Trawl	All Gear	Fixed	Trawl	All Gear	Fixed	Trawl	All Gear
Flathead Sole	2013	0.015	0.222	0.222	0.015	0.221	0.221	0.015	0.221	0.221
	2014	0.131	0.176	0.176	0.131	0.176	0.176	0.131	0.176	0.176
	2015	0.015	0.148	0.148	0.003	0.148	0.147	0.003	0.148	0.147
	2016	0.113	0.194	0.193	-	0.193	0.193	0.113	0.193	0.193
	2017	0.015	0.221	0.221	0.015	0.221	0.221	0.015	0.221	0.221
Arrowtooth	2013	*	0.154	0.154	0.015	0.154	0.153	0.015	0.154	0.153
	2014	*	0.201	0.201	0.131	0.201	0.201	0.131	0.201	0.201
	2015	*	0.182	0.182	0.003	0.182	0.181	0.003	0.182	0.181
	2016	0.113	0.213	0.212	0.113	0.213	0.213	0.113	0.213	0.213
	2017	*	0.324	0.324	0.015	0.324	0.312	0.015	0.324	0.312
Kamchatka Flounder	2013	-	-	-	0.015	0.137	0.137	0.015	0.137	0.137
	2014	-	-	-	0.131	0.183	0.183	0.131	0.183	0.183
	2015	-	*	*	0.003	0.165	0.165	0.003	0.165	0.165
	2016	-	-	-	0.113	0.206	0.206	0.113	0.206	0.206
	2017	-	-	-	0.015	0.367	0.365	0.015	0.367	0.365
Turbot	2013	*	0.439	0.439	0.015	0.439	0.252	0.015	0.439	0.252
	2014	0.131	0.474	0.225	0.131	0.474	0.318	0.131	0.474	0.318
	2015	*	0.502	0.502	0.003	0.502	0.249	0.003	0.502	0.250
	2016	*	0.649	0.649	0.113	0.649	0.413	0.113	0.649	0.414
	2017	-	0.689	0.689	0.015	0.689	0.460	0.015	0.689	0.460
Other Flatfish	2013	-	-	-	*	0.158	0.158	*	0.158	0.158
	2014	-	-	-	*	0.142	0.142	*	0.142	0.142
	2015	-	-	-	0.003	0.140	0.003	0.003	0.140	0.003
	2016	-	-	-	*	0.162	0.162	*	0.162	0.162
	2017	-	-	-	*	0.200	0.200	*	0.200	0.200
Pacific Ocean Perch	2013	-	0.211	0.211	0.975	0.211	0.211	0.975	0.211	0.211
	2014	*	0.238	0.238	0.630	0.238	0.238	0.630	0.238	0.238
	2015	*	0.209	0.209	0.833	0.209	0.209	0.833	0.209	0.209
	2016	*	0.180	0.180	*	0.180	0.180	*	0.180	0.180
	2017	*	0.218	0.218	1.001	0.218	0.218	1.001	0.218	0.218

Continued on next page.

Table 11: Continued

		Shoreside			At Sea			All Sectors		
	Year	Fixed	Trawl	All Gear	Fixed	Trawl	All Gear	Fixed	Trawl	All Gear
Northern Rockfish	2013	*	0.139	0.139	0.975	0.139	0.140	0.975	0.139	0.140
	2014	-	0.179	0.179	0.630	0.179	0.179	0.630	0.179	0.179
	2015	-	0.149	0.149	0.833	0.149	0.149	0.833	0.149	0.149
	2016	*	0.127	0.127	0.780	0.127	0.127	0.780	0.127	0.127
	2017	*	0.152	0.152	1.001	0.152	0.153	1.001	0.152	0.153
Other Rockfish	2013	0.999	0.207	0.974	0.975	0.363	0.430	0.981	0.363	0.450
	2014	0.644	0.207	0.599	0.630	0.425	0.444	0.635	0.424	0.452
	2015	0.837	0.492	0.800	0.833	0.277	0.344	0.834	0.278	0.366
	2016	0.749	0.345	0.701	0.780	0.351	0.390	0.772	0.351	0.400
	2017	0.956	0.496	0.906	1.001	0.381	0.424	0.990	0.382	0.436
Other Groundfish	2013	0.500	0.023	0.081	0.500	0.050	0.375	0.500	0.047	0.363
	2014	0.568	0.151	0.193	0.568	0.151	0.477	0.568	0.151	0.451
	2015	0.154	0.122	0.123	0.154	0.049	0.136	0.154	0.086	0.134
	2016	0.280	0.150	0.175	0.280	0.017	0.213	0.280	0.037	0.211
	2017	0.306	0.207	0.220	0.306	0.015	0.246	0.306	0.056	0.244

Notes: Prices are for catch from both federal and state of Alaska fisheries. The ex-vessel price is calculated as value of landings divided by estimated or actual round weight. Prices for catch processed by an at-sea processor without a COAR buying record (e.g., from catcher processors) are set using the prices for the matching species (group), region and gear-types for which buying records exist shoreside. Trawl-caught sablefish, rockfish and flatfish in the BSAI and trawl-caught Atka mackerel in both the BSAI and the GOA are not well represented in the COAR buying records. A price was calculated for these categories from product-report prices; the price in this case is the value of the first wholsale products divided by the calculated round weight and multiplied by a constant 0.4 to correct for value added by processing. The "All Alaska/All gear" column is the average weighted by retianed catch. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea Production Reports; andADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 12: Bering Sea & Aleutian Islands ex-vessel value of the groundfish catch by vessel category, gear, and species, 2013-2017; calculations based on COAR ($ millions).

		Catcher Vessel				Catcher Processor				All Sectors			
	Year	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear
Pollock	2013	-	-	218.65	218.65	-	-	205.63	206.54	-	-	424.28	425.19
	2014	-	-	226.54	226.54	-	-	200.28	201.43	-	-	426.82	427.97
	2015	-	-	227.41	227.42	-	-	182.91	185.30	-	-	410.33	412.72
	2016	-	-	209.36	209.36	-	-	165.24	165.50	-	-	374.61	374.86
	2017	-	-	205.54	205.54	-	-	147.13	147.35	-	-	352.67	352.89
Pacific Cod	2013	0.57	14.72	21.69	36.98	78.31	4.37	23.48	106.15	78.88	19.08	45.17	143.13
	2014	1.38	22.10	21.24	44.72	80.21	4.99	24.74	109.94	81.59	27.09	45.98	154.66
	2015	0.45	17.29	16.32	34.07	83.66	5.22	20.84	109.72	84.12	22.51	37.16	143.79
	2016	0.04	24.14	20.40	44.58	81.58	4.89	25.20	111.67	81.62	29.03	45.60	156.25
	2017	0.08	31.59	22.27	53.94	93.25	4.38	26.36	123.99	93.33	35.98	48.63	177.93
Sablefish	2013	3.57	*	*	3.57	2.94	-	0.49	3.43	6.51	*	0.49	7.00
	2014	4.54	*	*	4.54	1.73	-	0.17	1.90	6.27	*	0.17	6.45
	2015	2.92	0.98	0	3.90	0.98	-	0.08	1.06	3.90	0.98	0.08	4.96
	2016	1.95	*	0.01	1.97	1.04	-	0.73	1.76	2.99	*	0.74	3.73
	2017	1.41	*	0.09	1.51	0.73	*	1.61	2.34	2.14	*	1.71	3.85
Atka Mackerel	2013	-	-	0.04	0.04	-	-	16.15	16.15	-	-	16.19	16.19
	2014	-	-	0.08	0.08	-	-	23.67	23.67	-	-	23.75	23.75
	2015	-	-	0.02	0.02	-	-	29.67	29.67	-	-	29.69	29.69
	2016	-	-	0.01	0.01	-	-	30.13	30.13	-	-	30.14	30.14
	2017	-	-	0	0	-	-	50.24	50.24	-	-	50.25	50.25
Yellowfin	2013	-	-	0.06	0.06	-	-	54.54	54.54	-	-	54.60	54.60
	2014	-	-	0.07	0.07	0.01	-	42.04	42.05	0.01	-	42.11	42.12
	2015	-	-	0.03	0.03	0	-	35.07	35.07	0	-	35.10	35.10
	2016	-	-	0.01	0.01	*	-	42.52	42.52	*	-	42.53	42.53
	2017	-	-	0.01	0.01	0	-	50.00	50.00	0	-	50.01	50.01
Rock Sole	2013	-	-	0.21	0.21	*	-	18.51	18.51	*	-	18.72	18.72
	2014	-	-	0.26	0.26	*	-	16.49	16.49	*	-	16.76	16.76
	2015	-	-	0.10	0.10	*	-	14.13	14.13	*	-	14.24	14.24
	2016	-	-	0.09	0.09	*	-	15.86	15.86	*	-	15.95	15.95
	2017	-	-	0.15	0.15	0	-	14.37	14.37	0	-	14.51	14.51

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Table 12: Continued

	Year	Catcher Vessel: Hook And Line	Catcher Vessel: Pot	Catcher Vessel: Trawl	Catcher Vessel: All Gear	Catcher Processor: Hook And Line	Catcher Processor: Pot	Catcher Processor: Trawl	Catcher Processor: All Gear	All Sectors: Hook And Line	All Sectors: Pot	All Sectors: Trawl	All Sectors: All Gear
Flathead Sole	2013	-	-	0.34	0.34	0	-	7.36	7.36	0	-	7.70	7.70
	2014	*	-	0.33	0.33	0	-	5.53	5.54	0	-	5.87	5.87
	2015	-	-	0.15	0.15	0	-	3.13	3.13	0	-	3.28	3.28
	2016	-	-	0.10	0.11	-	-	3.74	3.74	-	-	3.84	3.84
	2017	-	-	0.15	0.15	0	-	3.80	3.80	0	-	3.95	3.95
Arrowtooth	2013	-	-	0.08	0.08	0	-	5.62	5.62	0	-	5.70	5.70
	2014	*	-	0.09	0.09	0.03	-	7.31	7.34	0.03	-	7.40	7.43
	2015	*	-	0.03	0.03	0	-	3.73	3.73	0	-	3.76	3.76
	2016	0	-	0.02	0.02	0.01	-	4.19	4.20	0.01	-	4.21	4.22
	2017	*	-	0.04	0.04	0.01	-	3.82	3.83	0.01	-	3.86	3.87
Kamchatka Flounder	2013	-	-	*	*	0	-	2.11	2.11	0	-	2.11	2.11
	2014	-	-	*	*	0	-	2.38	2.39	0	-	2.38	2.39
	2015	-	-	0	0	0	-	1.68	1.68	0	-	1.68	1.68
	2016	-	-	*	*	0	-	2.06	2.06	0	-	2.06	2.06
	2017	-	-	*	*	0	-	3.41	3.41	0	-	3.41	3.41
Turbot	2013	*	-	0	0	0.02	-	0.75	0.77	0.02	-	0.75	0.77
	2014	0	-	0	0	0.18	-	0.79	0.98	0.18	-	0.80	0.98
	2015	*	-	0.01	0.01	0.01	-	1.13	1.14	0.01	-	1.14	1.15
	2016	*	-	0	0	0.24	-	1.73	1.96	0.24	-	1.73	1.97
	2017	-	-	0	0	0.03	-	2.74	2.77	0.03	-	2.74	2.77
Other Flatfish	2013	-	-	*	*	*	-	0	0	*	-	0	0
	2014	-	-	*	*	*	-	0	0	*	-	0	0
	2015	-	-	*	*	0	-	*	0	0	-	*	0
	2016	-	-	*	*	*	-	0	0	*	-	0	0
	2017	-	-	*	*	*	-	*	*	*	-	*	*
Pacific Ocean Perch	2013	-	-	0.10	0.10	0	-	14.20	14.20	0	-	14.30	14.30
	2014	*	-	0.20	0.20	0	-	16.30	16.30	0	-	16.50	16.50
	2015	*	-	0.33	0.33	0	-	13.50	13.50	0	-	13.84	13.84
	2016	*	-	0.25	0.25	*	-	11.78	11.78	*	-	12.03	12.03
	2017	-	-	0.31	0.31	0	-	14.24	14.24	0	-	14.56	14.56

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Table 12: Continued

		Catcher Vessel				Catcher Processor				All Sectors			
	Year	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear
Northern Rockfish	2013	*	-	0	0	0.01	-	0.55	0.56	0.01	-	0.56	0.56
	2014	-	-	0.01	0.01	0	-	0.85	0.85	0	-	0.86	0.86
	2015	-	-	0.01	0.01	0	-	2.21	2.21	0	-	2.22	2.22
	2016	*	-	0	0	0	-	1.19	1.19	0	-	1.19	1.19
	2017	-	-	0	0	0.01	-	1.46	1.47	0.01	-	1.47	1.48
Other Rockfish	2013	0.09	-	0	0.09	0.26	-	0.78	1.04	0.34	-	0.78	1.12
	2014	0.06	-	0	0.07	0.12	-	0.81	0.92	0.18	-	0.81	0.99
	2015	0.06	-	0	0.07	0.17	-	0.41	0.57	0.23	-	0.41	0.64
	2016	0.04	-	0	0.05	0.13	-	0.59	0.72	0.17	-	0.60	0.77
	2017	0.04	-	0	0.05	0.13	-	0.68	0.82	0.18	-	0.69	0.86
Other Groundfish	2013	0	-	0.02	0.06	6.32	-	0.24	6.56	6.32	-	0.26	6.63
	2014	0.01	-	0.26	0.37	8.23	-	0.61	8.83	8.24	-	0.87	9.20
	2015	0	-	0.36	0.38	2.25	-	0.14	2.39	2.25	-	0.51	2.78
	2016	0	-	0.11	0.15	3.16	-	0.07	3.23	3.16	-	0.17	3.39
	2017	*	-	0.25	0.30	5.19	-	0.07	5.25	5.19	-	0.31	5.55
All Species	2013	4.22	-	241.28	260.26	88.78	-	355.24	448.38	93.00	-	596.52	708.64
	2014	5.99	-	249.22	277.42	91.68	-	347.10	443.77	97.67	-	596.32	721.19
	2015	3.44	-	244.87	266.60	89.46	-	312.82	407.50	92.89	-	557.69	674.09
	2016	2.04	-	230.43	256.65	86.41	-	308.91	400.21	88.45	-	539.34	656.87
	2017	1.53	-	228.90	262.08	99.57	-	327.70	431.65	101.10	-	556.60	693.73

Notes: Ex-vessel value is calculated by multiplying ex-vessel prices by the retained round weight catch. Refer to Table 18 for a description of the price derivation. The value added by at-sea processing is not included in these estimates of ex-vessel value. All groundfish includes additional species categories. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea Production Reports; andADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 13: Bering Sea & Aleutian Islands vessel and permit counts, ex-vessel value, value per vessel, and percent value of BSAI FMP groundfish and all BSAI fisheries by fleet, 2013-2017; calculations based on COAR ($ millions).

	Year	Vessels	Permits	Ex-vessel Value Per Vessel $1,000	Ex-vessel Value $million	Percent Value, BSAI FMP Groundfish	Percent Value, All BSAI Fisheries
AFA CV	2013	88	15	2,690.04	236.72	33.32	20.70
	2014	88	14	2,787.99	245.34	33.92	20.00
	2015	86	15	2,812.02	241.83	35.91	22.06
	2016	89	18	2,594.21	230.88	35.08	20.22
	2017	86	16	2,650.16	227.91	32.60	19.21
AFA CP	2013	16	16	12,989.19	207.83	29.25	18.17
	2014	17	17	12,183.62	207.12	28.63	16.88
	2015	17	17	10,984.64	186.74	27.73	17.03
	2016	16	16	10,178.78	162.86	24.74	14.26
	2017	16	16	9,909.06	158.55	22.68	13.37
A80	2013	18	18	7,251.93	130.53	18.37	11.41
	2014	18	18	7,225.30	130.06	17.98	10.60
	2015	18	18	6,477.65	116.60	17.31	10.64
	2016	19	19	6,599.32	125.39	19.05	10.98
	2017	19	19	7,867.07	149.47	21.38	12.60
BSAI Trawl	2013	15	9	1,426.52	21.40	3.01	1.87
	2014	12	9	1,131.69	13.58	1.88	1.11
	2015	13	12	968.94	12.60	1.87	1.15
	2016	13	12	1,602.54	20.83	3.16	1.82
	2017	16	15	1,347.87	21.57	3.08	1.82

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Table 13: Continued

	Year	Vessels	Permits	Ex-vessel Value Per Vessel $1,000	Ex-vessel Value $million	Percent Value, BSAI FMP Groundfish	Percent Value, All BSAI Fisheries
CV Hook and Line	2013	13	9	*	*	*	*
	2014	6	7	*	*	*	*
	2015	5	5	*	*	*	*
	2016	1	1	*	*	*	*
	2017	5	4	*	*	*	*
CP Hook and Line	2013	31	31	2,766.80	85.77	12.07	7.50
	2014	30	30	3,002.70	90.08	12.45	7.34
	2015	30	30	2,950.16	88.50	13.14	8.07
	2016	31	31	2,755.96	85.43	12.98	7.48
	2017	28	28	3,536.34	99.02	14.16	8.35
Sablefish IFQ	2013	26	10	326.48	8.49	1.19	0.74
	2014	22	10	391.62	8.62	1.19	0.70
	2015	18	8	231.84	4.17	0.62	0.38
	2016	20	7	185.93	3.72	0.56	0.33
	2017	17	10	382.19	6.50	0.93	0.55
Pot	2013	59	13	324.23	19.13	2.69	1.67
	2014	56	18	485.72	27.20	3.76	2.22
	2015	48	18	469.43	22.53	3.35	2.06
	2016	56	17	519.33	29.08	4.42	2.55
	2017	64	17	562.98	36.03	5.15	3.04

Notes: These tables include the value of groundfish purchases reported by processing plants, as well as by other entities, such as markets and restaurants, that normally would not report sales of groundfish products.Keep this in mind when comparing ex-vessel values in this table to gross processed-product values. The data are for catch from both federal and state of Alaska fisheries. The category ”BSAI Trawl” does not include trawl vessel in the other categories (e.g. ”AFA CV”, ”AFA CP”, ”A80”). Values are not adjusted for inflation.

Source: ADF&G Commercial Operators Annual Reports (COAR); and ADF&G Intent to Operate (ITO) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 14: Bering Sea & Aleutian Islands production of groundfish products by species, 2013-2017, (1,000 metric tons product weight).

		2013			2014			2015			2016			2017		
	Product	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
Pollock	Whole Fish	0.16	1.65	1.81	0.31	1.09	1.40	1.11	0.68	1.80	0.10	0.69	0.79	0.04	0.25	0.30
	Head And Gut	37.28	3.69	40.97	34.77	2.77	37.54	25.38	*	25.38	28.61	0.04	28.65	24.21	-	24.21
	Roe	8.37	5.55	13.91	11.71	8.89	20.60	12.01	6.74	18.75	10.44	3.82	14.26	11.71	6.72	18.43
	Deep-Skin Fillets	36.83	14.76	51.59	32.68	11.01	43.69	34.56	9.22	43.77	38.24	8.55	46.79	45.10	13.03	58.13
	Other Fillets	59.63	59.66	119.28	63.68	68.41	132.09	57.44	65.80	123.24	49.61	64.89	114.50	42.13	56.69	98.82
	Surimi	80.85	80.81	161.66	87.81	83.52	171.33	95.94	91.80	187.74	100.51	90.31	190.82	102.60	94.13	196.73
	Minced Fish	23.47	7.27	30.74	19.98	6.09	26.06	19.71	5.47	25.19	22.38	11.69	34.07	17.05	9.44	26.49
	Fishmeal	20.98	32.89	53.87	23.25	33.60	56.85	26.45	34.59	61.03	27.15	36.25	63.40	27.94	34.69	62.63
	Other Products	12.21	20.78	33.00	13.57	22.40	35.97	12.60	21.44	34.04	14.52	27.09	41.61	13.32	24.88	38.20
	All Products	279.79	227.05	506.84	287.75	237.78	525.54	285.20	235.74	520.94	291.54	243.34	534.89	284.10	239.84	523.94
Pacific Cod	Whole Fish	1.99	0.41	2.40	0.19	0.79	0.98	0.12	0.39	0.51	1.36	0.43	1.79	0.22	*	0.22
	Head And Gut	82.45	15.31	97.76	81.36	19.20	100.56	84.84	15.98	100.82	84.44	14.24	98.68	80.10	12.28	92.38
	Roe	0.38	2.40	2.78	0.69	2.77	3.46	0.58	1.79	2.37	0.52	1.61	2.13	0.47	1.73	2.20
	Fillets	0.28	8.51	8.79	0.15	8.27	8.42	0.20	6.08	6.28	0.14	9.89	10.03	0.14	9.88	10.01
	Other Products	4.32	5.64	9.96	3.03	7.06	10.10	5.23	5.26	10.48	6.61	7.16	13.77	7.07	7.66	14.73
	All Products	89.43	32.27	121.70	85.42	38.09	123.51	90.97	29.49	120.47	93.06	33.34	126.40	87.99	31.55	119.54
Sablefish	Head And Gut	0.41	0.70	1.11	0.15	0.54	0.69	0.08	0.38	0.46	0.22	0.28	0.50	0.42	0.45	0.87
	Other Products	0.02	*	0.02	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.02	0.05	0.04	0.08
	All Products	0.43	0.70	1.13	0.16	0.55	0.71	0.09	0.39	0.47	0.23	0.29	0.52	0.46	0.49	0.95

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Table 14: Continued

	Product	2013 At Sea	2013 Shoreside	2013 All	2014 At Sea	2014 Shoreside	2014 All	2015 At Sea	2015 Shoreside	2015 All	2016 At Sea	2016 Shoreside	2016 All	2017 At Sea	2017 Shoreside	2017 All
Atka Mackerel	Whole Fish	2.91	*	2.91	3.17	0.08	3.25	3.31	*	3.31	2.13	0.01	2.14	6.40	*	6.40
	Head And Gut	11.14	-	11.14	17.12	-	17.12	29.09	-	29.09	30.53	-	30.53	35.45	-	35.45
	Other Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
	All Products	14.05	0.00	14.05	20.29	0.08	20.38	32.40	0.00	32.40	32.66	0.01	32.67	41.85	0.00	41.86
Yellowfin	Whole Fish	8.43	*	8.43	16.72	*	16.72	7.18	-	7.18	9.76	-	9.76	9.23	-	9.23
	Head And Gut	85.76	-	85.76	76.69	-	76.69	66.73	-	66.73	68.36	-	68.36	67.77	-	67.77
	Fillets	-	-	-	-	-	-	-	-	-	-	-	-	*	-	*
	Other Products	0.37	0.02	0.40	0.36	0.02	0.38	0.08	0.01	0.09	0.16	0.01	0.16	0.09	0.00	0.10
	All Products	94.56	0.02	94.59	93.77	0.02	93.79	73.98	0.01	73.99	78.28	0.01	78.28	77.10	0.00	77.10
Rock Sole	Whole Fish	0.57	*	0.57	2.53	*	2.53	0.47	-	0.47	0.63	*	0.63	1.56	*	1.56
	Head And Gut	29.50	-	29.50	25.87	-	25.87	24.48	-	24.48	23.90	-	23.90	17.33	-	17.33
	Fillets	*	-	*	0.00	-	0.00	0.01	-	0.01	*	-	*	*	*	*
	Other Products	0.46	0.10	0.57	0.31	0.08	0.38	0.12	0.06	0.18	0.08	0.08	0.16	0.13	0.07	0.20
	All Products	30.53	0.10	30.64	28.71	0.08	28.79	25.08	0.06	25.13	24.61	0.08	24.69	19.02	0.07	19.09
Flathead Sole	Whole Fish	0.51	*	0.51	0.56	0.13	0.69	0.26	0.01	0.26	0.52	*	0.52	0.10	*	0.10
	Head And Gut	7.12	-	7.12	6.96	-	6.96	4.45	-	4.45	4.13	-	4.13	4.03	-	4.03
	Fillets	-	-	-	*	-	*	0.00	-	0.00	-	-	-	-	-	-
	Other Products	0.30	0.11	0.41	0.25	0.09	0.34	0.30	0.08	0.37	0.11	0.05	0.16	0.05	0.05	0.11
	All Products	7.93	0.11	8.04	7.77	0.21	7.99	5.00	0.09	5.09	4.75	0.05	4.81	4.19	0.05	4.25

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Table 14: Continued

	Product	2013 At Sea	2013 Shoreside	2013 All	2014 At Sea	2014 Shoreside	2014 All	2015 At Sea	2015 Shoreside	2015 All	2016 At Sea	2016 Shoreside	2016 All	2017 At Sea	2017 Shoreside	2017 All
Arrowtooth	Whole Fish	*	*	*	0.03	*	0.03	*	*	*	0.25	*	0.25	*	-	*
	Head And Gut	7.13	-	7.13	6.89	-	6.89	4.73	*	4.73	4.39	-	4.39	3.46	-	3.46
	Fillets	-	*	*	-	-	-	-	-	-	-	-	-	-	-	-
	Other Products	0.06	0.12	0.18	0.05	0.09	0.14	0.03	0.03	0.06	0.01	0.02	0.03	0.01	0.02	0.03
	All Products	7.19	0.12	7.31	6.98	0.09	7.06	4.75	0.03	4.79	4.64	0.02	4.67	3.46	0.02	3.48
Kamchatka Flounder	Whole Fish	*	-	*	-	-	-	-	-	-	*	-	*	-	-	-
	Head And Gut	6.08	-	6.08	5.33	-	5.33	2.79	-	2.79	2.72	-	2.72	2.05	-	2.05
	Fishmeal	0.01	-	0.01	0.01	-	0.01	0.01	-	0.01	0.00	-	0.00	0.00	-	0.00
	All Products	6.09	-	6.09	5.34	-	5.34	2.80	-	2.80	2.72	-	2.72	2.05	-	2.05
Turbot	Whole Fish	-	-	-	-	*	*	-	*	*	0.03	-	0.03	-	-	-
	Head And Gut	0.78	-	0.78	0.75	*	0.75	1.19	-	1.19	1.29	*	1.29	1.75	-	1.75
	Other Products	0.24	0.00	0.24	0.23	0.00	0.24	0.43	0.00	0.43	0.51	0.00	0.51	0.68	0.00	0.68
	All Products	1.02	0.00	1.02	0.99	0.00	0.99	1.63	0.00	1.63	1.83	0.00	1.83	2.43	0.00	2.43
Other Flatfish	Whole Fish	1.03	*	1.03	1.58	*	1.58	2.37	*	2.37	2.05	*	2.05	1.33	0.04	1.37
	Head And Gut	6.22	-	6.22	6.67	-	6.67	5.73	-	5.73	4.79	*	4.79	7.11	*	7.11
	Fillets	-	-	-	-	-	-	-	-	-	-	-	-	-	*	*
	Other Products	0.18	0.01	0.18	0.09	0.01	0.11	0.01	0.02	0.02	0.02	0.01	0.03	0.01	0.01	0.02
	All Products	7.42	0.01	7.42	8.34	0.01	8.36	8.11	0.02	8.13	6.87	0.01	6.87	8.45	0.04	8.49
Pacific Ocean Perch	Whole Fish	0.11	0.12	0.23	*	0.21	0.21	-	0.37	0.37	0.31	0.43	0.74	0.41	0.41	0.82
	Head And Gut	15.25	0.00	15.26	15.95	*	15.95	14.90	*	14.90	14.15	*	14.15	13.82	*	13.82
	Other Products	0.02	0.01	0.03	0.04	0.01	0.05	0.09	0.07	0.16	0.21	0.02	0.23	0.27	0.03	0.30
	All Products	15.38	0.13	15.51	15.98	0.23	16.21	14.99	0.44	15.42	14.67	0.45	15.12	14.50	0.44	14.94

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Table 14: Continued

	Product	2013			2014			2015			2016			2017		
		At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
Northern Rockfish	Whole Fish	*	*	*	*	0.00	0.00	-	0.01	0.01	-	0.00	0.00	-	*	*
	Head And Gut	0.75	*	0.75	1.22	-	1.22	3.59	-	3.59	1.96	-	1.96	2.03	-	2.03
	Other Products	0.00	*	0.00	0.01	0.00	0.01	0.01	*	0.01	0.01	0.00	0.01	0.00	*	0.00
	All Products	0.76	*	0.76	1.23	0.01	1.24	3.59	0.01	3.60	1.97	0.00	1.97	2.03	*	2.03
Other Rockfish	Whole Fish	0.25	-	0.25	0.24	0.02	0.26	0.10	*	0.10	0.15	*	0.15	0.17	0.00	0.18
	Head And Gut	0.32	0.02	0.34	0.31	0.02	0.33	0.25	0.02	0.27	0.29	0.02	0.30	0.27	0.01	0.28
	Other Products	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01
	All Products	0.57	0.02	0.60	0.55	0.04	0.59	0.35	0.03	0.38	0.44	0.02	0.46	0.45	0.02	0.47
Other Groundfish	Whole Fish	*	0.09	0.09	*	0.34	0.34	*	0.38	0.38	0.00	0.15	0.16	*	0.26	0.26
	Head And Gut	0.00	-	0.00	0.01	*	0.01	0.01	*	0.01	0.01	-	0.01	0.01	*	0.01
	Fillets	-	-	-	-	-	-	-	-	-	*	-	*	-	-	-
	Fishmeal	0.11	0.05	0.16	0.10	0.17	0.27	0.05	0.48	0.53	0.05	0.15	0.19	0.06	0.17	0.23
	Other Products	1.86	0.03	1.89	2.26	0.12	2.38	2.06	0.31	2.37	1.79	0.02	1.81	2.40	*	2.40
	All Products	1.97	0.17	2.14	2.37	0.63	3.00	2.12	1.17	3.30	1.85	0.32	2.17	2.48	0.43	2.91

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Table 14: Continued

		2013			2014			2015			2016			2017		
	Product	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
All Species	Whole Fish	15.97	2.27	18.24	25.34	2.66	28.00	14.90	1.84	16.75	17.29	1.71	19.00	19.48	0.97	20.45
	Head And Gut	290.20	19.72	309.92	280.06	22.53	302.58	268.26	16.38	284.64	269.78	14.58	284.36	259.81	12.75	272.56
	Roe	8.75	7.94	16.70	12.40	11.66	24.06	12.59	8.52	21.12	10.96	5.43	16.39	12.17	8.46	20.63
	Fillets	0.28	8.51	8.79	0.15	8.27	8.42	0.21	6.08	6.28	0.14	9.89	10.03	0.14	9.88	10.01
	Deep-Skin Fillets	36.83	14.76	51.59	32.68	11.01	43.69	34.56	9.22	43.77	38.24	8.55	46.79	45.10	13.03	58.13
	Other Fillets	59.63	59.66	119.28	63.68	68.41	132.09	57.44	65.80	123.24	49.61	64.89	114.50	42.13	56.69	98.82
	Surimi	80.85	80.81	161.66	87.81	83.52	171.33	95.94	91.80	187.74	100.51	90.31	190.82	102.60	94.13	196.73
	Minced Fish	23.47	7.27	30.74	19.98	6.09	26.06	19.71	5.47	25.19	22.38	11.69	34.07	17.05	9.44	26.49
	Fishmeal	21.09	32.94	54.03	23.36	33.77	57.13	26.50	35.07	61.57	27.20	36.40	63.60	28.01	34.86	62.87
	Other Products	20.05	26.84	46.89	20.22	29.91	50.13	20.97	27.28	48.24	24.03	34.48	58.51	24.09	32.76	56.85
	All Products	557.13	260.72	817.84	565.67	277.82	843.49	551.07	267.46	818.53	560.13	277.94	838.06	550.58	272.96	823.54

Notes: Total includes additional species not listed in the production details as well as confidential data from Tables 28 and 29. These estimates are for catch from both federal and state of Alaska fisheries. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 15: Bering Sea & Aleutian Islands gross value of groundfish products by species, 2013-2017, ($ million).

		2013			2014			2015			2016			2017		
	Product	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
Pollock	Whole Fish	0.1	1.8	1.9	0.3	0.8	1.1	1.1	0.8	1.9	0.1	0.5	0.6	0.0	0.2	0.3
	Head And Gut	58.3	5.2	63.5	49.4	3.9	53.3	35.6	*	35.6	48.9	0.0	48.9	29.0	-	29.0
	Roe	68.8	33.2	102.0	83.8	46.9	130.7	69.9	24.8	94.7	72.4	17.1	89.4	85.9	31.0	116.9
	Deep-Skin Fillets	138.8	45.7	184.5	116.6	36.4	153.0	120.3	29.9	150.2	142.7	26.3	169.0	150.1	41.3	191.4
	Other Fillets	169.5	189.6	359.0	181.1	195.5	376.6	176.1	172.6	348.7	141.9	191.3	333.2	107.8	145.8	253.5
	Surimi	192.4	164.9	357.2	228.4	186.5	414.9	268.4	204.4	472.8	291.9	210.2	502.1	370.2	207.2	577.4
	Minced Fish	35.3	10.4	45.7	26.1	7.9	33.9	29.1	7.9	37.1	39.7	19.2	58.9	26.1	13.1	39.2
	Fishmeal	40.7	52.2	92.9	47.2	47.0	94.2	53.7	47.8	101.5	50.3	53.4	103.7	45.7	50.7	96.4
	Other Products	15.2	19.5	34.7	14.0	20.6	34.6	14.4	18.1	32.5	20.4	25.2	45.6	16.1	17.9	34.0
	All Products	719.0	522.6	1,241.6	747.0	545.4	1,292.4	768.7	506.3	1,275.0	808.3	543.2	1,351.5	830.8	507.3	1,338.1
Pacific Cod	Whole Fish	2.2	0.4	2.6	0.1	1.7	1.8	0.1	0.5	0.6	2.1	0.7	2.8	0.4	*	0.4
	Head And Gut	200.0	26.1	226.1	237.0	41.4	278.4	266.8	36.3	303.1	250.6	30.7	281.4	287.9	32.5	320.4
	Roe	0.7	4.7	5.4	1.4	6.1	7.5	0.8	3.0	3.8	0.6	2.3	2.8	0.6	2.7	3.4
	Fillets	0.7	54.3	55.0	0.3	49.5	49.8	0.5	36.4	36.9	0.4	74.1	74.5	0.5	81.2	81.7
	Other Products	5.0	9.5	14.6	4.9	10.9	15.9	11.1	9.5	20.5	15.0	11.8	26.9	13.6	15.2	28.7
	All Products	208.6	95.0	303.6	243.8	109.6	353.4	279.2	85.7	365.0	268.8	119.5	388.3	303.1	131.6	434.7
Sablefish	Head And Gut	5.1	9.9	15.0	2.5	8.0	10.5	1.5	6.2	7.8	3.0	4.9	7.9	4.7	7.2	11.9
	Other Products	0.0	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.5	0.6
	All Products	5.1	9.9	15.0	2.5	8.0	10.5	1.6	6.3	7.8	3.0	5.0	8.0	4.8	7.7	12.5

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Table 15: Continued

		2013			2014			2015			2016			2017		
	Product	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
Atka Mackerel	Whole Fish	5.3	*	5.3	4.6	0.1	4.7	3.9	*	3.9	4.1	0.0	4.1	11.9	*	11.9
	Head And Gut	32.4	-	32.4	56.9	-	56.9	69.1	-	69.1	69.6	-	69.6	114.8	-	114.8
	Other Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	All Products	37.7	0.0	37.7	61.5	0.1	61.6	73.0	0.0	73.0	73.7	0.0	73.7	126.6	0.0	126.6
Yellowfin	Whole Fish	24.9	*	24.9	17.0	*	17.0	7.0	-	7.0	10.6	-	10.6	12.4	-	12.4
	Head And Gut	95.7	-	95.7	76.9	-	76.9	71.2	-	71.2	83.3	-	83.3	98.2	-	98.2
	Fillets	-	-	-	-	-	-	-	-	-	-	-	-	*	-	*
	Other Products	1.1	0.1	1.1	0.7	0.0	0.8	0.2	0.0	0.2	0.3	0.0	0.3	0.2	0.0	0.2
	All Products	121.7	0.1	121.7	94.6	0.0	94.7	78.4	0.0	78.4	94.2	0.0	94.2	110.8	0.0	110.8
Rock Sole	Whole Fish	0.6	*	0.6	2.9	*	2.9	0.5	-	0.5	0.8	*	0.8	2.0	*	2.0
	Head And Gut	37.1	-	37.1	31.4	-	31.4	29.4	-	29.4	33.0	-	33.0	28.0	-	28.0
	Fillets	*	-	*	0.0	-	0.0	0.0	-	0.0	*	-	*	*	*	*
	Other Products	1.3	0.3	1.6	0.6	0.2	0.8	0.2	0.1	0.3	0.1	0.1	0.3	0.2	0.1	0.3
	All Products	39.1	0.3	39.4	35.0	0.2	35.2	30.2	0.1	30.3	33.9	0.1	34.0	30.2	0.1	30.3
Flathead Sole	Whole Fish	1.5	*	1.5	0.8	0.1	0.9	0.3	0.0	0.3	0.6	*	0.6	0.1	*	0.1
	Head And Gut	13.4	-	13.4	10.8	-	10.8	6.2	-	6.2	6.9	-	6.9	7.7	-	7.7
	Fillets	-	-	-	*	-	*	0.0	-	0.0	-	-	-	-	-	-
	Other Products	0.9	0.3	1.2	0.5	0.2	0.7	0.6	0.1	0.7	0.2	0.1	0.2	0.1	0.1	0.2
	All Products	15.8	0.3	16.1	12.1	0.3	12.3	7.0	0.2	7.2	7.7	0.1	7.8	7.9	0.1	8.0

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Table 15: Continued

	Product	2013			2014			2015			2016			2017		
		At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
Arrowtooth	Whole Fish	*	*	*	0.0	*	0.0	*	*	*	0.3	*	0.3	*	-	*
	Head And Gut	9.9	-	9.9	12.5	-	12.5	7.7	*	7.7	8.3	-	8.3	9.9	-	9.9
	Fillets	-	*	*	-	-	-	-	-	-	-	-	-	-	-	-
	Other Products	0.2	0.4	0.5	0.1	0.2	0.3	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	All Products	10.0	0.4	10.4	12.7	0.2	12.8	7.8	0.1	7.8	8.6	0.0	8.7	9.9	0.0	9.9
Kamchatka Flounder	Whole Fish	*	-	*	-	-	-	-	-	-	*	-	*	-	-	-
	Head And Gut	7.4	-	7.4	8.7	-	8.7	4.1	-	4.1	5.0	-	5.0	6.7	-	6.7
	Fishmeal	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0
	All Products	7.4	-	7.4	8.7	-	8.7	4.1	-	4.1	5.0	-	5.0	6.7	-	6.7
Turbot	Whole Fish	-	-	-	-	*	*	-	*	*	0.1	-	0.1	-	-	-
	Head And Gut	3.3	-	3.3	3.5	*	3.5	5.3	-	5.3	7.2	*	7.2	9.3	-	9.3
	Other Products	0.8	0.0	0.8	1.0	0.0	1.0	1.6	0.0	1.6	2.0	0.0	2.0	2.2	0.0	2.2
	All Products	4.1	0.0	4.1	4.4	0.0	4.4	6.9	0.0	6.9	9.3	0.0	9.3	11.5	0.0	11.5
Other Flatfish	Whole Fish	2.0	*	2.0	2.3	*	2.3	2.7	*	2.7	2.7	*	2.7	2.3	0.1	2.4
	Head And Gut	6.8	-	6.8	7.2	-	7.2	5.8	-	5.8	5.0	*	5.0	12.7	*	12.7
	Fillets	-	-	-	-	-	-	-	-	-	-	-	-	-	*	*
	Other Products	0.5	0.0	0.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	All Products	9.3	0.0	9.3	9.7	0.0	9.8	8.4	0.0	8.5	7.7	0.0	7.7	15.0	0.1	15.2
Pacific Ocean Perch	Whole Fish	0.1	0.2	0.3	*	0.3	0.3	-	0.5	0.5	0.4	0.5	1.0	0.5	0.5	1.0
	Head And Gut	36.1	0.0	36.1	42.2	*	42.2	34.9	*	34.9	29.1	*	29.1	34.6	*	34.6
	Other Products	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.3	0.3	0.0	0.3	0.4	0.0	0.4
	All Products	36.3	0.2	36.4	42.3	0.3	42.6	35.1	0.6	35.7	29.8	0.6	30.3	35.5	0.5	36.1

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Table 15: Continued

	Product	2013 At Sea	2013 Shoreside	2013 All	2014 At Sea	2014 Shoreside	2014 All	2015 At Sea	2015 Shoreside	2015 All	2016 At Sea	2016 Shoreside	2016 All	2017 At Sea	2017 Shoreside	2017 All
Northern Rockfish	Whole Fish	*	*	*	*	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	*	*
	Head And Gut	1.2	*	1.2	2.5	-	2.5	5.9	-	5.9	2.8	-	2.8	3.4	-	3.4
	Other Products	0.0	*	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	0.0	*	0.0
	All Products	1.2	*	1.2	2.5	0.0	2.5	5.9	0.0	5.9	2.8	0.0	2.8	3.4	*	3.4
Other Rockfish	Whole Fish	0.8	-	0.8	1.1	0.0	1.1	0.4	*	0.4	0.7	*	0.7	0.9	0.0	0.9
	Head And Gut	1.0	0.2	1.2	0.8	0.1	0.9	0.6	0.2	0.8	0.7	0.1	0.8	0.7	0.1	0.7
	Other Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	All Products	1.9	0.2	2.1	1.9	0.1	2.0	1.0	0.2	1.2	1.4	0.1	1.5	1.6	0.1	1.6
Other Groundfish	Whole Fish	*	0.0	0.0	*	0.5	0.5	*	0.4	0.4	0.0	0.3	0.3	*	0.5	0.5
	Head And Gut	0.0	-	0.0	0.0	*	0.0	0.0	*	0.0	0.0	-	0.0	0.0	*	0.0
	Fillets	-	-	-	-	-	-	-	-	-	*	-	*	-	-	-
	Fishmeal	0.2	0.1	0.2	0.1	0.2	0.3	0.1	0.9	1.0	0.1	0.2	0.3	0.1	0.3	0.4
	Other Products	3.6	0.1	3.7	3.7	0.7	4.3	3.9	1.1	5.1	2.8	0.2	3.0	4.5	*	4.5
	All Products	3.8	0.1	4.0	3.8	1.4	5.2	4.1	2.5	6.6	2.9	0.7	3.7	4.6	0.8	5.3

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Table 15: Continued

	Product	2013			2014			2015			2016			2017		
		At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
All Species	Whole Fish	37.7	2.4	40.1	29.3	3.5	32.7	15.9	2.2	18.1	22.6	2.0	24.6	30.6	1.3	31.9
	Head And Gut	507.6	41.3	548.9	542.3	53.3	595.7	544.1	42.7	586.9	553.4	35.8	589.1	647.6	39.8	687.5
	Roe	69.4	37.9	107.4	85.2	53.1	138.2	70.7	27.8	98.5	72.9	19.3	92.3	86.6	33.7	120.3
	Fillets	0.7	54.3	55.0	0.4	49.5	49.8	0.6	36.4	37.0	0.4	74.1	74.5	0.5	81.2	81.7
	Deep-Skin Fillets	138.8	45.7	184.5	116.6	36.4	153.0	120.3	29.9	150.2	142.7	26.3	169.0	150.1	41.3	191.4
	Other Fillets	169.5	189.6	359.0	181.1	195.5	376.6	176.1	172.6	348.7	141.9	191.3	333.2	107.8	145.8	253.5
	Surimi	192.4	164.9	357.2	228.4	186.5	414.9	268.4	204.4	472.8	291.9	210.2	502.1	370.2	207.2	577.4
	Minced Fish	35.3	10.4	45.7	26.1	7.9	33.9	29.1	7.9	37.1	39.7	19.2	58.9	26.1	13.1	39.2
	Fishmeal	40.9	52.3	93.1	47.4	47.2	94.5	53.8	48.7	102.5	50.4	53.6	104.0	45.8	51.0	96.8
	Other Products	28.7	30.2	58.9	25.8	32.8	58.6	32.3	29.3	61.6	41.2	37.6	78.8	37.1	33.9	71.1
	All Products	1,220.9	629.1	1,849.9	1,282.5	665.7	1,948.2	1,311.3	601.9	1,913.3	1,357.1	669.4	2,026.5	1,502.4	648.4	2,150.7

Notes: Total includes additional species not listed in the production details as well as confidential data from Tables 28 and 29. These estimates are for catch from both federal and state of Alaska fisheries. Values are not adjusted for inflation. “*” indicates a confidential value; “-” indicates no applicable data or value.

Source: NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 16: Bering Sea & Aleutian Islands price per pound of groundfish products by species and processing mode, 2013-2017, ($/lb).

		2013		2014		2015		2016		2017	
	Product	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside
Pollock	Whole Fish	0.40	0.49	0.46	0.32	0.45	0.51	0.35	0.34	0.29	0.42
	Head And Gut	0.71	0.64	0.64	0.64	0.64	*	0.78	0.41	0.54	-
	Roe	3.73	2.72	3.25	2.39	2.64	1.67	3.14	2.03	3.33	2.09
	Deep-Skin Fillets	1.71	1.41	1.62	1.50	1.58	1.47	1.69	1.39	1.51	1.44
	Other Fillets	1.29	1.44	1.29	1.30	1.39	1.19	1.30	1.34	1.16	1.17
	Surimi	1.08	0.93	1.18	1.01	1.27	1.01	1.32	1.06	1.64	1.00
	Minced Fish	0.68	0.65	0.59	0.59	0.67	0.66	0.80	0.74	0.69	0.63
	Fishmeal	0.88	0.72	0.92	0.63	0.92	0.63	0.84	0.67	0.74	0.66
	Other Products	0.57	0.43	0.47	0.42	0.52	0.38	0.64	0.42	0.55	0.33
	All Products	1.17	1.04	1.18	1.04	1.22	0.97	1.26	1.01	1.33	0.96
Pacific Cod	Whole Fish	0.50	0.45	0.36	0.97	0.34	0.57	0.71	0.69	0.87	*
	Head And Gut	1.10	0.77	1.32	0.98	1.43	1.03	1.35	0.98	1.63	1.20
	Roe	0.77	0.89	0.90	1.00	0.60	0.77	0.51	0.64	0.62	0.71
	Fillets	1.07	2.89	0.94	2.71	1.18	2.72	1.37	3.40	1.79	3.73
	Other Products	0.53	0.77	0.74	0.70	0.96	0.82	1.03	0.75	0.87	0.90
	All Products	1.06	1.34	1.29	1.31	1.39	1.32	1.31	1.63	1.56	1.89
Sablefish	Head And Gut	5.67	6.39	7.48	6.70	8.60	7.43	6.24	7.93	5.12	7.22
	Other Products	0.87	*	0.50	2.67	1.93	2.30	0.83	3.17	0.87	6.31
	All Products	5.40	6.39	7.01	6.64	8.34	7.37	6.02	7.74	4.68	7.16
Atka Mackerel	Whole Fish	0.83	*	0.66	0.60	0.53	*	0.86	0.62	0.84	*
	Head And Gut	1.32	-	1.51	-	1.08	-	1.03	-	1.47	-
	Other Products	1.00	1.10	1.15	0.51	0.87	0.88	0.73	0.74	0.55	0.81
	All Products	1.22	1.09	1.37	0.60	1.02	0.88	1.02	0.66	1.37	0.81

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Table 16: Continued

	Product	2013 At-sea	2013 Shoreside	2014 At-sea	2014 Shoreside	2015 At-sea	2015 Shoreside	2016 At-sea	2016 Shoreside	2017 At-sea	2017 Shoreside
Yellowfin	Whole Fish	1.34	*	0.46	*	0.45	-	0.49	-	0.61	-
	Head And Gut	0.51	-	0.45	-	0.48	-	0.55	-	0.66	-
	Fillets	-	-	-	-	-	-	-	-	*	-
	Other Products	1.30	1.30	0.90	0.92	1.02	0.87	0.86	0.73	0.74	0.80
	All Products	0.58	1.30	0.46	0.92	0.48	0.87	0.55	0.73	0.65	0.80
Rock Sole	Whole Fish	0.50	*	0.53	*	0.50	-	0.59	*	0.59	*
	Head And Gut	0.54	-	0.45	-	0.49	-	0.56	-	0.65	-
	Head And Gut With Roe	0.85	-	0.85	-	0.89	-	1.00	-	1.24	-
	Fillets	*	-	5.70	-	2.78	-	*	-	*	*
	Other Products	1.26	1.30	0.92	0.92	0.87	0.87	0.78	0.73	0.63	0.80
	All Products	0.58	1.30	0.55	0.92	0.55	0.87	0.62	0.73	0.72	0.80
Flathead Sole	Whole Fish	1.38	*	0.62	0.37	0.44	0.55	0.57	*	0.61	*
	Head And Gut	0.85	-	0.70	-	0.63	-	0.76	-	0.87	-
	Fillets	-	-	*	-	2.33	-	-	-	-	-
	Other Products	1.35	1.30	0.93	0.92	0.87	0.87	0.66	0.73	0.59	0.80
	All Products	0.90	1.30	0.70	0.59	0.64	0.84	0.74	0.73	0.86	0.80
Arrowtooth	Whole Fish	*	*	0.54	*	*	*	0.56	*	*	-
	Head And Gut	0.63	-	0.82	-	0.74	*	0.86	-	1.30	-
	Fillets	-	*	-	-	-	-	-	-	-	-
	Other Products	1.27	1.30	0.92	0.92	0.87	0.87	0.64	0.73	0.65	0.80
	All Products	0.63	1.30	0.82	0.92	0.74	0.87	0.84	0.73	1.30	0.80
Kamchatka Flounder	Whole Fish	*	-	-	-	-	-	*	-	-	-
	Head And Gut	0.55	-	0.74	-	0.67	-	0.83	-	1.48	-
	Fishmeal	1.29	-	0.92	-	0.94	-	0.86	-	0.67	-
	All Products	0.55	-	0.74	-	0.67	-	0.83	-	1.48	-

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Table 16: Continued

	Product	2013		2014		2015		2016		2017	
		At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside
Turbot	Whole Fish	-	-	-	*	-	*	1.97	-	-	-
	Head And Gut	1.92	-	2.09	*	2.01	-	2.52	*	2.41	-
	Other Products	1.53	1.33	1.84	0.93	1.69	0.88	1.76	0.73	1.45	0.80
	All Products	1.83	1.33	2.03	0.93	1.93	0.88	2.30	0.73	2.14	0.80
Other Flatfish	Whole Fish	0.90	*	0.67	*	0.51	*	0.59	*	0.78	1.62
	Head And Gut	0.49	-	0.49	-	0.46	-	0.47	*	0.81	*
	Fillets	-	-	-	-	-	-	-	-	-	*
	Other Products	1.26	1.30	0.90	0.92	0.88	0.87	0.76	0.73	0.65	0.80
	All Products	0.57	1.30	0.53	0.92	0.47	0.87	0.51	0.73	0.81	1.49
Pacific Ocean Perch	Whole Fish	0.59	0.59	*	0.55	-	0.56	0.65	0.58	0.57	0.54
	Head And Gut	1.07	0.60	1.20	*	1.06	*	0.93	*	1.14	*
	Other Products	0.92	1.01	0.80	0.80	0.87	0.87	0.60	0.73	0.60	0.80
	All Products	1.07	0.61	1.20	0.56	1.06	0.61	0.92	0.58	1.11	0.56
Northern Rockfish	Whole Fish	*	*	*	0.58	-	0.46	-	0.67	-	*
	Head And Gut	0.70	*	0.92	-	0.75	-	0.64	-	0.77	-
	Other Products	0.92	*	0.80	0.80	0.87	*	0.59	0.73	0.61	*
	All Products	0.70	*	0.92	0.74	0.75	0.46	0.64	0.71	0.77	*
Other Rockfish	Whole Fish	1.48	-	2.08	0.92	1.72	*	2.27	*	2.29	0.69
	Head And Gut	1.47	3.80	1.18	2.42	1.08	3.28	1.06	2.95	1.14	2.42
	Other Products	1.47	3.07	0.92	0.58	0.99	1.35	0.78	1.40	0.75	0.77
	All Products	1.47	3.68	1.57	1.49	1.26	3.08	1.47	2.83	1.58	1.93
Other Groundfish	Whole Fish	*	0.10	*	0.72	*	0.53	1.02	0.96	*	0.80
	Head And Gut	1.14	-	0.75	*	0.64	*	1.83	-	0.78	*
	Fillets	-	-	-	-	-	-	*	-	-	-
	Fishmeal	0.73	0.53	0.59	0.50	0.87	0.87	0.68	0.73	0.71	0.78
	Other Products	0.89	1.05	0.74	2.49	0.87	1.69	0.72	4.01	0.84	*
	All Products	0.88	0.40	0.73	1.00	0.87	0.97	0.72	1.03	0.84	0.79

Notes: These estimates are based on data from both federal and state of Alaska fisheries. Prices based on confidential data have been excluded. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 17: Bering Sea & Aleutian Islands total product value per round metric ton of retained catch by processor type, species, and year, 2013-2017, ($/mt).

	Species	2013	2014	2015	2016	2017
Motherships	Pollock	808	1,035	971	909	*
	Pacific Cod	555	388	464	709	*
Catcher/processors	Pollock	1,036	1,023	1,047	1,090	1,128
	Sablefish	7,806	9,747	10,660	7,708	5,760
	Pacific Cod	1,180	1,421	1,579	1,484	1,756
	Flatfish	768	693	691	789	969
	Rockfish	1,173	1,369	1,141	977	1,162
	Atka Mackerel	1,681	2,019	1,391	1,363	1,977
	Other	482	457	509	426	473
Shoreside processors	Pollock	950	980	887	929	860
	Sablefish	9,901	9,563	13,156	12,327	11,282
	Pacific Cod	1,397	1,489	1,391	1,566	1,719
	Flatfish	1,102	553	564	1,024	709
	Rockfish	1,422	935	1,071	1,151	965
	Other	433	1,611	1,776	1,823	1,257

Notes: These estimates include the product value of catch from both federal and state of Alaska fisheries. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea and Shoreside Production Reports; ADF&G Commercial Operators Annual Reports (COAR); and NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 18: Bering Sea & Aleutian Islands number of processors, gross product value, value per processor, and percent value of BSAI FMP groundfish of processed groundfish by processor group, 2013-2017 ($ millions).

	Year	Processors	Wholesale Value ($million)	Wholesale Value Per Processor ($1,000)	Percent Value, BSAI FMP Groundfish
AFA CP	2013	15	642.79	42,852.36	36.56
	2014	16	644.77	40,298.40	34.73
	2015	16	663.09	41,442.94	36.33
	2016	15	684.55	45,636.76	35.41
	2017	16	748.00	46,749.75	36.34
A80	2013	18	296.23	16,456.97	16.85
	2014	18	309.44	17,191.11	16.67
	2015	18	293.37	16,298.26	16.07
	2016	19	320.59	16,873.12	16.58
	2017	19	392.41	20,653.02	19.07
CP Hook and Line	2013	33	165.66	5,019.98	9.42
	2014	31	200.22	6,458.80	10.78
	2015	31	230.85	7,446.68	12.65
	2016	32	211.38	6,605.62	10.93
	2017	29	246.04	8,484.12	11.95
Sablefish IFQ	2013	7	4.11	587.12	0.23
	2014	8	2.14	267.57	0.12
	2015	5	1.44	287.33	0.08
	2016	7	1.40	200.13	0.07
	2017	6	1.68	280.06	0.08
Motherships & Inshore Floating Procs.	2013	3	89.54	29,845.92	5.09
	2014	3	115.13	38,376.24	6.20
	2015	3	111.49	37,162.50	6.11
	2016	4	106.69	26,673.75	5.52
	2017	2	*	*	*
BSAI Shoreside Processors	2013	9	537.29	59,699.10	30.56
	2014	8	573.97	71,746.19	30.92
	2015	6	513.67	85,611.13	28.15
	2016	7	576.25	82,321.86	29.81
	2017	7	555.74	79,391.83	27.00

Notes: The data are for catch from both federal and state of Alaska fisheries. The processor groups are defined as follows: "AFA CP" are the AFA catcher processors. "A80" are the catcher processors as defined under Amendment 80 of the BSAI FMP. "CP Hook and Line" are the hook and line catcher processors. "Sablefish IFQ" are processors processing sablefish IFQ. Values are not adjusted for inflation.

Source: ADF&G Commercial Operators Annual Reports (COAR); and ADF&G Intent to Operate (ITO) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 19: Bering Sea & Aleutian Islands number of vessels, average and median length, and average and median capacity (tonnage) of vessels that caught groundfish by vessel type, and gear, 2013-2017.

	Year	Vessels	Average Length (feet)	Median Length (feet)	Average Capacity (tons)	Median Capacity (tons)
AFA CV	2013	88	127	124	163	134
	2014	88	128	124	163	133
	2015	86	127	124	162	134
	2016	89	126	123	158	133
	2017	86	125	123	156	133
AFA CP	2013	16	300	296	1,673	1,592
	2014	17	289	285	1,599	1,592
	2015	17	289	285	1,617	1,592
	2016	16	302	296	1,711	1,592
	2017	16	290	285	1,565	1,592
A80	2013	18	180	185	420	426
	2014	18	186	185	426	426
	2015	18	184	185	428	426
	2016	19	185	185	444	426
	2017	19	180	185	476	473
BSAI Trawl	2013	15	140	144	271	276
	2014	12	127	130	193	148
	2015	14	118	108	151	132
	2016	13	133	130	243	132
	2017	16	123	123	175	132
CV Hook and Line	2013	4	52	56	36	37
	2014	3	49	48	35	37
	2015	2	56	58	42	43
	2017	2	57	59	43	47
CP Hook and Line	2013	31	146	136	323	258
	2014	30	146	136	344	260
	2015	30	145	136	333	258
	2016	31	146	136	338	258
	2017	28	148	141	350	296
Sablefish IFQ	2013	31	87	94	96	111
	2014	23	91	98	105	111
	2015	19	77	58	89	98
	2016	21	88	98	105	111
	2017	19	87	72	114	97

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Table 19: Continued

	Year	Vessels	Average Length (feet)	Median Length (feet)	Average Capacity (tons)	Median Capacity (tons)
Pot	2013	59	91	58	127	105
	2014	55	84	58	116	105
	2015	48	86	58	123	105
	2016	56	80	58	114	105
	2017	64	83	58	119	105
Jig	2013	6	36	38	14	15
	2014	3	31	32	19	18
	2015	4	32	33	15	14
	2016	2	42	42	25	26
	2017	1	42	42	26	26
No Fleet/ Other	2013	4	30	26	10	5
	2014	2	48	48	28	28
	2015	1	48	48	28	28
	2017	2	31	30	14	13

Notes: These estimates include only vessels fishing part of federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 20: Bering Sea & Aleutian Islands number of vessels that caught groundfish by month, vessel type, and gear, 2014-2018.

		Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Catcher Vessels	Hook & Line	2014	5	4	5	6	5	7	10	8	9	7	4	2	21
		2015	3	2	4	3	7	6	6	7	8	9	3	1	21
		2016	1	-	1	1	3	5	7	6	7	4	-	-	16
		2017	-	1	2	2	4	2	4	4	9	2	-	-	15
	Pot	2014	41	22	18	19	14	1	1	1	14	13	11	12	54
		2015	29	27	21	15	1	2	2	1	13	21	9	16	47
		2016	28	29	33	31	3	1	1	1	10	21	17	18	54
		2017	48	21	25	25	7	4	1	-	11	13	15	33	63
		2018	-	-	-	-	-	-	-	-	-	-	-	1	1
	Trawl	2014	42	81	81	65	2	71	72	71	55	4	1	-	100
		2015	70	86	88	62	5	73	70	74	65	27	4	-	100
		2016	72	91	91	69	8	60	70	69	53	16	1	-	101
		2017	71	92	79	70	6	68	69	65	46	14	2	-	102
	All Gear	2014	88	107	104	90	21	79	83	80	78	24	14	14	173
		2015	102	115	113	79	13	81	78	82	86	57	16	17	165
		2016	101	120	125	101	14	66	78	76	70	41	18	18	170
		2017	119	114	106	97	17	74	74	69	66	29	17	33	178
		2018	-	-	-	-	-	-	-	-	-	-	-	1	1
Catcher Processors	Hook & Line	2014	26	26	28	25	18	20	26	25	25	27	27	24	31
		2015	26	27	28	24	22	18	22	25	28	27	27	28	31
		2016	28	29	28	21	11	19	25	25	25	25	26	23	32
		2017	27	27	26	21	11	20	25	26	25	24	24	24	29
	Pot	2014	4	4	2	1	1	-	-	-	3	3	3	1	4
		2015	4	4	2	2	1	-	-	1	4	4	4	1	4
		2016	5	3	3	2	-	-	-	1	3	3	1	3	5
		2017	5	2	2	2	-	-	-	1	5	5	2	3	6
	Trawl	2014	30	34	34	21	19	31	29	30	28	18	14	4	34
		2015	34	34	33	21	19	30	27	28	28	20	14	3	34
		2016	32	32	33	25	20	29	30	30	32	24	12	4	35
		2017	26	33	33	27	19	29	32	32	29	19	14	2	35
	All Gear	2014	60	64	64	47	38	51	55	55	56	48	44	29	68
		2015	64	65	63	47	42	48	49	54	60	51	45	32	69
		2016	65	64	64	48	31	48	55	56	60	52	39	30	71
		2017	58	62	61	50	30	49	57	58	59	48	40	29	68

Notes: These estimates include only vessels fishing part of federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 21: Bering Sea & Aleutian Islands catcher vessel (excluding catcher/processors) weeks of fishing groundfish by vessel-length class (feet), gear, and target, 2013-2017.

		Hook & Line		Pot			Trawl			All Gear		
	Year	<60ft	60-125ft	<60ft	60-125ft	>=125ft	<60ft	60-125ft	>=125ft	<60ft	60-125ft	>=125ft
Pollock	2013	-	-	-	-	-	-	902	608	-	902	608
	2014	-	-	-	-	-	-	838	551	-	838	551
	2015	-	-	-	-	-	-	904	612	-	904	612
	2016	-	-	-	-	-	-	863	568	-	863	568
	2017	-	-	-	-	-	-	862	498	-	862	498
Sablefish	2013	88	14	-	35	20	-	-	-	88	49	20
	2014	77	19	-	34	15	-	-	-	77	53	15
	2015	69	14	6	18	4	-	-	-	75	32	4
	2016	31	13	-	21	8	-	-	-	31	34	8
	2017	26	7	-	25	12	-	-	-	26	32	12
Pacific Cod	2013	72	-	221	124	31	8	264	40	301	388	71
	2014	103	-	345	115	29	13	247	35	461	362	64
	2015	48	-	312	117	15	-	265	32	360	382	47
	2016	13	-	423	149	15	-	278	38	436	427	53
	2017	18	-	393	172	39	-	214	30	411	386	69
Flatfish	2013	-	-	-	-	-	-	0	47	-	0	47
	2014	-	-	-	-	-	-	2	31	-	2	31
	2015	-	-	-	-	-	-	27	30	-	27	30
	2016	-	-	-	-	-	-	42	34	-	42	34
	2017	-	-	-	-	-	-	48	53	-	48	53
Rockfish	2013	-	-	-	-	-	-	-	9	-	-	9
	2014	1	-	-	-	-	-	-	11	1	-	11
	2015	1	-	-	-	-	-	4	9	1	4	9
	2016	-	-	-	-	-	-	2	4	-	2	4
	2017	-	-	-	-	-	-	3	4	-	3	4
Atka Mackerel	2013	-	-	-	-	-	-	-	7	-	-	7
	2014	-	-	-	-	-	-	-	12	-	-	12
	2015	-	-	-	-	-	-	5	10	-	5	10
	2016	-	-	-	-	-	-	6	13	-	6	13
	2017	-	-	-	-	-	-	5	15	-	5	15
All Groundfish	2013	160	14	-	-	-	8	1,166	710	389	1,340	761
	2014	181	19	-	-	-	13	1,086	640	539	1,254	684
	2015	117	14	-	-	-	-	1,205	692	435	1,354	711
	2016	43	13	-	-	-	-	1,191	657	466	1,373	680
	2017	44	7	-	-	-	-	1,132	600	437	1,335	651

Notes: These estimates include only vessels fishing part of federal TACs. A vessel that fished more than one category in a week is apportioned a partial week based on catch weight. A target is determined based on vessel, week, processing mode, NMFS area, and gear. All groundfish include additional target categories. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 22: Bering Sea & Aleutian Islands catcher/processor vessel weeks of fishing groundfish by vessel-length class (feet), gear, and target, 2013-2017.

		Hook & Line			Pot			Trawl			All Gear			
	Year	<60ft	60-124ft	125-230ft	<60ft	60-124ft	125-230ft	60-124ft	125-230ft	>230ft	<60ft	60-124ft	125-230ft	>230ft
Pollock	2013	-	-	-	-	-	-	3	14	309	-	3	14	309
	2014	-	-	-	-	-	-	1	14	305	-	1	14	305
	2015	-	-	-	-	-	-	1	6	310	-	1	6	310
	2016	-	-	-	-	-	-	1	4	303	-	1	4	303
	2017	-	-	-	-	-	-	0	5	301	-	0	5	301
Sablefish	2013	-	84	3	-	-	-	0	0	-	-	84	3	-
	2014	-	41	2	-	-	-	-	0	-	-	41	2	-
	2015	-	38	0	-	-	-	-	-	-	-	38	0	-
	2016	11	26	0	-	-	-	-	0	-	11	26	0	-
	2017	19	-	1	-	9	-	1	0	-	19	10	1	-
Pacific Cod	2013	-	239	718	-	-	54	5	11	5	-	244	783	5
	2014	7	250	817	-	19	53	0	9	12	7	269	879	12
	2015	9	253	812	-	23	62	1	11	9	9	277	885	9
	2016	9	223	766	17	13	54	1	17	11	26	237	837	11
	2017	8	180	790	13	20	44	1	11	7	21	201	845	7
Flatfish	2013	-	1	15	-	-	-	105	401	87	-	106	416	87
	2014	-	5	12	-	-	-	92	415	81	-	97	427	81
	2015	-	2	26	-	-	-	105	395	51	-	107	421	51
	2016	-	-	25	-	-	-	100	427	60	-	100	452	60
	2017	-	-	26	-	-	-	88	406	52	-	88	432	52
Rockfish	2013	-	2	0	-	-	-	0	40	16	-	2	40	16
	2014	-	1	-	-	-	-	3	34	12	-	4	34	12
	2015	-	0	-	-	-	-	3	36	17	-	3	36	17
	2016	-	2	1	-	-	-	0	39	8	-	2	40	8
	2017	-	-	-	-	-	-	3	45	4	-	3	45	4
Atka Mackerel	2013	-	-	-	-	-	-	0	33	13	-	0	33	13
	2014	-	-	-	-	-	-	-	40	19	-	-	40	19
	2015	-	-	-	-	-	-	-	66	27	-	-	66	27
	2016	-	-	-	-	-	-	-	80	23	-	-	80	23
	2017	-	-	-	-	-	-	7	105	11	-	7	105	11
All Groundfish	2013	-	326	736	-	-	54	113	498	428	-	439	1,289	428
	2014	7	298	831	-	19	53	96	513	428	7	413	1,397	428
	2015	9	293	838	-	23	62	110	513	415	9	426	1,413	415
	2016	20	251	792	17	13	54	101	567	405	37	365	1,413	405
	2017	27	180	818	13	29	44	99	574	375	40	308	1,436	375

Notes: These estimates include only vessels fishing part of federal TACs. A vessel that fished more than one category in a week is apportioned a partial week based on catch weight. A target is determined based on vessel, week, processing mode, NMFS area, and gear. All groundfish include additional target categories. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 23: Bering Sea & Aleutian Islands catcher vessel crew weeks in the groundfish fisheries by month, 2013-2017.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2013	883	1,639	1,964	841	164	1,070	1,402	1,530	863	518	184	33	11,090
2014	790	1,519	1,968	858	293	907	1,290	1,602	972	374	218	106	10,896
2015	972	1,656	1,724	567	132	854	1,240	1,722	1,114	644	142	136	10,904
2016	948	1,901	1,796	1,271	138	692	1,529	1,254	850	521	187	157	11,245
2017	1,340	1,966	1,827	1,314	290	825	1,451	1,144	1,120	346	258	260	12,141

Notes: Crew weeks are calculated by summing weekly reported crew size over vessels and time period. These estimates include only vessels targeting groundfish counted toward federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea Production Reports. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 24: Bering Sea & Aleutian Islands at-sea processor vessel crew weeks in the groundfish fisheries by month, 2013-2017.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2013	4,694	13,341	16,032	4,875	3,756	8,744	9,974	13,745	8,716	5,773	4,581	2,506	96,737
2014	4,472	13,482	16,511	4,776	4,981	8,841	11,722	14,986	8,523	4,935	4,706	2,384	100,319
2015	7,843	13,467	12,837	5,523	5,003	7,875	10,938	14,849	9,239	6,836	3,458	2,228	100,096
2016	7,231	13,368	12,458	6,661	3,785	6,339	13,126	11,701	9,298	7,213	3,109	2,109	96,398
2017	6,262	12,766	12,818	7,720	3,454	6,229	14,396	11,861	9,409	4,968	3,641	2,055	95,579

Notes: Crew weeks are calculated by summing weekly reported crew size over vessels and time period. These estimates include only vessels targeting groundfish counted toward federal TACs. Catcher processors typically account for 90-95% of the total at-sea crew weeks in all areas. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea Production Reports. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 25: Gulf of Alaska groundfish retained catch by vessel type, gear, and species, 2013-2017 (1,000 metric tons, round weight).

		Central Gulf				Western Gulf				All Gulf			
	Year	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear
Pollock	2013	0.1	-	80.6	80.7	*	-	7.6	7.6	0.1	-	93.7	93.8
	2014	0.1	-	124.1	124.2	0	-	13.1	13.2	0.2	-	140.9	141.1
	2015	0.1	-	132.7	132.9	0	-	25.8	25.8	0.2	-	162.8	163.0
	2016	0.1	-	110.9	111.1	0	-	61.0	61.0	0.2	-	175.8	176.0
	2017	0.1	-	133.1	133.2	0	-	49.2	49.2	0.1	-	184.2	184.3
Pacific Cod	2013	8.2	15.6	13.2	36.9	4.2	15.5	6.1	25.8	13.5	31.0	19.3	63.9
	2014	10.5	21.0	15.5	47.0	6.5	17.1	7.7	31.2	18.2	38.1	23.2	79.5
	2015	9.4	23.1	14.2	46.7	5.0	17.1	7.2	29.3	16.1	40.1	21.3	77.6
	2016	5.1	20.6	7.7	33.4	4.2	17.0	7.4	28.6	10.5	37.6	15.1	63.2
	2017	3.8	11.3	5.3	20.5	4.4	15.0	7.6	27.0	8.7	26.3	12.9	48.0
Sablefish	2013	4.3	-	0.6	4.9	1.3	-	*	1.3	11.2	-	0.6	11.9
	2014	3.8	-	0.7	4.5	1.1	-	0.1	1.2	9.6	-	0.9	10.5
	2015	3.6	-	0.6	4.3	0.9	-	0	1.0	9.3	-	0.8	10.1
	2016	3.2	-	0.7	3.8	0.9	-	0	0.9	8.2	-	0.9	9.0
	2017	3.0	0.4	0.7	4.2	0.8	0.2	0.1	1.1	8.2	0.9	1.0	10.1
Atka Mackerel	2013	-	-	0.5	0.5	-	-	0.2	0.2	-	-	0.8	0.8
	2014	-	-	0.7	0.7	-	-	0.2	0.2	-	-	0.9	0.9
	2015	*	-	0.5	0.5	-	-	0.3	0.3	*	-	0.9	0.9
	2016	-	-	0.8	0.8	-	-	0.1	0.1	-	-	0.9	0.9
	2017	-	-	0.2	0.2	*	-	0.4	0.4	*	-	0.7	0.7
Arrowtooth	2013	0	-	15.8	15.8	0	-	0.1	0.1	0	-	16.0	16.0
	2014	0	-	31.3	31.3	0	-	0.6	0.6	0	-	31.9	31.9
	2015	0	-	16.7	16.7	*	-	0.3	0.3	0	-	16.9	16.9
	2016	0	-	17.5	17.5	0	-	0.2	0.2	0	-	17.7	17.7
	2017	0	-	24.8	24.8	0	-	0.1	0.1	0	-	24.9	24.9
Flathead Sole	2013	*	-	1.9	1.9	-	-	0.1	0.1	*	-	2.0	2.0
	2014	-	-	2.1	2.1	-	-	0.1	0.1	-	-	2.2	2.2
	2015	-	-	1.6	1.6	-	-	0.1	0.1	-	-	1.7	1.7
	2016	-	-	2.2	2.2	-	-	0.1	0.1	-	-	2.2	2.2
	2017	-	-	1.9	1.9	-	-	0	0	-	-	1.9	1.9

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Table 25: Continued

	Year	Central Gulf Hook And Line	Central Gulf Pot	Central Gulf Trawl	Central Gulf All Gear	Western Gulf Hook And Line	Western Gulf Pot	Western Gulf Trawl	Western Gulf All Gear	All Gulf Hook And Line	All Gulf Pot	All Gulf Trawl	All Gulf All Gear
Rex Sole	2013	-	-	3.5	3.5	-	-	0	0	-	-	3.5	3.5
	2014	-	-	3.4	3.4	-	-	0	0	-	-	3.4	3.4
	2015	-	-	1.9	1.9	-	-	0	0	-	-	1.9	1.9
	2016	-	-	1.5	1.5	-	-	0	0	-	-	1.5	1.5
	2017	-	-	1.2	1.2	-	-	0	0	-	-	1.2	1.2
Shallow-water Flatfish	2013	*	-	5.2	5.2	-	-	0	0	*	-	5.2	5.2
	2014	*	-	4.2	4.2	*	-	0	0	*	-	4.2	4.2
	2015	*	-	2.9	2.9	-	-	0	0	*	-	2.9	2.9
	2016	*	-	3.6	3.6	-	-	0	0	*	-	3.6	3.6
	2017	-	-	2.0	2.0	*	-	0	0	*	-	2.0	2.0
Deep-water Flatfish	2013	0	-	0.1	0.1	0	-	0	0	0	-	0.1	0.1
	2014	*	-	0.2	0.2	*	-	0	0	*	-	0.2	0.2
	2015	*	-	0.1	0.1	-	-	*	*	*	-	0.1	0.1
	2016	*	-	0.1	0.1	*	-	*	*	*	-	0.1	0.1
	2017	*	-	0.1	0.1	0	-	0	0	0	-	0.1	0.1
Pacific Ocean Perch	2013	*	-	10.4	10.4	*	-	0.2	0.2	*	-	10.7	10.7
	2014	*	-	12.1	12.1	*	-	2.0	2.0	*	-	14.2	14.2
	2015	*	-	14.1	14.1	-	-	1.9	1.9	*	-	16.0	16.0
	2016	-	-	16.1	16.1	*	-	2.4	2.4	*	-	18.5	18.5
	2017	0	-	14.9	14.9	*	-	2.6	2.6	0	-	17.5	17.5
Northern Rockfish	2013	*	-	2.5	2.5	*	-	2.2	2.2	*	-	4.7	4.7
	2014	0	-	3.3	3.3	*	-	0.8	0.8	0	-	4.1	4.1
	2015	*	-	2.8	2.8	*	-	0.9	0.9	*	-	3.8	3.8
	2016	*	-	3.2	3.2	0	-	0.1	0.1	0	-	3.2	3.2
	2017	0	-	1.5	1.5	0	-	0.2	0.2	0	-	1.7	1.7

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Table 25: Continued

		Central Gulf				Western Gulf				All Gulf			
	Year	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear
Dusky Rockfish	2013	0	-	2.8	2.8	-	-	0.2	0.2	0	-	3.0	3.0
	2014	0	-	2.7	2.8	*	-	0.1	0.1	0	-	2.9	2.9
	2015	0	-	2.4	2.5	*	-	0.2	0.2	0	-	2.6	2.6
	2016	0	-	3.1	3.1	0	-	0.1	0.1	0.1	-	3.1	3.2
	2017	0	-	2.3	2.3	0	-	0.1	0.1	0	-	2.4	2.4
Other Rockfish	2013	0.4	-	0.8	1.2	0.1	-	0	0.1	1.2	-	0.9	2.1
	2014	0.3	-	1.5	1.8	0.1	-	0.2	0.3	1.0	-	1.8	2.8
	2015	0.4	-	1.1	1.5	0.1	-	0.1	0.2	1.1	-	1.3	2.4
	2016	0.3	-	1.6	1.9	0.1	-	0.2	0.3	1.0	-	1.9	2.9
	2017	0.3	-	1.3	1.6	0.1	-	0.1	0.2	1.0	-	1.6	2.5
Other Groundfish	2013	0.5	-	2.0	2.6	0	-	0	0.2	0.7	-	2.0	2.9
	2014	0.5	-	0.9	1.8	0.1	-	0	0.2	0.6	-	1.0	2.1
	2015	0.6	-	0.9	1.8	0.1	-	*	0.1	0.8	-	1.0	2.1
	2016	0.2	-	1.1	1.4	0.1	-	0	0.2	0.4	-	1.1	1.7
	2017	0.1	-	0.8	1.0	0.2	-	0	0.2	0.3	-	0.8	1.3

Notes: The estimates are of retained catch (i.e., excludes discarded catch). All groundfish include additional species categories. These estimates include only catch counted against federal TACs. Includes FMP groundfish catch on halibut targets. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 26: Gulf of Alaska groundfish retained catch by species, gear, and target fishery, 2016-2017, (1,000 metric tons, round weight).

Gear	Area	Year	Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	Other	All Species
Hook and Line	Central Gulf	2016	Pollock, Bottom	*	-	*	-	-	-	-	-	-	-	-	*
			Sablefish	*	2.9	0	*	-	-	*	-	0.2	-	0	3.2
			Pacific Cod	0.1	*	5.1	*	-	-	-	*	0	-	0.1	5.4
			Rockfish	0	-	0	-	-	-	-	-	0	-	-	0
			All Targets	0.1	3.2	5.1	*	-	-	*	*	0.4	-	0.2	9.0
		2017	Sablefish	-	2.8	0	0	-	-	*	-	0.2	-	0	3.1
			Pacific Cod	0.1	0	3.8	-	-	-	-	-	0	-	0.1	3.9
			Rockfish	*	*	0	-	-	-	-	-	0	-	-	0
			All Targets	0.1	3.0	3.8	0	-	-	*	-	0.3	-	0.1	7.4
	Western Gulf	2016	Sablefish	*	0.9	0	*	-	-	*	-	0.1	-	*	1.0
			Pacific Cod	0	*	4.2	*	-	-	-	-	0	-	0.1	4.3
			All Targets	0	0.9	4.2	*	-	-	*	-	0.1	-	0.1	5.4
		2017	Sablefish	*	0.8	*	*	-	-	*	-	0.1	-	-	0.8
			Pacific Cod	0	*	4.4	0	-	-	0	*	0.1	*	0.2	4.7
			All Targets	0	0.8	4.4	0	-	-	0	*	0.1	*	0.2	5.5
	All Gulf	2016	Pollock, Bottom	*	-	*	-	-	-	-	-	-	-	-	*
			Sablefish	*	7.6	0	*	-	-	*	-	0.6	-	0	8.3
			Pacific Cod	0.2	*	10.2	*	-	-	-	*	0.1	-	0.3	10.7
			Rockfish	0	-	0	-	-	-	-	-	0.1	-	-	0.1
			All Targets	0.2	8.2	10.3	0	-	-	*	*	1.0	-	0.3	20.0
		2017	Sablefish	*	7.7	0	0	-	-	*	-	0.6	-	0	8.3
			Pacific Cod	0.1	0	8.6	0	-	-	0	*	0.1	*	0.3	9.1
			Rockfish	*	0	0	-	-	-	-	-	0.1	-	-	0.1
			All Targets	0.1	8.2	8.7	0	-	-	0	*	1.0	*	0.3	18.3
Pot	Central Gulf	2016	Pacific Cod	0	-	20.6	-	-	-	-	*	*	*	0.1	20.8
			All Targets	0	-	20.6	-	-	-	-	*	*	*	0.1	20.8
		2017	Sablefish	-	0.4	*	*	-	-	-	-	0	-	-	0.4
			Pacific Cod	0	*	11.3	*	*	-	-	*	0	-	0.1	11.5
			All Targets	0	0.4	11.3	*	*	-	-	*	0	-	0.1	11.9

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Table 26: Continued

			Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	Other	All Species
Pot	Western Gulf	2016	Pacific Cod	*	-	17.0	*	*	-	-	*	*	*	0.1	17.0
			All Targets	*	-	17.0	*	*	-	-	*	*	*	0.1	17.0
		2017	Pollock, Bottom	-	-	*	-	-	-	-	-	-	-	-	*
			Sablefish	-	0.2	-	-	-	-	-	-	*	-	-	0.2
			Pacific Cod	0	-	15.0	*	*	-	-	0	*	*	0.1	15.1
			All Targets	0	0.2	15.0	*	*	-	-	0	*	*	0.1	15.3
	All Gulf	2016	Sablefish	-	*	-	-	-	-	-	-	-	-	-	*
			Pacific Cod	0	-	37.6	*	*	-	-	*	*	*	0.2	37.8
			All Targets	0	*	37.6	*	*	-	-	*	*	*	0.2	37.8
		2017	Pollock, Bottom	-	-	*	-	-	-	-	-	-	-	-	*
			Sablefish	-	0.9	*	*	-	-	-	-	0	-	-	0.9
			Pacific Cod	0	*	26.3	*	*	-	-	0	0	*	0.2	26.6
			All Targets	0	0.9	26.3	*	*	-	-	0	0	*	0.2	27.5
Trawl	Central Gulf	2016	Pollock, Bottom	8.5	0.1	0.6	0.7	0.2	0.1	0	0.2	0.2	0.2	0.1	10.9
			Pollock, Pelagic	101.5	0	0.1	0.2	0	0	0	0	0.2	0	0.1	102.3
			Sablefish	-	0.1	0	0	*	0	0	*	0	-	*	0.2
			Pacific Cod	0.2	0	5.1	0.8	0.2	0.1	0	0.6	0	0	0.2	7.2
			Arrowtooth	0.5	0.1	1.3	14.1	1.2	0.9	0	0.4	0.9	0	0.5	20.0
			Flathead Sole	0	0	0	0.1	0.2	*	*	0	0	-	0	0.3
			Rex Sole	0	*	0	0	0	0.1	*	0	0	*	0	0.2
			Flatfish, Shallow	0	0	0.2	0.1	0.1	0	0	0.9	0	0	0.1	1.4
			Rockfish	0.1	0.3	0.3	1.1	0	0.1	0	0	22.4	0.4	0	24.8
			Atka Mackerel	-	*	*	*	*	*	*	*	*	*	*	*
			All Targets	110.9	0.6	7.6	17.0	2.0	1.4	0.1	2.2	23.8	0.6	1.1	167.3
		2017	Pollock, Bottom	6.8	0	0.5	1.0	0.2	0.1	0	0.3	0.1	0	0.1	9.0
			Pollock, Pelagic	124.7	0	0	0.1	0	0	*	0	0.4	*	0	125.2
			Sablefish	*	0.1	*	*	*	*	0	*	0	-	*	0.1
			Pacific Cod	0.4	0	3.3	0.2	0.1	0	*	0.6	0.1	0	0.1	4.8
			Arrowtooth	0.7	0.2	1.2	21.9	1.4	1.0	0.1	0.4	1.2	0.1	0.4	28.5
			Flathead Sole	-	-	-	-	*	-	-	-	-	-	-	*
			Rex Sole	*	*	*	*	*	*	*	*	*	*	*	*
			Flatfish, Shallow	0	0	0.1	0.1	0	0	*	0.3	0	*	0	0.6
			Rockfish	0.5	0.3	0.2	1.3	0.1	0.1	0	0	18.2	0.1	0.1	20.8
			All Targets	133.1	0.7	5.3	24.6	1.8	1.2	0.1	1.5	19.9	0.2	0.8	189.1

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Table 26: Continued

			Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	Other	All Species
Trawl	Western Gulf	2016	Pollock, Bottom	0.8	-	0	*	*	*	-	*	0	-	0	0.9
			Pollock, Pelagic	59.8	0	0.1	0.1	0	0	-	0	0	0	0	60.2
			Pacific Cod	*	*	7.2	0	0	*	-	*	*	*	0	7.2
			Arrowtooth	*	*	*	*	*	*	*	*	*	*	*	*
			Flathead Sole	*	*	*	*	*	*	-	*	*	-	-	*
			Rockfish	0.3	0	0	0	0	0	*	0	2.7	0.1	*	3.3
			All Targets	61.0	0	7.4	0.2	0.1	0	*	0	2.8	0.1	0	71.5
		2017	Pollock, Bottom	0.3	*	0	*	*	*	-	-	*	*	*	0.3
			Pollock, Pelagic	48.6	0	0	0.1	0	0	*	0	0	0	0	48.7
			Pacific Cod	0	*	7.5	0	0	*	-	*	*	*	0	7.5
			Arrowtooth	*	*	*	*	*	*	-	*	*	-	*	*
			Flathead Sole	*	-	*	*	*	*	-	-	*	-	*	*
			Rex Sole	*	*	*	*	*	*	-	-	*	-	*	*
			Rockfish	0.3	0.1	0.1	0	0	0	0	0	2.9	0.4	0	3.9
			Atka Mackerel	*	*	*	*	*	*	-	*	*	*	*	*
			All Targets	49.2	0.1	7.6	0.1	0	0	0	0	3.0	0.4	0	60.4

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Table 26: Continued

			Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	Other	All Species
Trawl	All Gulf	2016	Pollock, Bottom	9.4	0.1	0.6	0.7	0.2	0.1	0	0.2	0.2	0.2	0.1	11.8
			Pollock, Pelagic	165.3	0	0.2	0.3	0.1	0	0	0	0.3	0	0.2	166.4
			Sablefish	-	0.1	0	0	*	0	0	*	0	-	*	0.2
			Pacific Cod	0.2	0	12.3	0.8	0.2	0.1	0	0.6	0	0	0.2	14.4
			Arrowtooth	0.5	0.1	1.3	14.1	1.2	0.9	0	0.4	0.9	0	0.5	20.0
			Flathead Sole	0	0	0	0.1	0.2	*	*	0	0	-	0	0.3
			Rex Sole	0	*	0	0	0	0.1	*	0	0	*	0	0.2
			Flatfish, Shallow	0	0	0.2	0.1	0.1	0	0	0.9	0	0	0.1	1.4
			Rockfish	0.4	0.3	0.3	1.1	0	0.1	0	0	25.2	0.5	0	28.1
			Atka Mackerel	-	*	*	*	*	*	*	*	*	*	*	*
			All Targets	175.8	0.7	14.9	17.2	2.0	1.4	0.1	2.2	26.6	0.7	1.1	242.8
		2017	Pollock, Bottom	7.1	0	0.6	1.0	0.2	0.1	0	0.3	0.1	0	0.1	9.3
			Pollock, Pelagic	175.2	0	0.1	0.1	0	0	*	0	0.4	0	0	175.9
			Sablefish	*	0.1	*	*	*	*	0	*	0	-	*	0.1
			Pacific Cod	0.4	0	10.8	0.2	0.1	0	*	0.6	0.1	0	0.1	12.3
			Arrowtooth	0.7	0.2	1.2	21.9	1.4	1.0	0.1	0.4	1.2	0.1	0.4	28.5
			Flathead Sole	*	-	*	*	*	*	-	-	*	-	*	*
			Rex Sole	*	*	*	*	*	*	*	*	*	*	*	*
			Flatfish, Shallow	0	0	0.1	0.1	0	0	*	0.3	0	*	0	0.6
			Rockfish	0.8	0.4	0.2	1.3	0.1	0.1	0	0	21.1	0.5	0.1	24.7
			Atka Mackerel	*	*	*	*	*	*	-	*	*	*	*	*
			All Targets	184.2	0.8	12.9	24.7	1.8	1.2	0.1	1.5	22.9	0.7	0.8	251.4
All Gear	Ctr. Gulf	2016	All Targets	111.0	3.8	33.3	17.0	2.0	1.4	0.1	2.2	24.2	0.6	1.4	197.1
		2017	All Targets	133.2	4.2	20.5	24.6	1.8	1.2	0.1	1.5	20.3	0.2	1.0	208.4
	West. Gulf	2016	All Targets	61.0	0.9	28.6	0.2	0.1	0	*	0	2.9	0.1	0.2	93.9
		2017	All Targets	49.2	1.1	27.0	0.1	0	0	0	0	3.1	0.4	0.2	81.2
	All Gulf	2016	All Targets	175.9	8.8	62.9	17.2	2.0	1.4	0.1	2.2	27.6	0.7	1.6	300.6
		2017	All Targets	184.3	9.9	47.9	24.7	1.8	1.2	0.1	1.5	23.9	0.7	1.3	297.1

Notes: Totals may include additional categories. The target is derived from an algorithm used to determine preponderance of catch, accounting for processor, trip, processing mode, NMFS area, and gear. These estimates include only catch counted against federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 27: Gulf of Alaska ex-vessel prices in the groundfish fisheries by gear, and species, 2013-2017; calculations based on COAR ($/lb, round weight).

	Year	Fixed	Trawl	All Gear
Pollock	2013	0.156	0.176	0.176
	2014	0.115	0.122	0.122
	2015	0.088	0.119	0.119
	2016	0.053	0.083	0.083
	2017	0.091	0.087	0.087
Pacific Cod	2013	0.273	0.244	0.264
	2014	0.307	0.271	0.297
	2015	0.306	0.260	0.293
	2016	0.302	0.270	0.294
	2017	0.336	0.329	0.334
Sablefish	2013	3.184	2.434	3.135
	2014	3.878	2.972	3.802
	2015	4.064	3.008	3.974
	2016	4.743	1.906	4.471
	2017	5.314	3.926	5.179
Atka Mackerel	2013	*	0.367	0.367
	2014	0.016	0.377	0.377
	2015	0.010	0.302	0.302
	2016	0.016	0.294	0.294
	2017	0.054	0.387	0.387
Arrowtooth	2013	0.019	0.084	0.084
	2014	0.241	0.115	0.115
	2015	0.337	0.113	0.113
	2016	0.105	0.085	0.085
	2017	0.096	0.108	0.108
Flathead Sole	2013	0.019	0.150	0.150
	2014	*	0.157	0.157
	2015	*	0.147	0.147
	2016	*	0.144	0.144
	2017	*	0.135	0.135
Rex Sole	2013	*	0.213	0.213
	2014	*	0.250	0.250
	2015	*	0.219	0.219
	2016	-	0.273	0.273
	2017	-	0.199	0.199
Shallow-water Flatfish	2013	0.045	0.207	0.207
	2014	0.278	0.209	0.209
	2015	0.133	0.198	0.198
	2016	0.105	0.142	0.142
	2017	0.096	0.158	0.158
Deep-water Flatfish	2013	0.019	0.104	0.103
	2014	0.241	0.113	0.113
	2015	0.336	0.102	0.102
	2016	0.105	0.098	0.098
	2017	0.096	0.110	0.110

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Table 27: Continued

	Year	Fixed	Trawl	All Gear
Pacific Ocean Perch	2013	0.360	0.208	0.208
	2014	0.637	0.182	0.182
	2015	0.193	0.187	0.187
	2016	*	0.186	0.186
	2017	0.441	0.178	0.178
Northern Rockfish	2013	0.363	0.202	0.202
	2014	0.258	0.176	0.176
	2015	*	0.177	0.177
	2016	0.627	0.171	0.171
	2017	0.748	0.172	0.172
Dusky Rockfish	2013	0.360	0.201	0.202
	2014	0.443	0.178	0.180
	2015	0.368	0.179	0.182
	2016	0.422	0.176	0.180
	2017	0.549	0.171	0.177
Other Rockfish	2013	0.879	0.240	0.589
	2014	0.818	0.229	0.438
	2015	0.775	0.216	0.466
	2016	0.788	0.200	0.398
	2017	0.850	0.195	0.443

Notes: Prices are for catch from both federal and state of Alaska fisheries. The unfrozen landings price is calculated as landed value divided by estimated or actual round weight. Prices for catch processed by an at-sea processor without a COAR buying record (e.g., from catcher processors) are set using the prices for the matching species (group), region and gear-types for which buying records exist. Trawl-caught sablefish, rockfish and flatfish in the GOA and trawl-caught Atka mackerel in both the GOA and the GOA are not well represented in the COAR buying records. A price was calculated for these categories from product-report prices; the price in this case is the value of the first wholsale products divided by the calculated round weight and multiplied by a constant 0.4 to correct for value added by processing. The “All Alaska/All gear” column is the average weighted by retianed catch. Values are not adjusted for inflation. “*” indicates a confidential value; “-” indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea Production Reports; andADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 28: Gulf of Alaska ex-vessel value of the groundfish catch by vessel category, gear, and species, 2013-2017; calculations based on COAR ($ millions).

		Central Gulf				Western Gulf				All Gulf			
	Year	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear
Pollock	2013	-	-	31.27	31.31	-	-	2.96	2.96	-	-	36.38	36.42
	2014	-	-	33.35	33.39	-	-	3.46	3.47	-	-	37.80	37.85
	2015	-	-	34.83	34.86	-	-	7.49	7.50	-	-	43.55	43.60
	2016	-	-	20.33	20.35	-	-	11.17	11.17	-	-	32.24	32.26
	2017	-	-	25.45	25.47	-	-	9.41	9.42	-	-	35.23	35.25
Pacific Cod	2013	4.91	9.31	7.12	21.33	2.64	9.27	3.30	15.21	8.25	18.57	10.42	37.24
	2014	7.11	14.24	9.29	30.65	4.41	11.57	4.60	20.58	12.37	25.81	13.89	52.08
	2015	6.36	15.62	8.13	30.11	3.32	11.57	4.18	19.07	10.79	27.18	12.32	50.29
	2016	3.41	13.78	4.58	21.77	2.70	11.35	4.41	18.47	6.86	25.13	8.99	40.98
	2017	2.82	8.43	3.87	15.13	3.15	11.19	5.50	19.84	6.33	19.62	9.37	35.32
Sablefish	2013	30.18	-	3.48	33.65	9.12	-	0.07	9.19	78.63	-	4.29	83.19
	2014	32.29	-	4.55	36.84	9.37	-	0.39	9.76	82.36	-	5.82	88.18
	2015	32.41	-	4.29	36.70	8.25	-	0.23	8.47	83.27	-	5.78	89.04
	2016	33.21	-	3.55	36.76	9.48	-	0.05	9.53	85.48	-	3.66	89.13
	2017	35.51	5.18	6.28	46.97	9.29	2.63	0.56	12.47	95.74	10.98	8.49	115.20
Atka Mackerel	2013	-	-	0.49	0.49	-	-	0.20	0.20	-	-	0.68	0.68
	2014	-	-	0.57	0.57	-	-	0.24	0.24	-	-	0.80	0.80
	2015	-	-	0.37	0.37	-	-	0.23	0.23	-	-	0.60	0.60
	2016	-	-	0.53	0.53	-	-	0.09	0.09	-	-	0.62	0.62
	2017	-	-	0.18	0.18	-	-	0.41	0.41	-	-	0.59	0.59
Arrowtooth	2013	0	-	2.94	2.94	0	-	0.04	0.04	0	-	2.98	2.98
	2014	0	-	7.95	7.95	0.01	-	0.39	0.40	0.01	-	8.35	8.36
	2015	0.01	-	4.16	4.17	0.01	-	0.08	0.08	0.02	-	4.24	4.26
	2016	0	-	3.27	3.27	0	-	0.13	0.13	0	-	3.40	3.40
	2017	0	-	5.91	5.91	0.01	-	0.03	0.03	0.01	-	5.94	5.95
Flathead Sole	2013	*	-	0.71	0.71	-	-	0.11	0.11	*	-	0.82	0.82
	2014	-	-	0.79	0.79	-	-	0.04	0.04	-	-	0.83	0.83
	2015	-	-	0.56	0.56	-	-	0.04	0.04	-	-	0.60	0.60
	2016	-	-	0.70	0.70	-	-	0.04	0.04	-	-	0.74	0.74
	2017	-	-	0.56	0.56	-	-	0.01	0.01	-	-	0.57	0.57

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Table 28: Continued

	Year	Central Gulf Hook And Line	Central Gulf Pot	Central Gulf Trawl	Central Gulf All Gear	Western Gulf Hook And Line	Western Gulf Pot	Western Gulf Trawl	Western Gulf All Gear	All Gulf Hook And Line	All Gulf Pot	All Gulf Trawl	All Gulf All Gear
Rex Sole	2013	-	-	1.68	1.68	-	-	0.03	0.03	-	-	1.71	1.71
	2014	-	-	1.91	1.91	-	-	0.04	0.04	-	-	1.95	1.95
	2015	-	-	0.91	0.91	-	-	0.02	0.02	-	-	0.93	0.93
	2016	-	-	0.97	0.97	-	-	0.04	0.04	-	-	1.01	1.01
	2017	-	-	0.61	0.61	-	-	0.01	0.01	-	-	0.63	0.63
Shallow-water Flatfish	2013	0	-	2.40	2.40	-	-	0.01	0.01	0	-	2.41	2.41
	2014	*	-	1.97	1.97	*	-	0.01	0.01	*	-	1.98	1.98
	2015	0	-	1.27	1.28	-	-	0.02	0.02	0	-	1.30	1.30
	2016	*	-	1.12	1.12	-	-	0	0	*	-	1.12	1.12
	2017	-	-	0.71	0.71	*	-	0	0	*	-	0.72	0.72
Deep-water Flatfish	2013	0	-	0.03	0.03	0	-	0	0	0	-	0.03	0.03
	2014	*	-	0.04	0.04	*	-	0.02	0.02	*	-	0.06	0.06
	2015	*	-	0.02	0.02	-	-	0.01	0.01	*	-	0.02	0.02
	2016	*	-	0.02	0.02	*	-	0	0	*	-	0.02	0.02
	2017	*	-	0.02	0.02	0	-	0	0	0	-	0.02	0.02
Pacific Ocean Perch	2013	*	-	4.79	4.79	*	-	0.09	0.09	*	-	5.58	5.58
	2014	*	-	4.86	4.86	*	-	0.83	0.83	*	-	6.42	6.42
	2015	*	-	5.82	5.82	-	-	0.80	0.80	*	-	7.43	7.43
	2016	-	-	6.61	6.61	*	-	1.01	1.01	*	-	8.77	8.77
	2017	0	-	5.88	5.88	*	-	1.03	1.03	0	-	7.99	7.99
Northern Rockfish	2013	0	-	1.10	1.10	*	-	0.99	0.99	0	-	2.09	2.09
	2014	0	-	1.27	1.27	*	-	0.33	0.33	0	-	1.60	1.60
	2015	*	-	1.08	1.08	*	-	0.39	0.39	*	-	1.47	1.47
	2016	*	-	1.19	1.19	0	-	0.04	0.04	0	-	1.22	1.23
	2017	0	-	0.57	0.57	0	-	0.08	0.08	0	-	0.64	0.64

Continued on next page.

Table 28: Continued

	Year	Central Gulf				Western Gulf				All Gulf			
		Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear	Hook And Line	Pot	Trawl	All Gear
Dusky Rockfish	2013	0.01	-	1.22	1.23	-	-	0.09	0.09	0.02	-	1.31	1.33
	2014	0.02	-	1.07	1.09	*	-	0.05	0.05	0.02	-	1.12	1.14
	2015	0.02	-	0.96	0.98	0	-	0.07	0.07	0.02	-	1.03	1.05
	2016	0.04	-	1.18	1.23	0	-	0.03	0.03	0.05	-	1.21	1.27
	2017	0.02	-	0.86	0.88	0.02	-	0.03	0.05	0.04	-	0.89	0.94
Other Rockfish	2013	0.72	-	0.45	1.17	0.17	-	0.02	0.19	2.29	-	0.52	2.81
	2014	0.60	-	0.79	1.39	0.18	-	0.09	0.27	1.81	-	0.93	2.74
	2015	0.65	-	0.53	1.17	0.16	-	0.06	0.22	1.82	-	0.63	2.44
	2016	0.57	-	0.71	1.28	0.18	-	0.06	0.24	1.72	-	0.86	2.58
	2017	0.56	-	0.55	1.12	0.20	-	0.05	0.24	1.80	-	0.68	2.48
Other Groundfish	2013	0.51	-	1.86	2.46	0.05	-	0.01	0.17	0.67	-	1.91	2.79
	2014	0.49	-	0.89	1.81	0.06	-	0.03	0.19	0.64	-	0.99	2.16
	2015	0.54	-	0.93	1.80	0.12	-	0.01	0.15	0.79	-	1.02	2.16
	2016	0.17	-	1.05	1.36	0.08	-	0.01	0.16	0.30	-	1.08	1.58
	2017	0.10	-	0.81	1.04	0.14	-	0.02	0.22	0.27	-	0.83	1.29

Notes: Ex-vessel value is calculated by multiplying ex-vessel prices by the retained round weight catch. Refer to Table 18 for a description of the price derivation. The value added by at-sea processing is not included in these estimates of ex-vessel value. All groundfish includes additional species categories. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea Production Reports; andADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 29: Gulf of Alaska vessel and permit counts, ex-vessel value, value per vessel, and percent value of GOA FMP groundfish and all GOA fisheries by processor group, 2013-2017; calculations based on COAR ($ millions).

	Year	Vessels	Permits	Ex-vessel Value Per Vessel $1,000	Ex-vessel Value $million	Percent Value, GOA FMP Groundfish	Percent Value, All GOA Fisheries
Western Gulf Trawl	2013	40	14	198.15	7.93	4.54	0.90
	2014	35	13	302.18	10.58	5.26	1.56
	2015	34	14	401.21	13.64	6.83	2.13
	2016	40	16	416.61	16.66	9.45	3.09
	2017	42	15	407.72	17.12	8.52	2.24
Central Gulf Trawl	2013	66	22	911.90	60.19	34.46	6.86
	2014	69	20	1,013.18	69.91	34.74	10.32
	2015	62	18	1,035.36	64.19	32.15	10.01
	2016	63	17	706.55	44.51	25.23	8.26
	2017	58	13	902.62	52.35	26.06	6.85
CV Hook and Line	2013	116	35	53.09	6.16	3.53	0.70
	2014	101	37	72.38	7.31	3.63	1.08
	2015	108	33	66.74	7.21	3.61	1.12
	2016	101	31	31.86	3.22	1.82	0.60
	2017	86	35	34.78	2.99	1.49	0.39
CP Hook and Line	2013	8	9	429.05	3.43	1.97	0.39
	2014	10	10	426.78	4.27	2.12	0.63
	2015	11	11	429.37	4.72	2.37	0.74
	2016	11	11	292.28	3.22	1.82	0.60
	2017	9	9	479.74	4.32	2.15	0.57
Sablefish IFQ	2013	287	42	255.57	73.35	42.00	8.36
	2014	277	37	278.27	77.08	38.31	11.37
	2015	267	37	287.23	76.69	38.41	11.96
	2016	269	35	297.78	80.10	45.41	14.86
	2017	264	40	382.36	100.94	50.25	13.22
Pot	2013	129	26	145.59	18.78	10.75	2.14
	2014	102	24	261.05	26.63	13.23	3.93
	2015	116	25	237.44	27.54	13.79	4.29
	2016	119	26	215.45	25.64	14.54	4.76
	2017	110	26	180.20	19.82	9.87	2.60
Jig	2013	219	37	5.12	1.12	0.64	0.13
	2014	259	38	10.32	2.67	1.33	0.39
	2015	242	41	9.21	2.23	1.12	0.35
	2016	208	41	7.11	1.48	0.84	0.27
	2017	108	32	1.40	0.15	0.08	0.02

Notes: These tables include the value of groundfish purchases reported by processing plants, as well as by other entities, such as markets and restaurants, that normally would not report sales of groundfish products. Keep this in mind when comparing ex-vessel values in this table to gross processed-product values. The data are for catch from both federal and state of Alaska fisheries. Values are not adjusted for inflation.

Source: ADF&G Commercial Operators Annual Reports (COAR); and ADF&G Intent to Operate (ITO) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 30: Gulf of Alaska production of groundfish products by species, 2013-2017, (1,000 metric tons product weight).

	Product	2013	2014	2015	2016	2017
Pollock	Whole Fish	0.67	0.27	2.30	14.49	9.34
	Head And Gut	21.28	29.68	30.34	27.81	37.39
	Roe	2.21	3.51	3.12	0.54	1.09
	Deep-Skin Fillets	*	*	-	*	0.63
	Other Fillets	5.79	8.19	9.10	14.32	15.09
	Surimi	8.60	12.33	14.65	13.41	10.61
	Minced Fish	0.20	0.19	*	1.25	1.44
	Fishmeal	*	*	*	1.39	*
	Other Products	0.81	0.49	0.27	1.92	2.46
	All Products	39.56	54.66	59.78	75.14	78.06
Pacific Cod	Whole Fish	1.24	0.45	0.69	0.25	0.14
	Head And Gut	6.63	13.95	19.05	8.43	6.11
	Salted/Split	*	-	-	-	-
	Roe	1.59	1.79	1.34	0.78	1.04
	Fillets	9.70	9.85	6.39	7.87	6.52
	Other Products	4.63	5.03	4.52	4.33	3.58
	All Products	23.80	31.07	32.00	21.65	17.39
Sablefish	Head And Gut	6.24	5.60	5.35	5.03	5.28
	Other Products	0.46	0.39	0.24	0.30	0.36
	All Products	6.70	5.99	5.59	5.34	5.64
Atka Mackerel	Whole Fish	-	*	*	*	*
	Head And Gut	0.53	0.51	0.47	0.45	0.37
	Other Products	*	-	*	*	*
	All Products	0.53	0.51	0.47	0.45	0.37
Arrowtooth	Whole Fish	0.05	0.16	0.17	1.09	3.22
	Head And Gut	6.44	15.58	7.59	7.05	11.28
	Kirimi	*	*	*	-	-
	Fillets	0.03	*	*	*	*
	Other Products	0.04	*	0.08	0.14	*
	All Products	6.56	15.75	7.84	8.28	14.50
Flathead Sole	Whole Fish	0.51	0.81	0.34	0.74	0.45
	Head And Gut	0.82	0.45	0.40	0.38	0.46
	Kirimi	*	0.13	0.15	*	*
	Fillets	0.01	0.04	*	*	*
	Other Products	*	*	-	*	*
	All Products	1.33	1.44	0.89	1.11	0.91

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Table 30: Continued

	Product	2013	2014	2015	2016	2017
Rex Sole	Whole Fish	3.30	3.18	1.73	1.43	1.27
	Head And Gut	0.09	0.09	0.08	0.07	0.01
	Kirimi	*	-	-	-	-
	Fillets	0.01	*	*	*	0.00
	Other Products	*	*	-	*	*
	All Products	3.39	3.27	1.81	1.51	1.28
Shallow-water Flatfish	Whole Fish	1.32	1.45	0.37	0.93	0.89
	Head And Gut	1.33	0.87	0.60	0.66	0.21
	Kirimi	*	*	0.51	*	*
	Fillets	0.16	0.10	0.04	0.02	*
	Other Products	*	*	-	*	*
	All Products	2.81	2.42	1.53	1.61	1.11
Deep-water Flatfish	Whole Fish	0.07	0.06	*	0.00	*
	Head And Gut	0.02	0.06	0.00	0.05	*
	Fillets	0.01	0.02	*	*	*
	Other Products	-	-	-	-	*
	All Products	0.09	0.14	0.00	0.05	*
Pacific Ocean Perch	Whole Fish	2.47	2.75	3.13	5.13	2.71
	Head And Gut	4.73	6.31	6.96	8.33	8.19
	Other Products	0.08	0.09	0.05	0.03	0.16
	All Products	7.27	9.15	10.14	13.49	11.06
Northern Rockfish	Whole Fish	0.08	0.32	*	0.02	0.00
	Head And Gut	2.19	1.84	1.75	1.42	0.83
	Other Products	0.07	0.03	0.02	0.08	0.01
	All Products	2.34	2.18	1.77	1.51	0.84
Dusky Rockfish	Whole Fish	0.33	0.26	0.27	0.22	0.28
	Head And Gut	1.15	1.15	1.02	1.36	0.97
	Other Products	0.12	0.15	0.12	0.07	0.07
	All Products	1.60	1.56	1.41	1.65	1.31

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Table 30: Continued

	Product	2013	2014	2015	2016	2017
Other Rockfish	Whole Fish	0.43	0.48	0.42	0.61	0.54
	Head And Gut	0.56	0.77	0.67	0.71	0.68
	Other Products	0.09	0.10	0.14	0.13	0.13
	All Products	1.08	1.34	1.23	1.45	1.34
Other Groundfish	Whole Fish	0.16	0.07	0.10	0.04	0.01
	Head And Gut	0.05	0.28	0.17	0.06	0.07
	Kirimi	-	*	*	-	*
	Roe	*	-	-	-	-
	Fillets	-	*	*	-	-
	Fishmeal	*	*	*	*	*
	Other Products	1.04	0.57	0.53	0.49	0.35
	All Products	1.24	0.93	0.80	0.59	0.43
All Species	Whole Fish	10.61	10.26	9.54	24.94	18.84
	Head And Gut	52.06	77.16	74.46	61.82	71.85
	Salted/Split	*	-	-	-	-
	Kirimi	*	0.13	0.66	*	*
	Roe	3.80	5.30	4.46	1.32	2.13
	Fillets	9.92	10.01	6.43	7.89	6.53
	Deep-Skin Fillets	*	*	-	*	0.63
	Other Fillets	5.79	8.19	9.10	14.32	15.09
	Surimi	8.60	12.33	14.65	13.41	10.61
	Minced Fish	0.20	0.19	*	1.25	1.44
	Fishmeal	*	*	*	1.39	*
	Other Products	7.34	6.85	5.97	7.49	7.11
	All Products	98.33	130.41	125.26	133.84	134.23

Notes: Total includes additional species not listed in the production details as well as confidential data from Tables 28 and 29. These estimates are for catch from both federal and state of Alaska fisheries. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 31: Gulf of Alaska gross value of groundfish products by species, 2013-2017, ($ million).

	Product	2013	2014	2015	2016	2017
Pollock	Whole Fish	0.9	0.4	2.2	7.0	5.7
	Head And Gut	36.5	40.7	40.6	23.3	30.1
	Roe	13.6	15.8	8.4	1.7	4.3
	Deep-Skin Fillets	*	*	-	*	2.1
	Other Fillets	20.5	24.4	26.1	39.8	32.9
	Surimi	20.3	24.0	27.6	28.7	17.7
	Minced Fish	0.3	0.2	*	1.5	1.5
	Fishmeal	*	*	*	2.2	*
	Other Products	1.0	0.3	0.2	2.2	2.5
	All Products	93.1	105.8	105.1	106.4	96.7
Pacific Cod	Whole Fish	1.3	0.7	0.8	0.5	0.2
	Head And Gut	14.4	38.4	52.2	22.7	20.3
	Salted/Split	*	-	-	-	-
	Roe	3.7	4.2	2.5	1.3	1.6
	Fillets	67.2	67.4	37.2	57.3	45.3
	Other Products	7.4	7.4	9.6	9.9	8.0
	All Products	93.9	118.0	102.5	91.8	75.5
Sablefish	Head And Gut	78.6	85.8	81.4	91.6	108.2
	Other Products	2.6	2.8	1.9	2.4	3.1
	All Products	81.2	88.6	83.2	94.1	111.3
Atka Mackerel	Whole Fish	-	*	*	*	*
	Head And Gut	1.8	1.7	1.3	1.2	1.2
	Other Products	*	-	*	*	*
	All Products	1.8	1.7	1.3	1.2	1.2
Arrowtooth	Whole Fish	0.1	0.2	0.1	1.1	4.9
	Head And Gut	5.8	22.0	9.9	12.1	26.7
	Kirimi	*	*	*	-	-
	Fillets	0.1	*	*	*	*
	Other Products	0.2	*	0.1	0.1	*
	All Products	6.1	22.2	10.2	13.3	31.5
Flathead Sole	Whole Fish	1.2	1.0	0.5	0.8	0.6
	Head And Gut	1.4	0.7	0.6	0.7	0.7
	Kirimi	*	0.4	0.4	*	*
	Fillets	0.0	0.1	*	*	*
	Other Products	*	*	-	*	*
	All Products	2.7	2.1	1.5	1.5	1.3

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Table 31: Continued

	Product	2013	2014	2015	2016	2017
Rex Sole	Whole Fish	7.9	6.7	3.2	3.2	2.8
	Head And Gut	0.3	0.3	0.2	0.2	0.0
	Kirimi	*	-	-	-	-
	Fillets	0.0	*	*	*	0.0
	Other Products	*	*	-	*	*
	All Products	8.2	7.0	3.4	3.4	2.8
Shallow-water Flatfish	Whole Fish	3.1	1.9	0.9	1.1	1.2
	Head And Gut	2.0	1.3	1.0	1.5	0.3
	Kirimi	*	*	1.2	*	*
	Fillets	0.6	0.3	0.2	0.1	*
	Other Products	*	*	-	*	*
	All Products	5.7	3.5	3.3	2.7	1.5
Deep-water Flatfish	Whole Fish	0.1	0.0	*	0.0	*
	Head And Gut	0.0	0.1	0.0	0.1	*
	Fillets	0.0	0.1	*	*	*
	Other Products	-	-	-	-	*
	All Products	0.1	0.2	0.0	0.1	*
Pacific Ocean Perch	Whole Fish	3.4	3.7	5.0	7.4	3.3
	Head And Gut	11.1	15.7	16.3	17.0	24.1
	Other Products	0.5	0.4	0.3	0.2	0.8
	All Products	15.0	19.7	21.5	24.6	28.1
Northern Rockfish	Whole Fish	0.1	0.4	*	0.0	0.0
	Head And Gut	3.9	4.5	3.7	4.1	1.8
	Other Products	0.4	0.1	0.1	0.5	0.1
	All Products	4.5	5.0	3.8	4.6	1.9
Dusky Rockfish	Whole Fish	0.9	0.4	0.6	0.4	0.4
	Head And Gut	1.7	2.8	2.6	3.9	2.1
	Other Products	0.6	0.5	0.5	0.5	0.5
	All Products	3.3	3.7	3.7	4.8	3.0

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Table 31: Continued

	Product	2013	2014	2015	2016	2017
Other Rockfish	Whole Fish	1.9	2.0	1.6	2.3	2.4
	Head And Gut	2.8	3.0	2.8	2.9	3.0
	Other Products	0.7	0.6	0.7	0.8	0.8
	All Products	5.4	5.7	5.2	6.0	6.2
Other Groundfish	Whole Fish	0.3	0.2	0.2	0.1	0.0
	Head And Gut	0.1	0.5	0.4	0.2	0.2
	Kirimi	-	*	*	-	*
	Roe	*	-	-	-	-
	Fillets	-	*	*	-	-
	Fishmeal	*	*	*	*	*
	Other Products	5.5	2.7	3.0	2.9	1.7
	All Products	6.0	3.4	3.6	3.2	1.9
All Species	Whole Fish	21.2	17.5	15.3	24.0	21.4
	Head And Gut	160.4	217.4	213.0	181.6	218.9
	Salted/Split	*	-	-	-	-
	Kirimi	*	0.4	1.5	*	*
	Roe	17.3	20.0	10.9	3.0	5.9
	Fillets	68.0	67.9	37.4	57.4	45.3
	Deep-Skin Fillets	*	*	-	*	2.1
	Other Fillets	20.5	24.4	26.1	39.8	32.9
	Surimi	20.3	24.0	27.6	28.7	17.7
	Minced Fish	0.3	0.2	*	1.5	1.5
	Fishmeal	*	*	*	2.2	*
	Other Products	18.8	14.9	16.5	19.5	17.4
	All Products	326.8	386.7	348.3	357.8	363.0

Notes: Total includes additional species not listed in the production details as well as confidential data from Tables 28 and 29. These estimates are for catch from both federal and state of Alaska fisheries. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 32: Gulf of Alaska price per pound of groundfish products by species, 2013-2017, ($/lb).

	Product	2013	2014	2015	2016	2017
Pollock	Whole Fish	0.60	0.67	0.43	0.22	0.28
	Head And Gut	0.78	0.62	0.61	0.38	0.36
	Roe	2.80	2.03	1.22	1.39	1.80
	Deep-Skin Fillets	*	*	-	*	1.49
	Other Fillets	1.61	1.35	1.30	1.26	0.99
	Surimi	1.07	0.89	0.85	0.97	0.76
	Minced Fish	0.61	0.56	*	0.53	0.46
	Fishmeal	*	*	*	0.71	*
	Other Products	0.53	0.31	0.39	0.51	0.45
	All Products	1.07	0.88	0.80	0.64	0.56
Pacific Cod	Whole Fish	0.47	0.66	0.56	0.95	0.81
	Head And Gut	0.98	1.25	1.24	1.22	1.51
	Salted/Split	*	-	-	-	-
	Roe	1.05	1.06	0.86	0.78	0.68
	Fillets	3.14	3.10	2.64	3.30	3.15
	Other Products	0.72	0.67	0.97	1.04	1.02
	All Products	1.79	1.72	1.45	1.92	1.97
Sablefish	Head And Gut	5.71	6.95	6.90	8.26	9.30
	Other Products	2.50	3.27	3.50	3.64	3.92
	All Products	5.49	6.71	6.75	7.99	8.95
Atka Mackerel	Whole Fish	-	*	*	*	*
	Head And Gut	1.50	1.54	1.24	1.21	1.47
	Other Products	*	-	*	*	*
	All Products	1.50	1.54	1.24	1.21	1.47
Arrowtooth	Whole Fish	0.63	0.53	0.27	0.46	0.69
	Head And Gut	0.41	0.64	0.59	0.78	1.07
	Fillets	1.74	*	*	*	*
	Other Products	1.70	*	0.63	0.45	*
	All Products	0.42	0.64	0.59	0.73	0.99
Flathead Sole	Whole Fish	1.10	0.54	0.71	0.49	0.59
	Head And Gut	0.77	0.69	0.63	0.86	0.74
	Fillets	1.56	1.36	*	*	*
	Other Products	*	*	-	*	*
	All Products	0.90	0.67	0.74	0.62	0.67
Rex Sole	Whole Fish	1.09	0.96	0.84	1.01	0.99
	Head And Gut	1.39	1.67	1.30	1.33	1.45
	Fillets	1.31	*	*	*	0.34
	Other Products	*	*	-	*	*
	All Products	1.10	0.98	0.86	1.02	0.99
Shallow-water Flatfish	Whole Fish	1.08	0.58	1.06	0.55	0.61
	Head And Gut	0.67	0.69	0.75	1.03	0.68
	Fillets	1.62	1.39	2.37	2.08	*
	Other Products	*	*	-	*	*
	All Products	0.91	0.65	0.97	0.77	0.63

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Table 32: Continued

	Product	2013	2014	2015	2016	2017
Deep-water Flatfish	Whole Fish	0.45	0.36	*	0.50	*
	Head And Gut	0.78	0.70	1.09	0.73	*
	Fillets	1.76	2.04	*	*	*
	Other Products	-	-	-	-	*
	All Products	0.61	0.73	1.09	0.72	*
Pacific Ocean Perch	Whole Fish	0.63	0.60	0.72	0.65	0.55
	Head And Gut	1.07	1.13	1.06	0.93	1.33
	Other Products	2.92	1.96	2.36	2.70	2.18
	All Products	0.94	0.98	0.96	0.83	1.15
Northern Rockfish	Whole Fish	0.71	0.59	*	0.72	0.76
	Head And Gut	0.81	1.10	0.97	1.32	1.01
	Other Products	2.60	2.03	1.73	2.82	2.11
	All Products	0.86	1.04	0.98	1.38	1.03
Dusky Rockfish	Whole Fish	1.25	0.66	1.07	0.87	0.62
	Head And Gut	0.68	1.09	1.14	1.30	1.00
	Other Products	2.41	1.62	1.97	3.08	2.98
	All Products	0.93	1.07	1.20	1.31	1.02
Other Rockfish	Whole Fish	1.98	1.92	1.74	1.72	1.98
	Head And Gut	2.27	1.77	1.92	1.85	2.01
	Other Products	3.63	3.01	2.46	2.87	2.91
	All Products	2.27	1.91	1.92	1.89	2.08
Other Groundfish	Whole Fish	0.98	1.13	1.08	1.26	2.19
	Head And Gut	0.81	0.75	0.93	1.61	1.41
	Roe	*	-	-	-	-
	Fillets	-	*	*	-	-
	Fishmeal	*	*	*	*	*
	Other Products	2.42	2.15	2.58	2.71	2.18
	All Products	2.18	1.65	2.03	2.50	2.06

Notes: These estimates are based on data from both federal and state of Alaska fisheries. Prices based on confidential data have been excluded. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 33: Gulf of Alaska total product value per round metric ton of retained catch by species and year, 2013-2017, ($/mt).

Species	2013	2014	2015	2016	2017
Pollock	1,003	754	636	616	542
Sablefish	6,744	8,390	8,164	10,367	11,034
Pacific Cod	1,468	1,482	1,319	1,452	1,572
Flatfish	866	827	777	865	1,234
Rockfish	1,280	1,315	1,280	1,300	1,452
Atka Mackerel	2,068	1,813	1,474	1,258	1,744
Other	2,044	1,552	1,675	1,917	1,517

Notes: These estimates include the product value of catch from both federal and state of Alaska fisheries. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea and Shoreside Production Reports; ADF&G Commercial Operators Annual Reports (COAR); and NMFS Alaska Region Blend and Catch-accounting System estimates. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 34: Gulf of Alaska number of processors, gross product value, value per processor, and percent value of GOA FMP groundfish of processed groundfish by processor group, 2013-2017, ($ millions).

	Year	Processors	Wholesale Value ($million)	Wholesale Value Per Processor ($1,000)	Percent Value, GOA FMP Groundfish
Central and Western Gulf Trawl	2013	14	27.74	1,981.73	6.58
	2014	11	49.15	4,468.29	10.24
	2015	9	34.98	3,886.93	7.98
	2016	15	33.46	2,230.55	7.36
	2017	11	50.35	4,577.04	10.96
CP Hook and Line	2013	9	5.33	592.20	1.26
	2014	13	8.25	634.83	1.72
	2015	11	9.53	866.01	2.17
	2016	12	7.47	622.12	1.64
	2017	11	10.22	929.27	2.22
Sablefish IFQ	2013	5	3.21	642.23	0.76
	2014	6	4.85	808.58	1.01
	2015	5	3.31	662.14	0.76
	2016	5	4.48	895.44	0.99
	2017	6	5.38	896.91	1.17
Motherships & Inshore Floating Procs.	2013	4	92.67	23,166.83	21.98
	2014	4	92.56	23,139.14	19.28
	2015	5	89.47	17,893.98	20.42
	2016	5	116.70	23,339.44	25.68
	2017	5	114.39	22,878.90	24.90
Kodiak Shoreside Procs.	2013	10	161.89	16,189.03	38.41
	2014	9	181.49	20,165.82	37.81
	2015	9	167.74	18,637.43	38.29
	2016	8	145.15	18,143.79	31.94
	2017	8	139.67	17,458.44	30.40
Southcentral Gulf Shoreside Procs.	2013	11	34.55	3,140.68	8.20
	2014	12	38.05	3,170.96	7.93
	2015	11	35.88	3,261.90	8.19
	2016	12	38.33	3,194.43	8.43
	2017	10	39.29	3,929.12	8.55
Southeastern Gulf Shoreside Procs.	2013	12	29.04	2,419.83	6.89
	2014	11	30.93	2,812.23	6.44
	2015	11	31.57	2,869.74	7.21
	2016	11	33.46	3,041.43	7.36
	2017	14	40.24	2,874.21	8.76
Western Gulf Shoreside Procs.	2013	3	67.10	22,365.43	15.92
	2014	3	74.72	24,905.56	15.57
	2015	3	65.63	21,876.77	14.98
	2016	3	75.43	25,144.97	16.60
	2017	3	59.88	19,959.23	13.03

Notes: The data are for catch from both federal and state of Alaska fisheries. The processor groups are defined as follows: "Western and Central Gulf Trawl" are the processors in the Western and Central Gulf. "CP Hook and Line" are the hook and line catcher processors. "Sablefish IFQ" are processors processing sablefish IFQ. Values are not adjusted for inflation.

Source: ADF&G Commercial Operators Annual Reports (COAR); and ADF&G Intent to Operate (ITO) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 35: Gulf of Alaska number of vessels, average and median length, and average and median capacity (tonnage) of vessels that caught groundfish by vessel type, and gear, 2013-2017.

	Year	Vessels	Average Length (feet)	Median Length (feet)	Average Capacity (tons)	Median Capacity (tons)
Central and Western Gulf Trawl	2013	84	90	88.0	112	94
	2014	82	88	88.0	112	94
	2015	78	87	87.5	112	98
	2016	84	87	88.0	110	98
	2017	81	90	88.0	122	103
CV Hook and Line	2013	62	45	42.0	29	24
	2014	61	43	42.0	27	24
	2015	64	42	42.0	25	24
	2016	58	44	42.0	28	24
	2017	49	43	42.0	26	24
CP Hook and Line	2013	7	118	128.0	281	134
	2014	9	125	128.0	279	134
	2015	11	130	128.0	285	143
	2016	10	147	136.0	290	132
	2017	9	148	136.0	347	132
Sablefish IFQ	2013	275	57	58.0	46	36
	2014	280	57	57.0	49	36
	2015	261	57	57.0	46	39
	2016	265	57	57.0	48	37
	2017	258	56	57.0	48	36
Pot	2013	128	61	58.0	59	52
	2014	101	61	58.0	58	52
	2015	116	61	58.0	55	48
	2016	118	60	58.0	57	48
	2017	108	61	58.0	56	48
Jig	2013	216	40	41.0	15	14
	2014	247	39	39.0	16	14
	2015	265	40	40.0	16	14
	2016	307	41	41.0	17	16
	2017	189	39	40.0	14	14
No Fleet/ Other	2013	15	42	38.0	15	11
	2014	11	58	51.0	41	23
	2015	16	45	40.0	24	10
	2016	14	47	48.0	23	24
	2017	8	41	38.0	16	13

Notes: These estimates include only vessels fishing part of federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 36: Gulf of Alaska number of vessels that caught groundfish by month, vessel type, and gear, 2013-2017.

		Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Catcher Vessels	Hook & Line	2013	61	90	167	248	231	197	109	116	97	117	69	40	506
		2014	58	96	192	234	286	136	103	121	128	97	74	46	538
		2015	78	122	207	259	298	132	94	107	133	109	57	49	521
		2016	76	115	187	260	243	119	84	108	118	103	42	13	479
		2017	52	81	120	164	168	126	81	72	121	102	53	19	369
	Pot	2013	75	73	102	23	-	-	-	-	14	16	13	12	128
		2014	57	40	87	7	2	-	-	3	38	39	22	11	102
		2015	78	77	100	51	-	-	-	-	13	17	19	24	116
		2016	80	86	78	66	-	-	-	-	15	24	29	32	118
		2017	74	86	89	91	16	11	9	5	11	18	15	8	127
	Trawl	2013	39	52	58	19	23	18	9	40	42	48	19	2	70
		2014	41	63	61	51	25	20	12	47	59	52	23	4	71
		2015	40	60	65	57	30	13	6	15	52	54	18	1	68
		2016	49	54	59	42	29	18	4	45	58	61	34	2	70
		2017	37	47	61	42	21	17	5	4	53	60	35	1	70
	All Gear	2013	173	212	317	288	254	215	118	156	153	180	101	54	665
		2014	147	199	327	291	313	156	115	171	219	185	119	61	672
		2015	192	254	360	363	328	145	100	122	198	179	94	74	671
		2016	199	246	312	365	272	137	88	152	191	187	102	47	628
		2017	163	210	254	293	203	152	93	80	184	175	102	28	523
Catcher Processors	Hook & Line	2013	1	2	3	4	3	6	4	2	1	-	2	1	10
		2014	1	6	8	5	3	2	1	1	3	3	3	1	13
		2015	3	5	6	4	6	3	2	1	3	3	2	1	12
		2016	1	2	4	5	4	4	1	2	4	4	2	4	12
		2017	-	3	7	7	3	2	3	1	6	3	1	1	11
	Trawl	2013	-	1	3	3	2	4	13	3	1	2	4	2	14
		2014	-	-	1	5	4	3	7	6	3	7	5	1	11
		2015	-	1	1	4	4	3	9	4	4	1	2	1	10
		2016	-	1	-	2	2	2	12	7	4	2	2	2	14
		2017	-	1	2	2	2	4	10	6	4	4	2	1	11
	All Gear	2013	1	3	6	7	5	10	17	5	2	2	6	3	24
		2014	1	6	9	10	7	5	8	7	6	10	8	2	24
		2015	3	6	7	8	10	6	11	5	7	4	4	2	22
		2016	1	3	4	7	6	6	13	9	8	6	4	6	26
		2017	-	4	9	9	5	6	13	7	10	7	3	2	22

Notes: These estimates include only vessels fishing part of federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 37: Gulf of Alaska catcher vessel (excluding catcher/processors) weeks of fishing groundfish by vessel-length class (feet), gear, and target, 2013-2017.

		Hook & Line		Pot		Trawl		All Gear	
	Year	<60ft	60-125ft	<60ft	60-125ft	<60ft	60-125ft	<60ft	60-125ft
Pollock	2013	-	-	-	-	87	384	87	384
	2014	-	-	-	-	181	550	181	550
	2015	-	-	-	-	237	569	237	569
	2016	-	-	-	-	289	524	289	524
	2017	-	-	-	-	180	527	180	527
Sablefish	2013	1,265	338	-	-	4	21	1,269	359
	2014	1,162	307	-	-	2	7	1,164	314
	2015	1,242	342	-	-	3	17	1,245	359
	2016	1,270	361	-	-	1	10	1,271	371
	2017	1,302	273	130	45	-	9	1,432	327
Pacific Cod	2013	1,200	18	714	201	116	88	2,030	307
	2014	1,525	20	756	216	163	73	2,444	309
	2015	1,824	14	895	238	145	114	2,864	366
	2016	1,384	7	944	228	117	102	2,445	337
	2017	566	-	879	209	109	60	1,554	269
Flatfish	2013	-	-	-	-	8	170	8	170
	2014	-	-	-	-	9	151	9	151
	2015	-	-	-	-	0	76	0	76
	2016	-	-	-	-	2	159	2	159
	2017	-	-	-	-	-	103	-	103
Rockfish	2013	508	2	-	-	11	99	519	101
	2014	425	4	-	-	7	101	432	105
	2015	370	6	-	-	4	97	374	103
	2016	282	3	-	-	3	120	285	123
	2017	275	2	-	-	7	88	282	90
Atka Mackerel	2016	-	-	-	-	-	1	-	1
All Groundfish	2013	2,987	358	-	-	225	762	3,926	1,320
	2014	3,114	331	-	-	362	881	4,235	1,430
	2015	3,437	362	-	-	391	872	4,722	1,472
	2016	2,942	371	-	-	412	914	4,297	1,514
	2017	2,150	275	-	-	297	786	3,456	1,316

Notes: These estimates include only vessels fishing part of federal TACs. A vessel that fished more than one category in a week is apportioned a partial week based on catch weight. A target is determined based on vessel, week, processing mode, NMFS area, and gear. All groundfish include additional target categories. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 38: Gulf of Alaska catcher/processor vessel weeks of fishing groundfish by vessel-length class (feet), gear, and target, 2013-2017.

		Hook & Line			Trawl			All Gear			
	Year	<60ft	60-124ft	125-230ft	60-124ft	125-230ft	>230ft	<60ft	60-124ft	125-230ft	>230ft
Pollock	2013	-	-	-	1	0	-	-	1	0	-
	2014	-	-	-	0	0	-	-	0	0	-
	2015	-	-	-	-	1	-	-	-	1	-
Sablefish	2013	11	-	27	-	-	-	11	-	27	-
	2014	7	-	18	0	-	-	7	0	18	-
	2015	9	-	19	0	-	-	9	0	19	-
	2016	9	-	17	-	-	-	9	-	17	-
	2017	9	-	20	-	-	-	9	-	20	-
Pacific Cod	2013	-	23	13	-	0	-	-	23	13	-
	2014	2	22	29	-	-	-	2	22	29	-
	2015	4	30	30	0	-	-	4	30	30	-
	2016	0	-	45	2	-	-	0	2	45	-
	2017	-	4	43	1	-	-	-	5	43	-
Flatfish	2013	-	-	-	48	12	-	-	48	12	-
	2014	-	-	-	62	27	-	-	62	27	-
	2015	-	-	-	49	16	-	-	49	16	-
	2016	-	-	-	41	8	-	-	41	8	-
	2017	-	-	-	62	16	-	-	62	16	-
Rockfish	2013	-	-	-	3	27	1	-	3	27	1
	2014	-	-	-	2	29	3	-	2	29	3
	2015	-	-	-	8	30	2	-	8	30	2
	2016	-	-	-	4	33	2	-	4	33	2
	2017	-	-	0	5	32	0	-	5	32	0
Atka Mackerel	2013	-	-	-	0	0	-	-	0	0	-
	2017	-	-	-	1	-	-	-	1	-	-
All Groundfish	2013	11	23	41	52	39	1	11	75	79	1
	2014	9	22	48	65	56	3	9	87	104	3
	2015	13	30	49	58	47	2	13	88	96	2
	2016	9	-	62	48	41	2	9	48	103	2
	2017	9	4	63	69	48	0	9	73	111	0

Notes: These estimates include only vessels fishing part of federal TACs. A vessel that fished more than one category in a week is apportioned a partial week based on catch weight. A target is determined based on vessel, week, processing mode, NMFS area, and gear. All groundfish include additional target categories. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; NMFS Alaska Region groundfish observer data; NMFS Alaska Region permit data; CFEC vessel registration file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 39: Gulf of Alaska catcher vessel crew weeks in the groundfish fisheries by month, 2013-2017.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2013	1,220	1,994	3,066	1,798	1,872	1,605	614	1,090	1,477	1,534	746	390	17,406
2014	1,049	1,860	3,266	2,032	2,336	1,162	516	994	1,990	1,820	864	443	18,330
2015	1,843	2,316	3,257	2,313	2,755	1,048	524	784	1,798	2,124	664	503	19,928
2016	1,692	2,318	2,506	3,069	1,982	1,024	635	903	1,736	2,298	642	371	19,176
2017	1,500	2,195	2,270	2,594	1,486	1,191	619	616	1,690	1,858	648	228	16,896

Notes: Crew weeks are calculated by summing weekly reported crew size over vessels and time period. These estimates include only vessels targeting groundfish counted toward federal TACs. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea Production Reports. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 40: Gulf of Alaska at-sea processor vessel crew weeks in the groundfish fisheries by month, 2013-2017.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2013	*	98	214	326	204	433	951	341	*	*	283	96	2,946
2014	*	190	358	638	233	201	834	526	312	427	415	*	4,134
2015	155	280	270	499	348	188	846	689	302	247	192	*	4,016
2016	*	107	97	320	215	293	1,229	504	254	228	152	189	3,588
2017	-	112	462	261	135	317	1,130	615	591	295	156	*	4,074

Notes: Crew weeks are calculated by summing weekly reported crew size over vessels and time period. These estimates include only vessels targeting groundfish counted toward federal TACs. Catcher processors typically account for 90-95% of the total at-sea crew weeks in all areas. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region At-sea Production Reports. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H1: Catch (net landed weight) in the commercial Pacific halibut fisheries off Alaska by FMP area, 2013-2017, (hundreds of metric tons).

Year	Gulf Of Alaska	Bering Sea And Aleutian Islands	All Alaska
2013	86.39	17.52	103.91
2014	65.15	13.40	78.56
2015	68.30	13.98	82.28
2016	68.76	15.09	83.85
2017	77.12	16.64	93.76

Notes: These estimates include catch from both federal and state of Alaska commercial fisheries. Net weight is dressed, head-off, slime and ice deducted.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H2: Catch (net landed weight) and percent of FMP area catch in the commercial Pacific halibut fisheries off Alaska by vessel length (feet) and FMP area, 2013-2017, (hundreds of metric tons).

		Gulf of Alaska		Bering Sea and Aleutian Islands		All Alaska	
	Length	Net Tons	Percent	Net Tons	Percent	Net Tons	Percent
2013	<20	0.09	0	0.24	0.01	0.33	0
	20-29	1.79	0.02	2.17	0.12	3.95	0.04
	30-39	12.85	0.15	2.28	0.13	15.13	0.15
	40-49	30.42	0.35	2.61	0.15	33.03	0.32
	50-59	26.49	0.31	5.96	0.34	32.45	0.31
	>=60	14.50	0.17	4.26	0.24	18.76	0.18
2014	<20	0.10	0	0.19	0.01	0.29	0
	20-29	1.92	0.03	1.52	0.11	3.44	0.04
	30-39	10.44	0.16	1.96	0.15	12.40	0.16
	40-49	23.77	0.37	1.94	0.14	25.70	0.33
	50-59	19.46	0.30	4.68	0.35	24.14	0.31
	>=60	9.11	0.14	3.12	0.23	12.23	0.16
2015	<20	0.10	0	*	*	0.10	0
	20-29	1.78	0.03	1.25	0.09	3.04	0.04
	30-39	10.99	0.16	1.71	0.12	12.70	0.16
	40-49	24.34	0.36	2.68	0.19	27.02	0.33
	50-59	21.61	0.32	5.11	0.37	26.72	0.33
	>=60	9.18	0.14	3.18	0.23	12.36	0.15
2016	<20	0.11	0	*	*	0.11	0
	20-29	1.95	0.03	1.18	0.08	3.13	0.04
	30-39	11.43	0.17	1.75	0.12	13.19	0.16
	40-49	25.05	0.37	2.79	0.19	27.84	0.33
	50-59	21.02	0.31	5.76	0.38	26.78	0.32
	>=60	8.83	0.13	3.50	0.23	12.33	0.15
2017	<20	0.10	0	*	*	0.10	0
	20-29	1.93	0.03	1.05	0.06	2.97	0.03
	30-39	12.79	0.17	2.80	0.17	15.59	0.17
	40-49	28.91	0.38	3.27	0.20	32.17	0.35
	50-59	23.15	0.30	5.70	0.35	28.84	0.31
	>=60	9.84	0.13	3.66	0.22	13.51	0.14

Notes: Excludes vessels in the Annette Island commercial Pacific halibut fishery. These estimates include catch from both federal and state of Alaska fisheries. Net weight is dressed, head-off, slime and ice deducted.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H3: Non-halibut prohibited species catch on commercial Pacific halibut target trips off Alaska by PSC species and area, 2013-2017.

Area	Gear	Year	Bairdi Tanner Crab (Count, K)	Chinook Salmon (Count, K)	Halibut (Tons)	Herring (Tons)	Non-Chinook Salmon (Count, K)	Opilio Tanner (Snow) Crab (Count, K)	Other King Crab (Count, K)	Red King Crab (Count, K)
Gulf of Alaska	Fixed	2013	570	-	15	-	-	-	0	0
		2014	133	-	11	-	-	0	0	-
		2015	128	-	22	-	-	-	0	0
		2016	63	-	44	-	-	0	0	0
		2017	4	-	15	-	-	0	0	-
	Trawl	2013	255	23	1,230	11	5	-	0	-
		2014	64	16	1,395	6	2	-	0	-
		2015	76	19	1,411	80	1	-	0	-
		2016	92	22	1,333	148	3	0	1	-
		2017	124	25	1,215	6	6	-	0	-
	All Gear	2013	824	23	1,245	11	5	-	0	0
		2014	198	16	1,405	6	2	0	0	-
		2015	204	19	1,433	80	1	-	0	0
		2016	155	22	1,377	148	3	0	1	0
		2017	129	25	1,230	6	6	0	0	-
Bering Sea and Aleutian Islands	Fixed	2013	247	*	538	0	-	33	2	107
		2014	593	0	456	-	-	105	5	145
		2015	633	0	326	0	0	138	32	182
		2016	315	0	225	*	0	43	16	27
		2017	357	0	193	0	0	168	77	35
	Trawl	2013	714	16	3,080	988	127	692	32	32
		2014	624	18	3,029	186	224	484	24	33
		2015	424	25	1,999	1,531	243	492	15	25
		2016	221	33	1,910	1,494	347	167	15	41
		2017	353	36	1,179	1,023	471	160	11	60
	All Gear	2013	961	16	3,618	988	127	725	35	140
		2014	1,217	18	3,485	186	224	590	29	178
		2015	1,057	25	2,324	1,531	243	630	48	207
		2016	536	33	2,135	1,494	347	210	31	68
		2017	710	36	1,373	1,023	471	327	88	95

Notes: These estimates include trips from both federal and state of Alaska fisheries. For details on prohibited species catch estimation see Cahalan, J., J. Gasper, and J. Mondragon. 2014. Catch sampling and estimation in the federal groundfish fisheries off Alaska, 2015 edition. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-286, 46 p. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Regional Office Prohibited Species Catch database. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H4A: Ex-vessel value and price in the commercial Pacific halibut fsiheries off Alaska by FMP area, 2013-2017, ($ millions and $/lb net weight, respectively).

	Gulf of Alaska		Bering Sea and Aleutian Islands		All Alaska	
Year	Value	Price	Value	Price	Value	Price
2013	95.75	5.03	16.66	4.32	112.41	4.91
2014	89.54	6.23	15.77	5.34	105.31	6.08
2015	94.33	6.26	17.68	5.74	112.01	6.17
2016	99.37	6.55	19.59	5.89	118.96	6.44
2017	97.63	5.74	18.53	5.05	116.16	5.62

Notes: Values and prices are for catch from both federal and state of Alaska fisheries. Price is calculated as landed value divided by net weight. Values are not adjusted for inflation. Net weight is dressed, head-off, slime and ice deducted.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H4B: Ex-vessel value and price in the commercial Pacific halibut fisheries off Alaska by IPHC area, 2013-2017, ($ millions and $/lb net weight, respectively).

	Variable	2013	2014	2015	2016	2017
2C	Value	15.67	21.55	23.57	27.36	2.76
	Price	5.16	6.22	6.30	6.61	5.80
3A	Value	58.05	48.58	50.75	50.31	5.36
	Price	5.09	6.31	6.31	6.60	5.86
3B	Value	20.20	17.83	16.67	17.83	0.89
	Price	4.82	6.10	6.13	6.43	5.55
4A	Value	5.32	4.79	7.94	8.34	0.93
	Price	4.41	5.76	6.00	6.22	5.15
4B	Value	5.14	5.89	6.03	6.30	0.58
	Price	4.21	5.41	5.69	5.76	5.15
4CDE	Value	8.02	6.65	6.93	8.82	0.35
	Price	4.34	5.09	5.62	5.83	5.13

Notes: Values and prices are for catch from both federal and state of Alaska fisheries. Price is calculated as landed value divided by net weight. Values are not adjusted for inflation. Net weight is dressed, head-off, slime and ice deducted.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H5: Ex-vessel value and average annual revenue per vessel in the commercial Pacific halibut fisheries off Alaska by FMP area and vessel length (feet), 2013-2017, ($ millions and $ thousands, respectively).

		Gulf of Alaska		Bering Sea and Aleutian Islands		All Alaska	
	Length	Value	Avg. Value/Vessel	Value	Avg. Value/Vessel	Value	Avg. Value/Vessel
2013	<20	0.10	5.26	0.20	3.84	0.30	4.27
	20-29	2.00	16.98	2.09	13.40	4.09	15.00
	30-39	14.18	53.11	2.10	53.87	16.28	54.82
	40-49	33.60	107.34	2.42	151.31	36.02	112.91
	50-59	29.45	216.58	5.66	195.28	35.12	247.31
	>=60	16.16	336.65	4.18	199.28	20.34	383.85
2014	<20	0.14	6.01	0.19	12.00	0.33	8.69
	20-29	2.64	21.84	1.39	26.73	4.03	23.44
	30-39	14.24	52.34	2.17	65.86	16.41	55.62
	40-49	32.39	107.97	2.30	143.81	34.69	114.49
	50-59	26.92	197.96	5.74	249.69	32.67	233.32
	>=60	12.73	295.98	3.97	233.41	16.70	362.94
2015	<20	0.14	8.49	*	*	0.18	6.51
	20-29	2.49	23.48	1.43	47.73	3.92	29.04
	30-39	15.07	57.73	2.02	81.00	17.09	61.48
	40-49	33.48	118.29	3.36	186.52	36.83	128.34
	50-59	29.93	212.25	6.63	255.07	36.56	250.41
	>=60	12.82	320.60	4.19	220.73	17.02	386.77
2016	<20	0.15	8.00	*	*	0.28	10.03
	20-29	2.81	26.51	1.33	42.99	4.14	30.46
	30-39	16.45	65.79	2.16	83.01	18.61	69.17
	40-49	36.04	128.25	3.53	220.55	39.57	138.35
	50-59	30.38	215.50	7.67	283.89	38.05	264.24
	>=60	13.03	317.73	4.78	281.20	17.81	414.12
2017	<20	0.12	10.01	*	*	0.26	12.26
	20-29	2.47	26.82	1.15	39.65	3.62	30.14
	30-39	16.18	62.94	3.11	94.17	19.28	68.87
	40-49	36.30	131.52	3.65	228.24	39.95	143.20
	50-59	29.37	219.17	6.29	251.55	35.66	266.10
	>=60	12.65	324.31	4.13	243.21	16.78	399.59

Notes: Values are for catch from both federal and state of Alaska fisheries. Excludes vessels in the Annette Island commercial Pacific halibut fishery. Length is measured in feet. Values are not adjusted for inflation.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H6: Ex-vessel value port ranking, annual ex-vessel value, price and percent of statewide value in the commercial Pacific halibut fisheries off Alaska by port, 2013-2017, ($ millions and $/lb net weight).

	Port	2013	2014	2015	2016	2017
Ex-vessel Value	Homer	24.24	18.51	17.25	18.32	13.08
	Kodiak	16.60	15.94	17.28	16.95	19.59
	Seward	14.79	11.56	12.76	13.25	13.44
	Dutch Harbor	*	*	*	*	*
	Sitka	6.02	*	*	8.17	*
	Juneau	6.86	5.79	*	7.50	6.68
	St Paul Island	*	*	*	*	*
	Petersburg	5.56	7.62	7.01	9.93	9.97
	Sand Point	*	*	*	*	*
	Yakutat	*	*	4.07	4.33	*
Price	Homer	4.95	6.05	6.11	6.43	5.82
	Kodiak	4.88	6.32	6.23	6.60	5.59
	Seward	5.07	6.20	6.20	6.46	5.79
	Dutch Harbor	*	*	*	*	*
	Sitka	5.06	*	*	6.53	*
	Juneau	5.44	6.12	*	6.75	6.01
	St Paul Island	*	*	*	*	*
	Petersburg	5.18	6.24	6.52	6.72	5.93
	Sand Point	*	*	*	*	*
	Yakutat	*	*	6.48	6.52	*
Precent State Value	Homer	22 %	18 %	15 %	15 %	11 %
	Kodiak	15 %	15 %	15 %	14 %	17 %
	Seward	13 %	11 %	11 %	11 %	12 %
	Dutch Harbor	*	*	*	*	*
	Sitka	5 %	*	*	7 %	*
	Juneau	6 %	5 %	*	6 %	6 %
	St Paul Island	*	*	*	*	*
	Petersburg	5 %	7 %	6 %	8 %	9 %
	Sand Point	*	*	*	*	*
	Yakutat	*	*	4 %	4 %	*
Rank	Homer	1	1	2	1	3
	Kodiak	2	2	1	2	1
	Seward	3	3	3	3	2
	Dutch Harbor	5	6	4	5	6
	Sitka	6	5	6	6	5
	Juneau	4	7	5	7	7
	St Paul Island	9	13	11	11	10
	Petersburg	7	4	7	4	4
	Sand Point	14	12	13	16	17
	Yakutat	8	10	9	9	9

Notes: Displays only the 10 Alaska ports of landing with the highest average ex-vessel value. Values and prices are for catch from both federal and state of Alaska fisheries. Price is calculated as landed value divided by net weight. Net weight is dressed, head-off, slime and ice deducted. Values are not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H7: First wholesale production volume, value and price in the commercial Pacific halibut fisheries off Alaska by product, 2013-2017, (1000s of metric tons, $ millions and $/lb net weight, respectively).

	Year	Quantity	Value	Price
Head and Gut	2013	6.46	92.69	6.51
	2014	4.80	81.92	7.73
	2015	5.38	92.07	7.77
	2016	6.29	94.99	6.85
	2017	5.64	91.84	7.39
Fillet	2013	1.66	35.78	9.80
	2014	0.88	25.53	13.23
	2015	1.11	34.82	14.21
	2016	1.23	39.30	14.50
	2017	1.40	42.04	13.65
Other Products	2013	0.83	2.90	1.58
	2014	0.50	2.47	2.23
	2015	3.05	6.86	1.02
	2016	0.68	4.61	3.09
	2017	0.46	2.74	2.68
All Products	2013	8.94	131.37	6.66
	2014	6.18	109.92	8.06
	2015	9.54	133.76	6.36
	2016	8.19	138.91	7.69
	2017	7.50	136.62	8.27

Notes: Landings, values and prices include both federal and state of Alaska fisheries. Price is calculated as landed value divided by net weight. Net weight is dressed, head-off, slime and ice deducted. Values are not adjusted for inflation.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H8: Number of vessels catching Pacific halibut commercially off Alaska and median vessel length by FMP area and vessel length class, 2013-2017.

		Gulf of Alaska		Bering Sea and Aleutian Islands		All Alaska	
	Year	Vessels	Median Length	Vessels	Median Length	Vessels	Median Length
<20	2013	19	17	53	18	71	18
	2014	23	18	16	18	38	18
	2015	16	18	12	18	27	18
	2016	19	17	10	18	28	18
	2017	12	18	9	18	21	18
20-29	2013	118	25	156	24	273	24
	2014	121	25	52	26	172	26
	2015	106	25	30	28	135	26
	2016	106	25	31	28	136	26
	2017	92	25	29	28	120	26
30-39	2013	267	34	39	32	297	34
	2014	272	34	33	32	295	34
	2015	261	35	25	33	278	34
	2016	250	34	26	32	269	34
	2017	257	34	33	32	280	33
40-49	2013	313	45	16	49	319	45
	2014	300	45	16	48	303	45
	2015	283	45	18	48	287	45
	2016	281	45	16	48	286	45
	2017	276	45	16	48	279	45
50-59	2013	136	58	29	58	142	58
	2014	136	57	23	58	140	57
	2015	141	57	26	58	146	57
	2016	141	58	27	58	144	58
	2017	134	58	25	58	134	58
≥60	2013	48	71	21	76	53	73
	2014	43	72	17	76	46	72
	2015	40	72	19	76	44	73
	2016	41	72	17	76	43	73
	2017	39	72	17	76	42	73

Notes: Excludes vessels in the Annette Island commercial Pacific halibut fishery. "-" indicates no applicable data or value.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H9: Total vessel days fishing Pacific halibut commercially off Alaska by area, 2013-2017.

Year	Gulf Of Alaska	Bering Sea And Aleutian Islands	All Alaska
2013	14,633	4,339	18,754
2014	12,842	2,894	15,520
2015	12,549	2,744	15,059
2016	12,757	2,800	15,352
2017	13,400	2,795	15,801

Notes: Excludes vessels in the Annette Island commercial Pacific halibut fishery.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table H10: Crew days fishing Pacific halibut commercially off Alaska by month and area, 2013-2017.

	Year	Mar-Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Gulf of Alaska	2013	8,546	10,247	7,777	4,859	7,350	6,589	5,928	1,300
	2014	9,918	9,426	5,754	3,601	6,301	5,476	4,179	499
	2015	9,274	10,725	4,904	3,028	5,018	6,386	4,433	733
	2016	10,309	10,111	4,964	3,566	5,887	5,078	3,358	627
	2017	10,399	9,558	5,883	3,704	5,677	6,564	4,941	814
Bering Sea and Aleutian Islands	2013	563	1,042	3,166	5,244	2,428	2,291	1,266	224
	2014	242	1,480	1,611	3,397	2,412	1,373	653	121
	2015	416	1,533	2,111	2,206	2,474	1,536	1,185	133
	2016	529	1,525	2,100	2,121	2,686	1,578	809	100
	2017	346	1,384	2,088	1,886	2,857	1,540	1,104	192
All Alaska	2013	9,109	11,207	10,807	10,011	9,632	8,670	7,029	1,460
	2014	10,160	10,670	7,224	6,904	8,497	6,775	4,754	620
	2015	9,618	12,126	6,894	5,139	7,252	7,787	5,459	866
	2016	10,741	11,397	6,845	5,642	8,417	6,584	4,098	695
	2017	10,672	10,775	7,845	5,450	7,996	7,814	5,736	1,006

Notes: Excludes vessels in the Annette Island commercial Pacific halibut fishery because crew size is not reported for this fishery. Minimal fishing occurs in March to enusre confidentiality it is combined with April.

Source: ADF&G fish tickets; CFEC gross earnings (fish tickets) file. Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

5. ECONOMIC PERFORMANCE INDICES FOR THE NORTH PACIFIC GROUNDFISH FISHERIES

5.1. Introduction

Fisheries markets are complex. A multitude of factors influence demand, supply, price, catch composition, product types produced and other market activity. Indices are a common method used by agencies to synthesize market information in a digestible format. Indices establish a baseline that helps characterize trends in the market for values, prices and quantities of fisheries goods. Market indices have many uses. From a management perspective indices can both retrospectively characterize changes in the market that may be related to policy decisions, or allow managers to evaluate current market conditions in the context of future policy change. Indices may also be useful to market participants when making business decisions.

This section of the Economic Status of the Groundfish Fisheries off Alaska attempts to distill the numerous factors that affect the North Pacific groundfish markets into a simple set of indices that can be used to track performance. Indices of value, price and quantity are presented for the Bering Sea and Aleutian Island (BSAI) at-sea, the BSAI shoreside, and the Gulf of Alaska (GOA). For the BSAI at-sea sector, index analysis will focus on the wholesale market; for the BSAI shoreside and GOA sectors, index analysis will consider the wholesale and ex-vessel markets. To help understand and evaluate the indices, we plot the value share stratified by species and product type for wholesale markets, and by species and gear type for the ex-vessel markets. Value share is the proportion of total value from each of the stratified components, such as the proportion of total value that comes from pollock. Additionally, bar graphs provide detail on the division of production among species, product types and gear types. Specifically, for the wholesale market, these graphs show species by product type and product type by species, and in the ex-vessel market, they show species by gear type and gear type by species.

Aggregate indices, by their very nature, cumulate over the many species, products types, and gear types in a sector. The values, prices, and quantities from individual components of these factors (e.g., individual species) may contribute to the movements of the aggregate indices in very different ways. The myriad of market influences make it difficult to disentangle the relative importance of different species or products when monitoring aggregate performance, a problem that can be approached by using a value-share decomposition to examine the influence of these different components on the aggregate index. Decomposition relates the indices for each of the components of a single factor to the aggregate through its value share. For example, consider an aggregate price index for a sector. The aggregate price index is a function of the prices of all the species sold (e.g., pollock, Pacific cod, sablefish). Here, species type is the factor and the component indices of this factor are the price indices for all the species (e.g., pollock price index, Pacific cod price index). The importance of each individual species price index is determined by the proportion of total value in the sector for the species. By decomposing the aggregate index in this way, one can see how each of the species price indices influence the movement in the aggregate price index. Similar value-share decompositions are also constructed for product types in the wholesale market, and for gear types in the ex-vessel market.

The primary tools we will use to analyze market performance are Figures 5.2-5.11. The index figures in Figures 5.2-5.11 are designed to help the reader visualize changes in the indices and relate the changes to shifts in aggregate value, prices, and quantities. All indices use 2013 as the base year for the index. All calculations and statistics are made using nominal U.S. dollars (i.e., not adjusted for inflation).[1] Aggregate indices are located in the upper-left panel and the value share decomposition of the aggregate index is below in the lower-left panels of the figures. Changes in the indices have been color coded to indicate the relevance in determining aggregate index movements. The relevance of a change in the price index in year t is calculated by $(year-on-year\ growth\ rate)*(share\ weight) = (I_t/I_{t-1}-1)*\tilde{w}(t)$ where I_t is the level of the index and $\tilde{w}(t) = \frac{p_t * q_t}{\sum_i p_t * q_t}$ is the year t value share. When the value $(year-on-year\ growth\ rate)*(share\ weight)$ is roughly zero, indicating little to no change or influence on the aggregate index, it is colored blue. When this value is less than -0.1, the index is colored red to indicate that it has had a significant negative impact on the aggregate index. When this value is greater than 0.1, the index is colored green, indicating a significant positive impact on the aggregate index. Shades in between these colors indicate intermediate impacts. The indices can take on these "significant colors" if the percentage change is large and/or the value share is large. The value share plot in the upper-right corner of each figure helps to discern the difference. For each sector and market, two decompositions are presented. The wholesale market is decomposed by species and product type, and the ex-vessel market is decomposed by species and gear type. To help relate the different decompositions, bar graphs in the lower-right panel of each figure show the composition of one factor (e.g., product type) for each relevant category of the other factor (e.g., species) as measured by production. The height of the bars shows the annual output in that market. Only the components of a factor with a value share greater than 1% have been plotted, although all prices and quantities were used in the construction of the aggregate index. Ex-vessel indices are constructed using catch that is counted against a federal total allowable catch (TAC). Hereafter, "wholesale value" and "ex-vessel value" refer to the revenue from production at the first wholesale level or from sales of catch on the ex-vessel market, respectively. Walleye pollock will often be referred to simply as "pollock"; similarly, Pacific cod will often be referred to as "cod". The "other" product type contains all products that are not fillets, H&G, surimi, meal and oil, or roe. In particular, the "other" product type include whole fish and minced fish.

Understanding the indices and their construction facilitates accurate interpretation. To properly interpret the indices, the reader must realize that the indices are merely descriptive and characterize the state of the market relative to other periods, and display the co-movement of different species, product types, or gear types both individually and in aggregate. The indices have no inherent causal interpretation. For example, it would be wrong to assert from these indices that a change in surimi prices "caused" a change in pollock price. Nor could we say the opposite. We can say that they are connected, as surimi is a significant portion of the value from pollock in some regions, but causality is beyond the scope of indices. Carefully designed regression analysis is better suited for addressing such causality questions. The indices are displayed graphically in Section 5.2 followed by tables with the index values.

5.2. Economic Indices of the Groundfish Fisheries off Alaska

[1] U.S. nominal dollars are used so price indices capture unadjusted changes in prices throughout time, allowing them to be used as deflator indices. For readers comparing these indices to other figures in the SAFE denominated in inflation adjusted terms, this adjustment should be kept in mind.

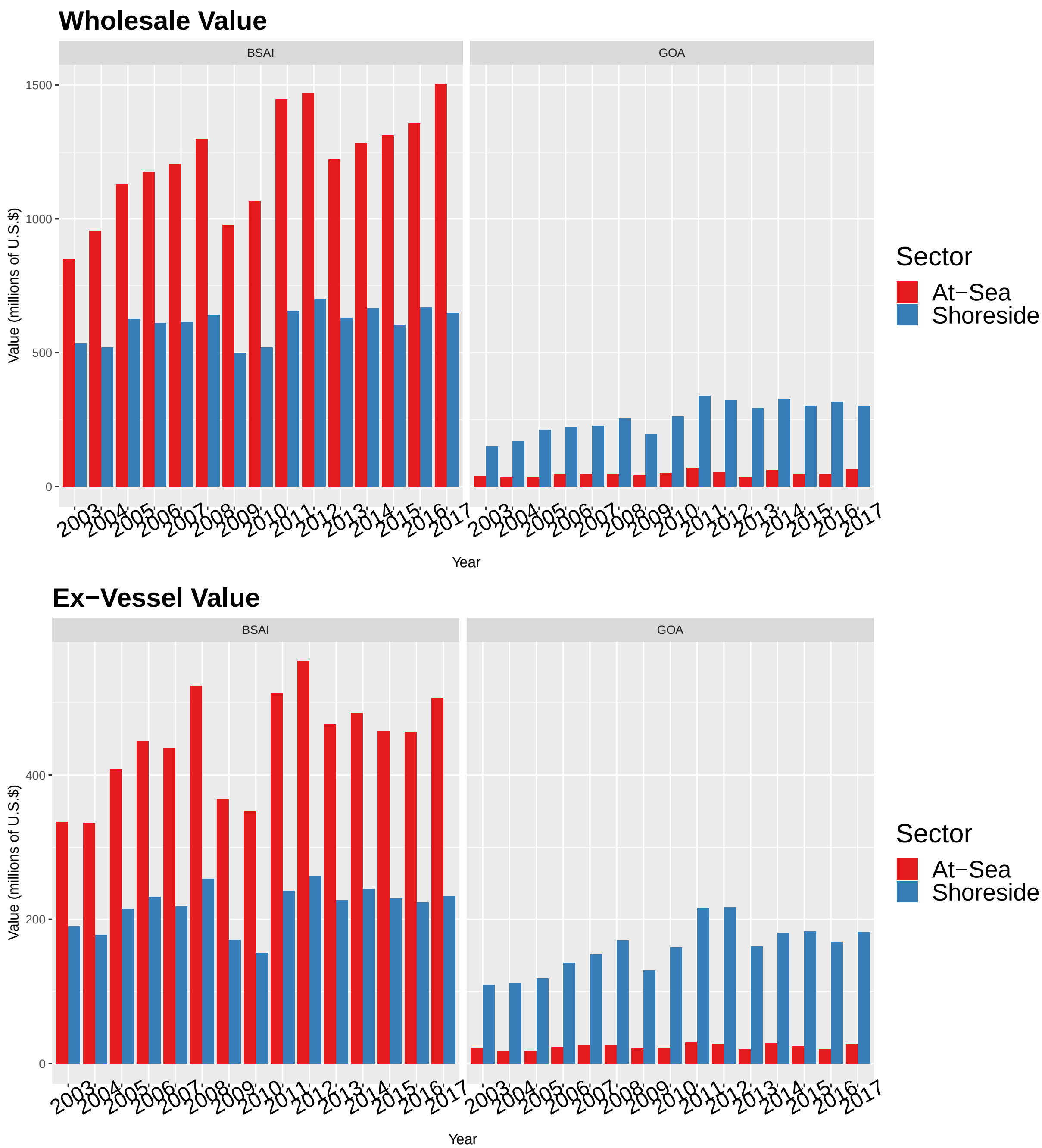

Figure 5.1: Wholesale and ex-vessel value by region and sector 2003-2017.
Source: NMFS Alaska Region's Catch-accounting system (CAS) and Weekly Production Report (WPR) estimates; Alaska Department of Fish and Game (ADF&G) Commercial Operator's Annual Report (COAR), National Marine Fisheries Service. P.O. Box 15700, Seattle, WA 98115-0070.

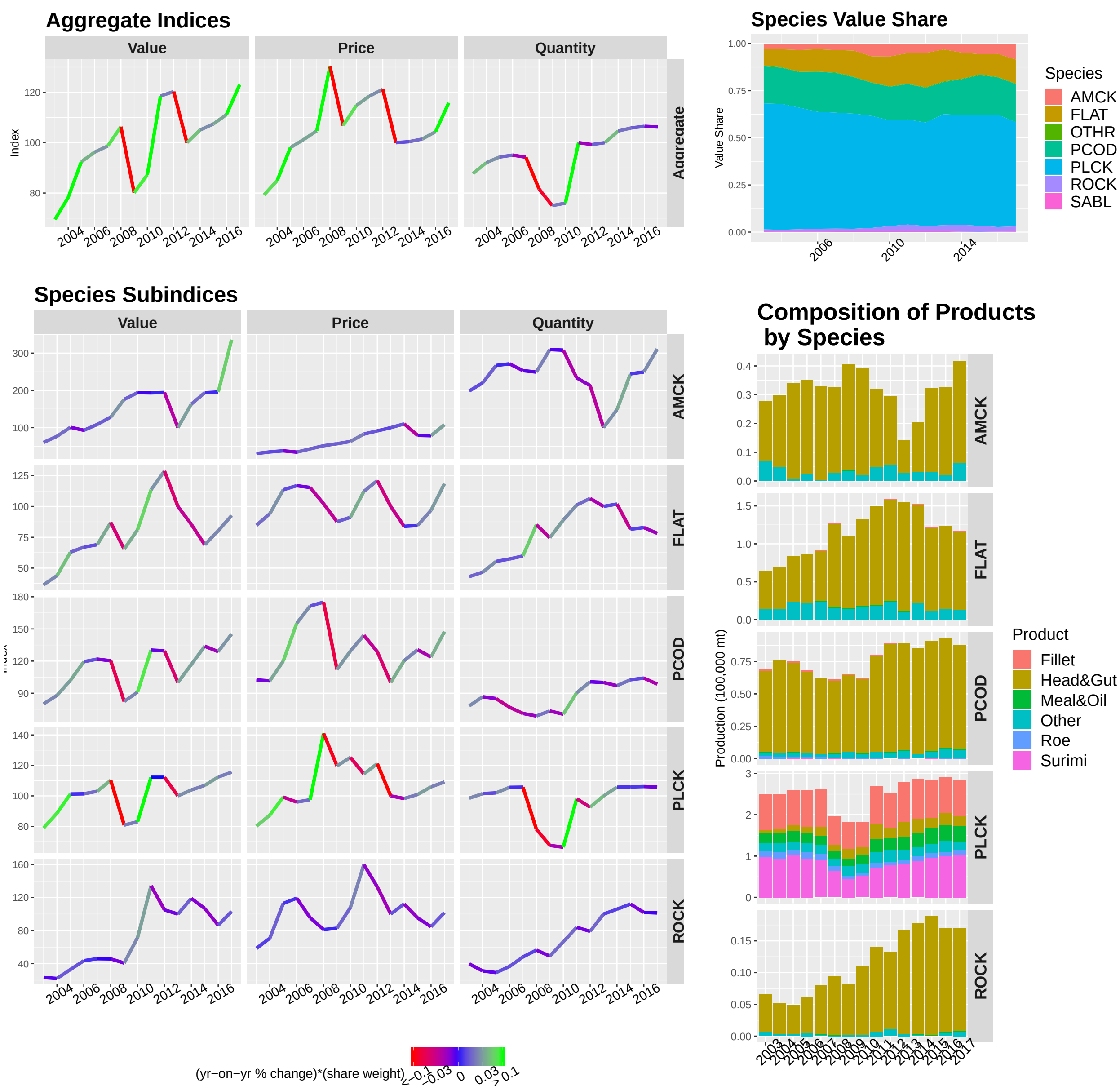

Figure 5.2: BSAI at-sea wholesale market: species decomposition 2003-2017 (Index 2013 = 100). **Notes:** Index values for 2012-2017, notes and source information for the indices are on Table 5.1. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

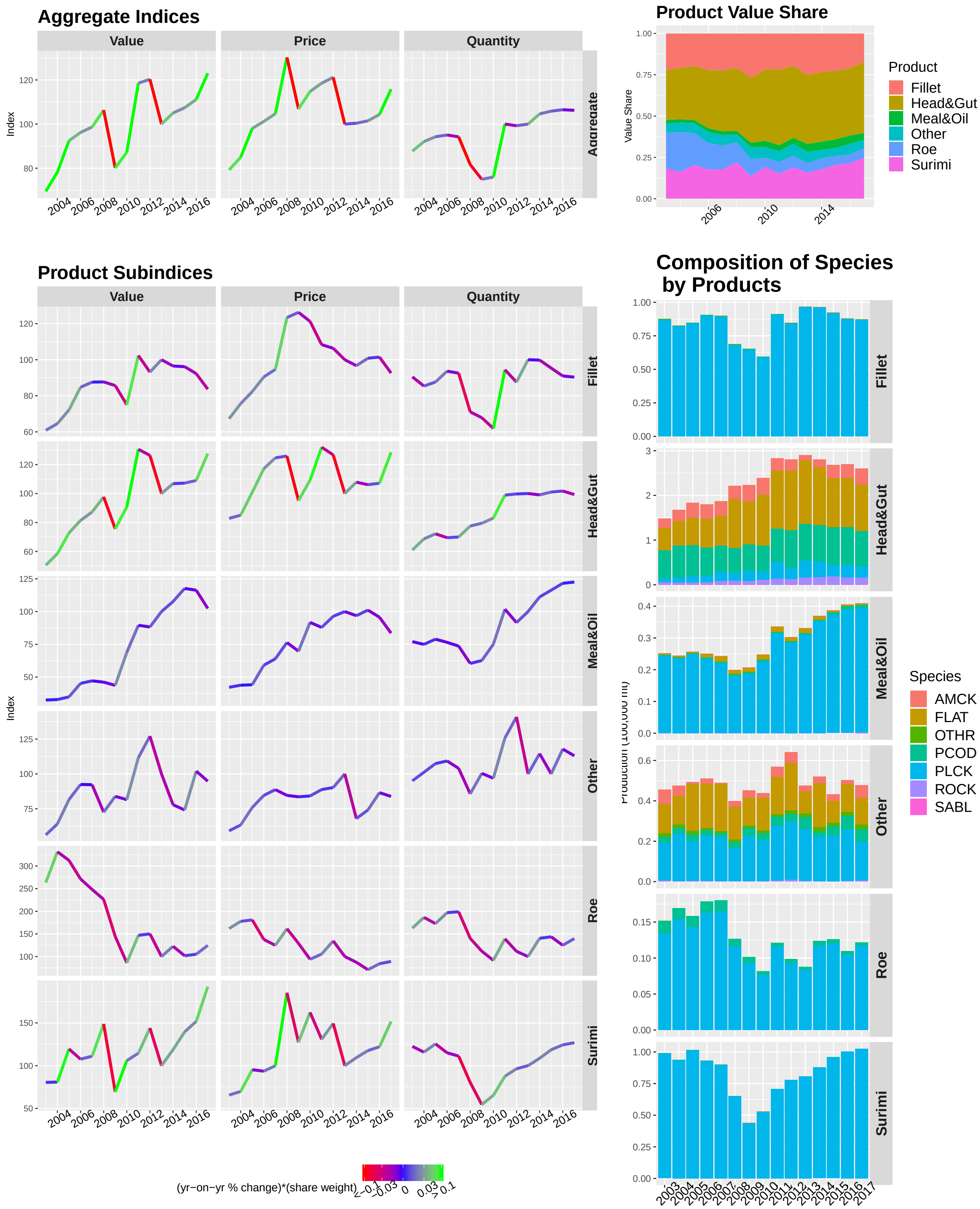

Figure 5.3: BSAI at-sea wholesale market: product decomposition 2003-2017 (Index 2013 = 100). **Notes:** Index values for 2012-2017, notes and source information for the indices are on Table 5.2. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

Figure 5.4: BSAI shoreside wholesale market: species decomposition 2003-2017 (Index 2013 = 100). **Notes:** Index values for 2012-2017, notes and source information for the indices are on Table 5.3. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

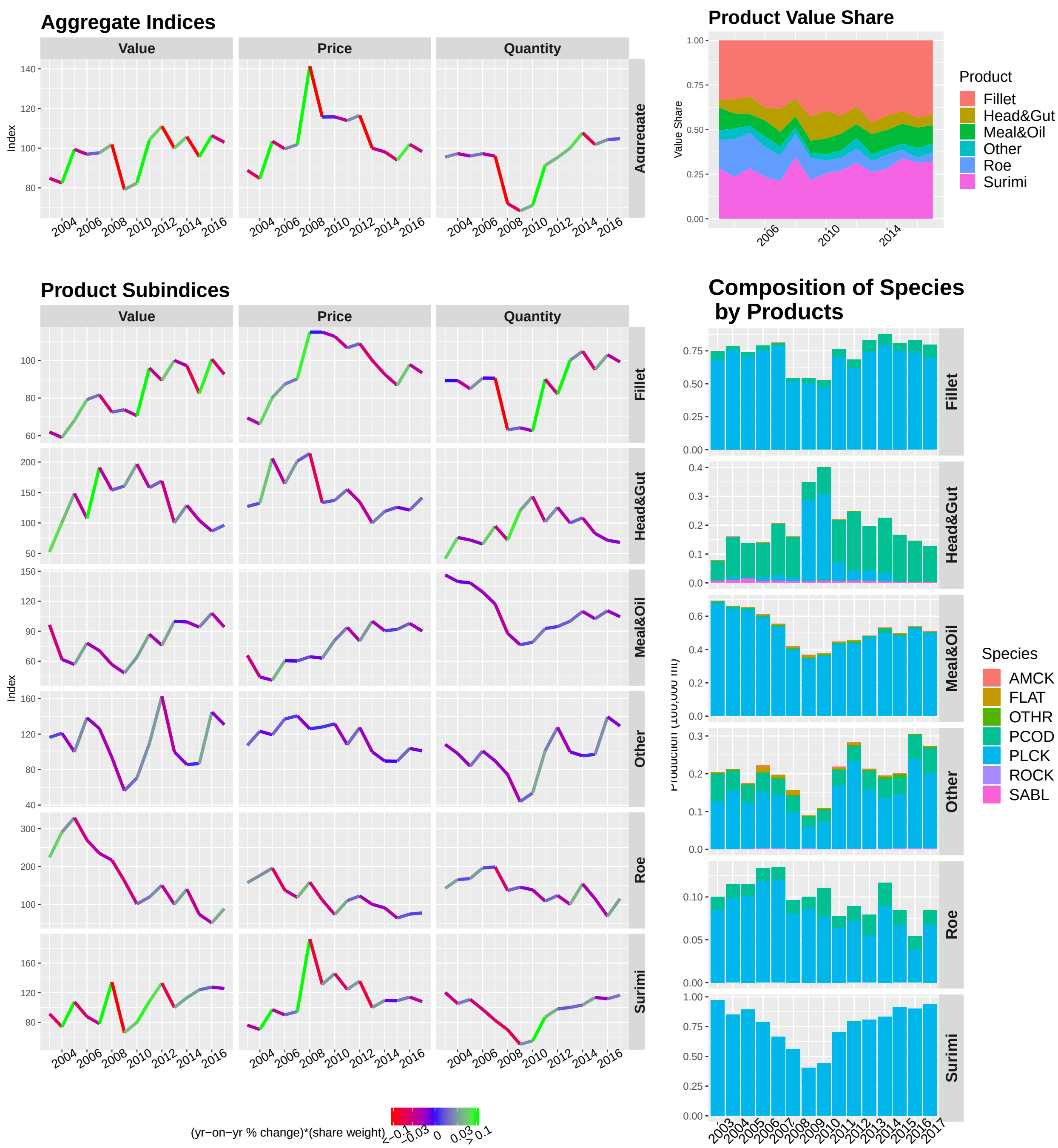

Figure 5.5: BSAI shoreside wholesale market: product decomposition 2003-2017 (Index 2013 = 100). **Notes:** Index values for 2012-2017, notes and source information for the indices are on Table 5.4. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

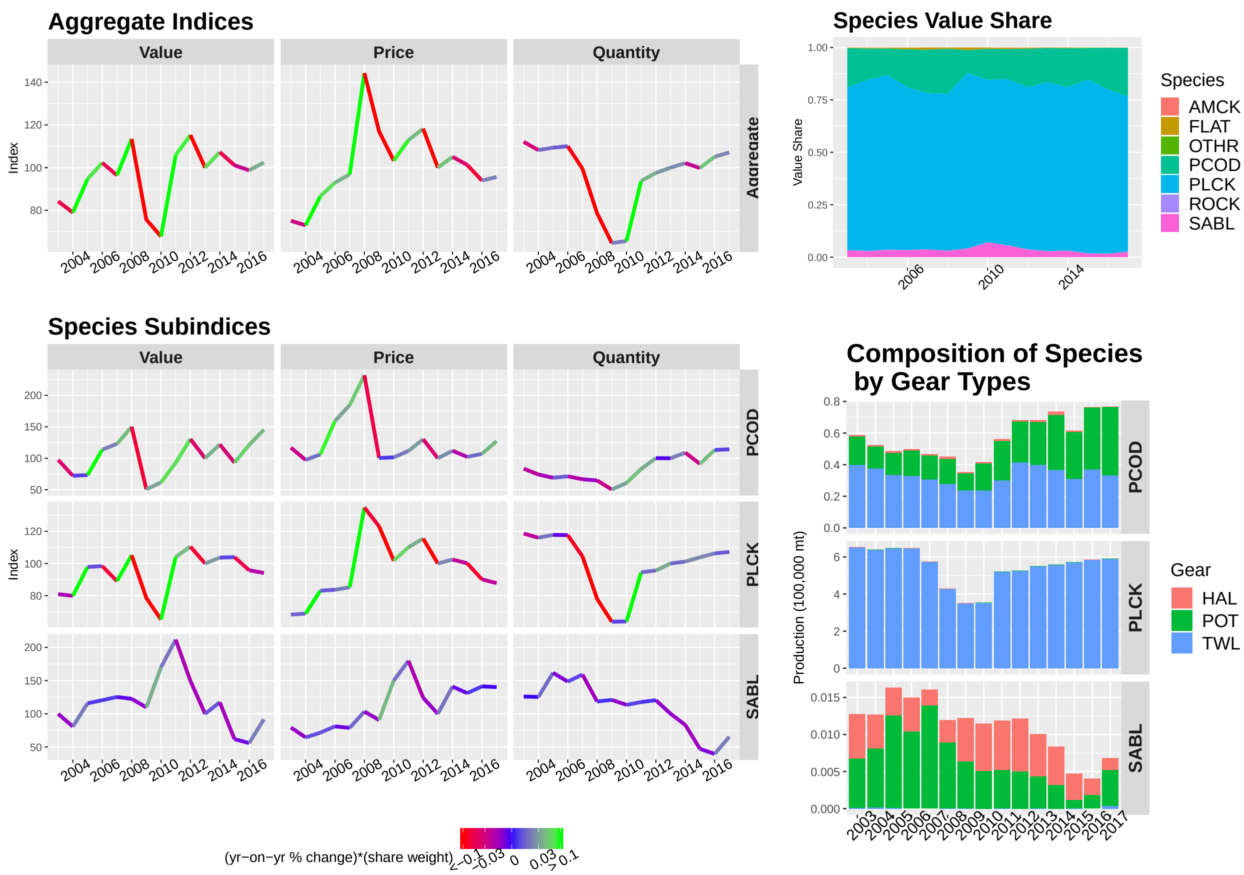

Figure 5.6: BSAI shoreside ex-vessel market: species decomposition 2003-2017 (Index 2013 = 100). **Notes:** Index values for 2012-2017, notes and source information for the indices are on Table 5.5. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

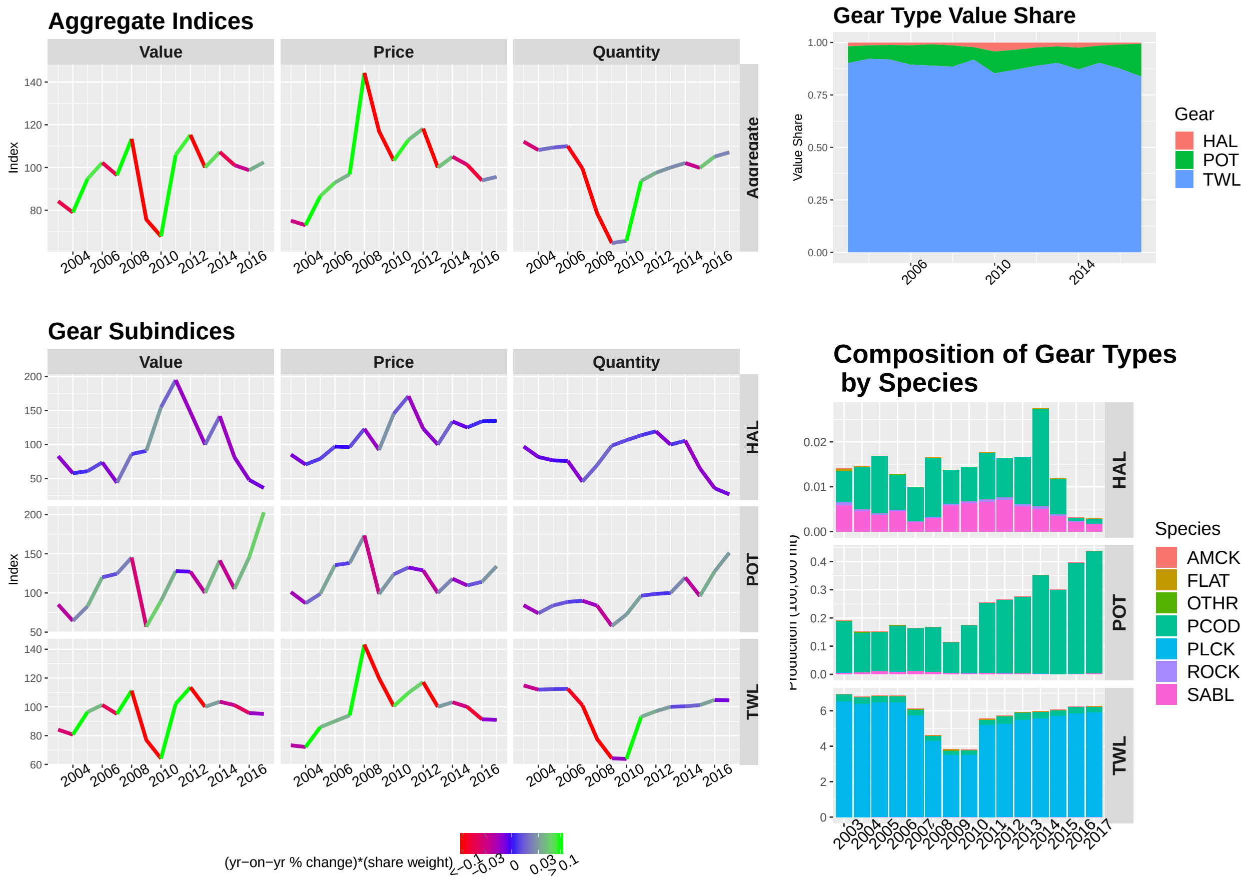

Figure 5.7: BSAI shoreside ex-vessel market: gear decomposition 2003-2017 (Index 2013 = 100). **Notes:** Index values for 2012-2017, notes and source information for the indices are on Table 5.6. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

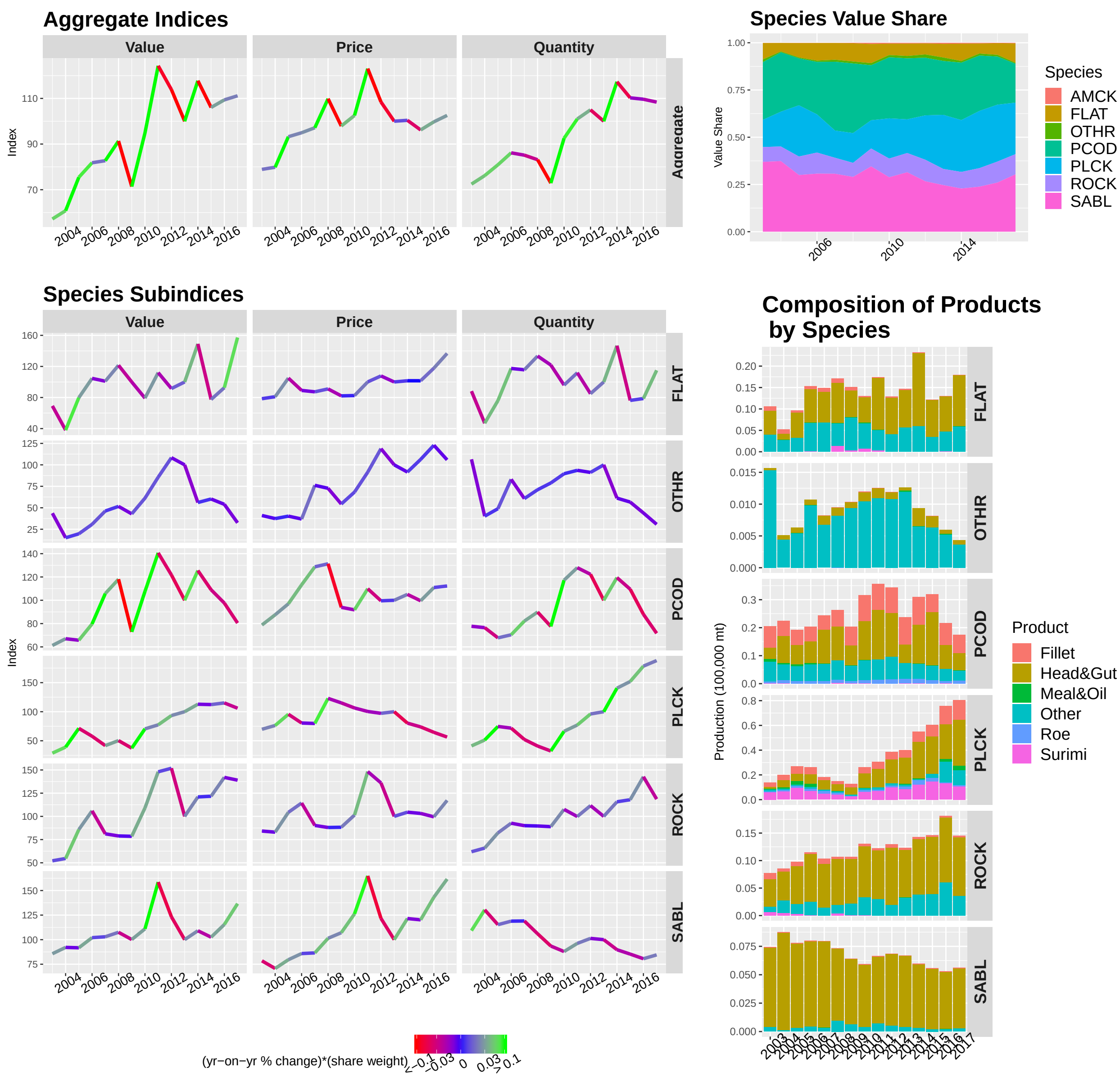

Figure 5.8: GOA wholesale market: species decomposition 2003-2017 (Index 2013 = 100). **Notes:** Index values for 2012-2017, notes and source information for the indices are on Table 5.7. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

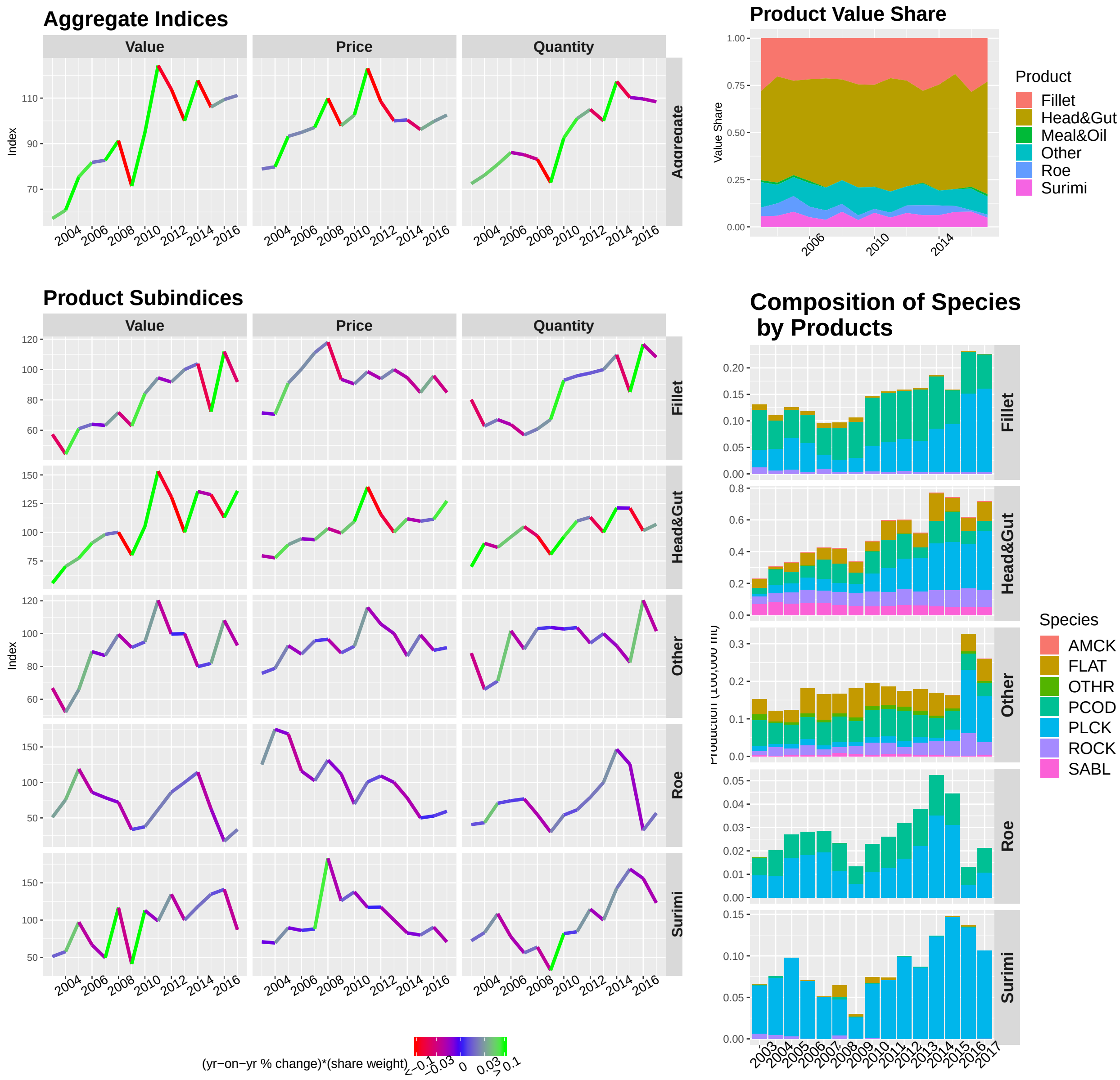

Figure 5.9: GOA wholesale market: product decomposition 2003-2017 (Index 2013 = 100).
Notes: Index values for 2012-2017, notes and source information for the indices are on Table 5.8. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

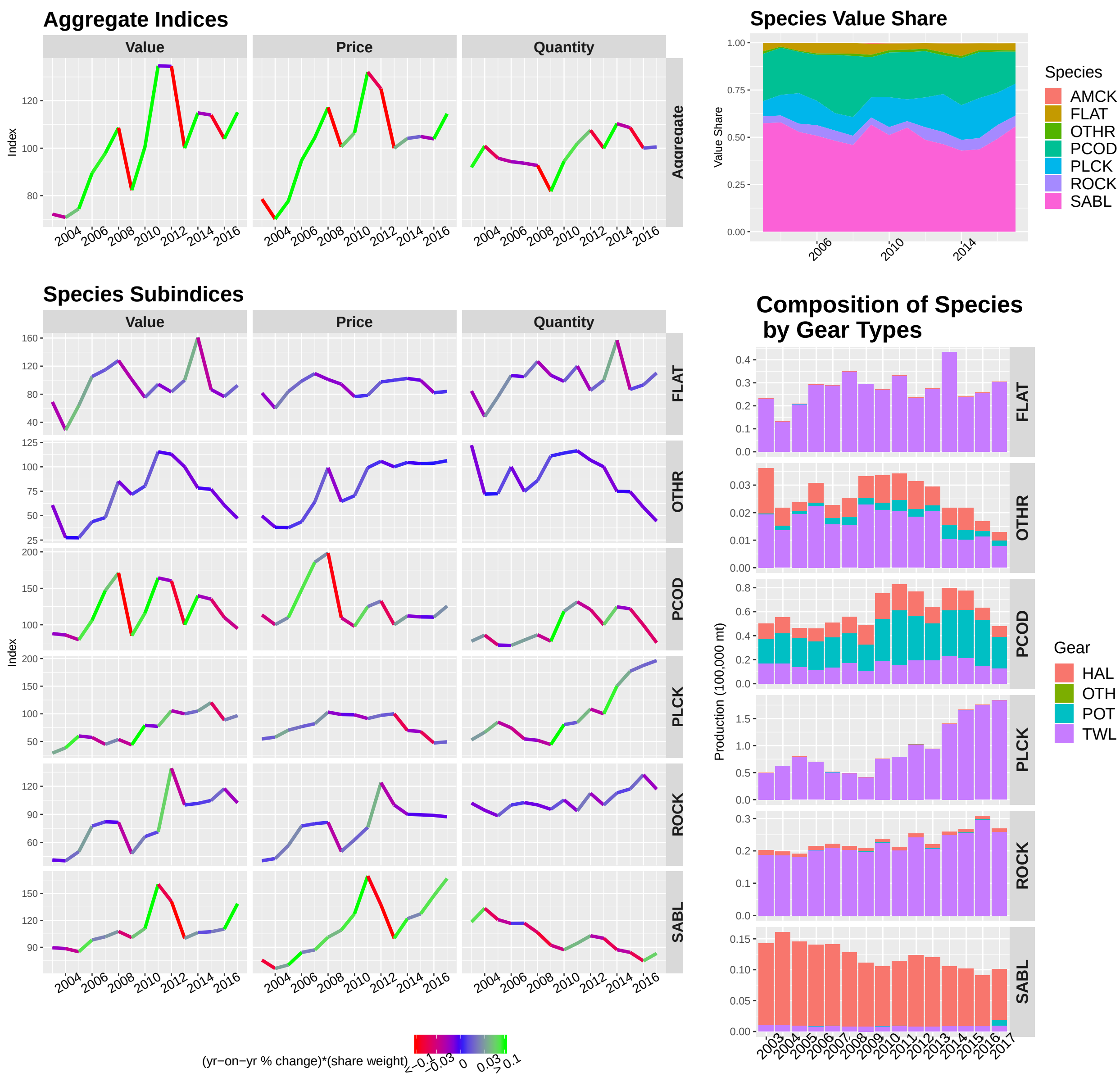

Figure 5.10: GOA ex-vessel market: species decomposition 2003-2017 (Index 2013 = 100). **Notes:** Index values for 2012-2017, notes and source information for the indices are on Table 5.9. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

Figure 5.11: GOA ex-vessel market: gear decomposition 2003-2017 (Index 2013 = 100).
Notes: Index values for 2012-2017, notes and source information for the indices are on Table 5.10. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

Table 5.1: Species Indices and Value Share for the BSAI At-Sea First-Wholesale Market 2012-2017.

Species	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	120.30	100.00	105.05	107.41	111.16	123.05
Aggregate	Price	121.21	100.00	100.40	101.46	104.36	115.82
Aggregate	Quantity	99.25	100.00	104.63	105.86	106.52	106.25
AMCK	Value	194.41	100.00	163.21	193.66	195.54	336.04
AMCK	Price	91.30	100.00	110.08	79.30	78.40	108.04
AMCK	Quantity	212.94	100.00	148.26	244.21	249.40	311.04
AMCK	Value Share	0.05	0.03	0.05	0.06	0.05	0.08
FLAT	Value	128.79	100.00	85.46	68.88	80.26	92.57
FLAT	Price	120.96	100.00	83.87	84.53	96.85	118.40
FLAT	Quantity	106.48	100.00	101.90	81.49	82.87	78.18
FLAT	Value Share	0.18	0.17	0.14	0.11	0.12	0.13
PCOD	Value	129.60	100.00	116.86	133.87	128.85	145.29
PCOD	Price	128.75	100.00	120.43	130.58	123.79	147.52
PCOD	Quantity	100.66	100.00	97.04	102.52	104.09	98.49
PCOD	Value Share	0.18	0.17	0.19	0.21	0.20	0.20
PLCK	Value	112.22	100.00	103.89	106.91	112.42	115.55
PLCK	Price	121.16	100.00	98.28	100.95	105.92	109.17
PLCK	Quantity	92.62	100.00	105.72	105.91	106.13	105.85
PLCK	Value Share	0.55	0.59	0.58	0.59	0.60	0.55
ROCK	Value	105.08	100.00	118.89	106.84	86.47	103.11
ROCK	Price	132.85	100.00	112.30	95.32	84.77	101.67
ROCK	Quantity	79.10	100.00	105.87	112.08	102.01	101.41
ROCK	Value Share	0.03	0.03	0.04	0.03	0.03	0.03

Notes: Species with a value share less than 1% were not included in this table. All groundfish species were used to calculate aggregate indices and value share. The Fisher index method was used to construct the indices. Further details can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.2: Product Indices and Value Share for the BSAI At-Sea First-Wholesale Market 2012-2017.

Product	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	120.30	100.00	105.05	107.41	111.16	123.05
Aggregate	Price	121.21	100.00	100.40	101.46	104.36	115.82
Aggregate	Quantity	99.25	100.00	104.63	105.86	106.52	106.25
Fillet	Value	93.13	100.00	96.50	96.15	92.28	83.66
Fillet	Price	106.34	100.00	96.69	100.84	101.42	92.59
Fillet	Quantity	87.58	100.00	99.81	95.34	90.98	90.35
Fillet	Value Share	0.20	0.25	0.23	0.23	0.21	0.17
Head&Gut	Value	126.31	100.00	106.84	107.19	109.02	127.59
Head&Gut	Price	126.69	100.00	107.86	106.09	107.15	128.49
Head&Gut	Quantity	99.70	100.00	99.06	101.04	101.74	99.30
Head&Gut	Value Share	0.44	0.42	0.42	0.41	0.41	0.43
Meal&Oil	Value	88.26	100.00	107.68	117.67	116.31	102.37
Meal&Oil	Price	96.39	100.00	96.85	101.15	95.66	83.55
Meal&Oil	Quantity	91.57	100.00	111.18	116.33	121.60	122.53
Meal&Oil	Value Share	0.04	0.05	0.05	0.05	0.05	0.04
Other	Value	127.12	100.00	77.89	74.14	102.04	94.74
Other	Price	90.23	100.00	67.98	74.12	86.59	83.85
Other	Quantity	140.88	100.00	114.57	100.03	117.84	112.99
Other	Value Share	0.07	0.07	0.05	0.05	0.06	0.05
Roe	Value	150.16	100.00	122.67	101.79	105.05	124.70
Roe	Price	134.64	100.00	87.37	70.88	84.12	89.22
Roe	Quantity	111.52	100.00	140.39	143.61	124.87	139.76
Roe	Value Share	0.07	0.06	0.07	0.05	0.05	0.06
Surimi	Value	144.01	100.00	118.76	139.52	151.74	192.41
Surimi	Price	149.40	100.00	109.34	117.61	122.09	151.66
Surimi	Quantity	96.39	100.00	108.61	118.63	124.28	126.87
Surimi	Value Share	0.19	0.16	0.18	0.20	0.22	0.25

Notes: Products types 'Minced', 'Other' and those with a value share less than 1% were not included in this table. All product types were used to contruct aggregate indices and value share. The Fisher index method was used to construct the indices. Further details can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.3: Species Indices and Value Share for the BSAI Shoreside First-Wholesale Market 2012-2017.

Species	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	111.10	100.00	105.78	95.68	106.36	102.98
Aggregate	Price	116.52	100.00	98.17	93.98	101.94	98.28
Aggregate	Quantity	95.34	100.00	107.75	101.81	104.33	104.78
PCOD	Value	117.00	100.00	115.33	90.19	125.79	138.57
PCOD	Price	124.42	100.00	105.16	107.05	116.64	132.99
PCOD	Quantity	94.04	100.00	109.67	84.26	107.84	104.20
PCOD	Value Share	0.16	0.15	0.16	0.14	0.18	0.20
PLCK	Value	109.69	100.00	104.38	96.94	103.94	97.08
PLCK	Price	115.82	100.00	96.76	91.35	99.00	91.76
PLCK	Quantity	94.71	100.00	107.87	106.11	104.99	105.81
PLCK	Value Share	0.82	0.83	0.82	0.84	0.81	0.78
SABL	Value	111.31	100.00	80.42	62.72	49.71	74.78
SABL	Price	95.71	100.00	105.97	117.46	125.61	115.88
SABL	Quantity	116.29	100.00	75.89	53.40	39.57	64.53
SABL	Value Share	0.02	0.02	0.01	0.01	0.01	0.01

Notes: Species with a value share less than 1% were not included in this table. All groundfish species were used to calculate aggregate indices and value share. The Fisher index method was used to construct the indices. Further details can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.4: Product Indices and Value Share for the BSAI Shoreside First-Wholesale Market 2012-2017.

Product	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	111.10	100.00	105.78	95.68	106.36	102.98
Aggregate	Price	116.52	100.00	98.17	93.98	101.94	98.28
Aggregate	Quantity	95.34	100.00	107.75	101.81	104.33	104.78
Fillet	Value	89.37	100.00	97.13	82.47	100.67	92.59
Fillet	Price	108.91	100.00	92.63	86.76	97.76	93.39
Fillet	Quantity	82.06	100.00	104.86	95.05	102.98	99.15
Fillet	Value Share	0.37	0.46	0.42	0.40	0.44	0.41
Head&Gut	Value	168.99	100.00	129.08	104.16	86.73	96.40
Head&Gut	Price	134.47	100.00	119.02	125.82	121.14	141.49
Head&Gut	Quantity	125.68	100.00	108.45	82.79	71.60	68.13
Head&Gut	Value Share	0.10	0.07	0.08	0.07	0.05	0.06
Meal&Oil	Value	75.90	100.00	99.32	94.04	108.04	94.19
Meal&Oil	Price	80.19	100.00	90.48	91.81	97.78	90.18
Meal&Oil	Quantity	94.65	100.00	109.77	102.43	110.49	104.44
Meal&Oil	Value Share	0.08	0.11	0.11	0.11	0.11	0.10
Other	Value	162.68	100.00	85.69	86.87	144.85	130.60
Other	Price	127.41	100.00	89.66	89.46	103.85	101.15
Other	Quantity	127.68	100.00	95.57	97.10	139.48	129.12
Other	Value Share	0.06	0.04	0.03	0.04	0.05	0.05
Roe	Value	150.54	100.00	139.93	73.27	50.96	88.90
Roe	Price	122.13	100.00	90.78	63.88	74.28	77.28
Roe	Quantity	123.26	100.00	154.14	114.70	68.61	115.05
Roe	Value Share	0.08	0.06	0.08	0.05	0.03	0.05
Surimi	Value	132.94	100.00	113.12	123.96	127.46	125.69
Surimi	Price	135.62	100.00	109.45	109.12	114.05	107.89
Surimi	Quantity	98.03	100.00	103.35	113.60	111.76	116.49
Surimi	Value Share	0.31	0.26	0.28	0.34	0.31	0.32

Notes: Products types 'Minced', 'Other' and those with a value share less than 1% were not included in this table. All product types were used to contruct aggregate indices and value share. The Fisher index method was used to construct the indices. Further details can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.5: Species Indices and Value Share for the BSAI Shoreside Ex-Vessel Market 2012-2017.

Species	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	115.27	100.00	107.26	101.11	98.74	102.43
Aggregate	Price	118.20	100.00	105.06	101.28	93.94	95.63
Aggregate	Quantity	97.52	100.00	102.10	99.83	105.10	107.11
PCOD	Value	130.54	100.00	122.06	93.06	121.17	145.46
PCOD	Price	130.22	100.00	112.02	102.12	107.06	127.29
PCOD	Quantity	100.25	100.00	108.96	91.13	113.17	114.27
PCOD	Value Share	0.18	0.16	0.18	0.15	0.20	0.23
PLCK	Value	110.45	100.00	103.66	103.95	95.78	94.08
PLCK	Price	115.47	100.00	102.45	100.12	90.12	87.79
PLCK	Quantity	95.65	100.00	101.18	103.83	106.28	107.16
PLCK	Value Share	0.77	0.81	0.78	0.83	0.78	0.74
SABL	Value	149.53	100.00	117.39	61.87	55.95	91.73
SABL	Price	124.09	100.00	140.98	131.07	141.25	140.18
SABL	Quantity	120.50	100.00	83.26	47.20	39.61	65.44
SABL	Value Share	0.04	0.03	0.03	0.02	0.02	0.02

Notes: Species with a value share less than 1% were not included in this table. All groundfish species were used to calculate aggregate indices and value share. The Fisher index method was used to construct the indices. Further details can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.6: Gear Indices and Value Share for the BSAI Shoreside Ex-Vessel Market 2012-2017.

Gear	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	115.27	100.00	107.26	101.11	98.74	102.43
Aggregate	Price	118.20	100.00	105.06	101.28	93.94	95.63
Aggregate	Quantity	97.52	100.00	102.10	99.83	105.10	107.11
HAL	Value	147.75	100.00	141.81	81.44	48.23	36.29
HAL	Price	123.58	100.00	134.08	125.17	134.20	134.92
HAL	Quantity	119.56	100.00	105.76	65.06	35.94	26.90
HAL	Value Share	0.02	0.02	0.02	0.02	0.01	0.01
POT	Value	127.13	100.00	141.47	105.18	145.47	202.87
POT	Price	128.70	100.00	118.12	109.56	114.14	134.12
POT	Quantity	98.77	100.00	119.78	96.00	127.44	151.26
POT	Value Share	0.09	0.08	0.10	0.08	0.12	0.16
TWL	Value	113.56	100.00	103.57	101.16	95.71	95.05
TWL	Price	117.15	100.00	103.19	99.95	91.35	90.92
TWL	Quantity	96.94	100.00	100.36	101.20	104.78	104.54
TWL	Value Share	0.89	0.90	0.87	0.90	0.87	0.84

Notes: The Fisher index method was used to construct the indices. Further details on index construction and gear decomposition can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.7: Species Indices and Value Share for the GOA First-Wholesale Market 2012-2017.

Species	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	113.86	100.00	117.75	106.04	109.36	111.15
Aggregate	Price	108.45	100.00	100.40	96.18	99.74	102.55
Aggregate	Quantity	104.99	100.00	117.28	110.25	109.64	108.38
FLAT	Value	91.53	100.00	149.00	77.46	92.68	157.19
FLAT	Price	107.78	100.00	101.55	101.55	117.78	136.72
FLAT	Quantity	84.92	100.00	146.72	76.27	78.70	114.97
FLAT	Value Share	0.06	0.07	0.09	0.05	0.06	0.10
OTHR	Value	108.35	100.00	56.13	60.23	54.02	32.52
OTHR	Price	118.81	100.00	91.60	106.33	122.86	105.83
OTHR	Quantity	91.19	100.00	61.28	56.64	43.97	30.73
OTHR	Value Share	0.02	0.02	0.01	0.01	0.01	0.01
PCOD	Value	121.73	100.00	125.52	109.02	97.61	80.48
PCOD	Price	99.55	100.00	105.06	99.56	110.94	112.27
PCOD	Quantity	122.28	100.00	119.47	109.50	87.98	71.68
PCOD	Value Share	0.31	0.29	0.30	0.29	0.25	0.21
PLCK	Value	93.38	100.00	112.88	112.26	115.12	106.01
PLCK	Price	97.19	100.00	80.33	73.87	64.51	56.39
PLCK	Quantity	96.08	100.00	140.52	151.97	178.45	187.98
PLCK	Value Share	0.23	0.29	0.27	0.30	0.30	0.27
ROCK	Value	151.84	100.00	120.94	121.68	142.01	139.01
ROCK	Price	136.06	100.00	104.52	103.17	99.53	117.20
ROCK	Quantity	111.60	100.00	115.71	117.94	142.69	118.60
ROCK	Value Share	0.11	0.09	0.09	0.10	0.11	0.11
SABL	Value	123.25	100.00	109.08	102.53	115.44	136.64
SABL	Price	121.67	100.00	121.50	120.20	143.22	161.67
SABL	Quantity	101.29	100.00	89.78	85.30	80.60	84.52
SABL	Value Share	0.27	0.25	0.23	0.24	0.26	0.30

Notes: Species with a value share less than 1% were not included in this table. All groundfish species were used to calculate aggregate indices and value share. The Fisher index method was used to construct the indices. Further details can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.8: Product Indices and Value Share for the GOA First-Wholesale Market 2012-2017.

Product	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	113.86	100.00	117.75	106.04	109.36	111.15
Aggregate	Price	108.45	100.00	100.40	96.18	99.74	102.55
Aggregate	Quantity	104.99	100.00	117.28	110.25	109.64	108.38
Fillet	Value	91.78	100.00	103.84	72.26	111.84	91.78
Fillet	Price	93.94	100.00	94.63	84.84	95.89	84.88
Fillet	Quantity	97.70	100.00	109.73	85.17	116.64	108.13
Fillet	Value Share	0.22	0.28	0.25	0.19	0.28	0.23
Head&Gut	Value	130.95	100.00	135.53	132.78	112.98	136.15
Head&Gut	Price	115.72	100.00	111.73	109.68	111.45	127.32
Head&Gut	Quantity	113.16	100.00	121.30	121.06	101.37	106.93
Head&Gut	Value Share	0.56	0.49	0.56	0.61	0.50	0.60
Other	Value	99.74	100.00	79.86	81.88	108.13	92.82
Other	Price	105.87	100.00	86.32	99.29	89.83	91.43
Other	Quantity	94.21	100.00	92.52	82.47	120.37	101.52
Other	Value Share	0.10	0.12	0.08	0.09	0.11	0.10
Roe	Value	86.19	100.00	114.42	62.79	17.14	33.73
Roe	Price	109.07	100.00	77.99	50.04	52.69	59.31
Roe	Quantity	79.02	100.00	146.72	125.48	32.52	56.87
Roe	Value Share	0.04	0.05	0.05	0.03	0.01	0.02
Surimi	Value	134.65	100.00	118.10	134.66	141.23	86.99
Surimi	Price	117.35	100.00	82.73	79.94	90.56	70.67
Surimi	Quantity	114.74	100.00	142.75	168.46	155.96	123.08
Surimi	Value Share	0.07	0.06	0.06	0.08	0.08	0.05

Notes: Products types 'Minced' and those with a value share less than 1% were not included in this table. All product types were used to contruct aggregate indices and value share. The Fisher index method was used to construct the indices. Further details can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.9: Species Indices and Value Share for the GOA Ex-Vessel Market 2012-2017.

Species	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	134.45	100.00	114.86	113.96	103.97	115.10
Aggregate	Price	125.01	100.00	104.12	104.92	103.93	114.49
Aggregate	Quantity	107.55	100.00	110.32	108.62	100.03	100.53
FLAT	Value	83.20	100.00	160.71	86.69	76.55	92.50
FLAT	Price	97.43	100.00	102.48	99.84	82.07	83.91
FLAT	Quantity	85.40	100.00	156.82	86.82	93.28	110.25
FLAT	Value Share	0.03	0.05	0.07	0.04	0.03	0.04
OTHR	Value	112.88	100.00	78.32	76.94	60.73	47.19
OTHR	Price	105.68	100.00	104.53	103.27	103.74	106.24
OTHR	Quantity	106.81	100.00	74.93	74.50	58.54	44.42
OTHR	Value Share	0.01	0.02	0.01	0.01	0.01	0.01
PCOD	Value	160.25	100.00	139.78	135.09	110.08	94.87
PCOD	Price	132.57	100.00	112.19	110.80	110.52	125.63
PCOD	Quantity	120.88	100.00	124.59	121.92	99.60	75.52
PCOD	Value Share	0.24	0.21	0.25	0.24	0.22	0.17
PLCK	Value	105.64	100.00	104.97	120.37	88.63	96.77
PLCK	Price	97.27	100.00	69.84	67.99	47.26	49.30
PLCK	Quantity	108.61	100.00	150.29	177.04	187.52	196.31
PLCK	Value Share	0.16	0.20	0.18	0.21	0.17	0.17
ROCK	Value	139.22	100.00	101.64	104.84	117.47	102.18
ROCK	Price	123.83	100.00	90.02	89.52	88.83	87.44
ROCK	Quantity	112.42	100.00	112.90	117.11	132.24	116.86
ROCK	Value Share	0.07	0.06	0.06	0.06	0.07	0.06
SABL	Value	141.20	100.00	106.44	107.31	110.37	138.61
SABL	Price	137.29	100.00	121.93	127.29	147.57	166.72
SABL	Quantity	102.85	100.00	87.30	84.30	74.79	83.14
SABL	Value Share	0.49	0.46	0.43	0.44	0.49	0.56

Notes: Species with a value share less than 1% were not included in this table. All groundfish species were used to calculate aggregate indices and value share. The Fisher index method was used to construct the indices. Further details can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 5.10: Gear Indices and Value Share for the GOA Ex-Vessel Market 2012-2017.

Gear	Index Type	2012	2013	2014	2015	2016	2017
Aggregate	Value	134.45	100.00	114.86	113.96	103.97	115.10
Aggregate	Price	125.01	100.00	104.12	104.92	103.93	114.49
Aggregate	Quantity	107.55	100.00	110.32	108.62	100.03	100.53
HAL	Value	145.83	100.00	108.41	107.73	105.07	116.58
HAL	Price	135.87	100.00	120.09	124.50	142.21	159.83
HAL	Quantity	107.33	100.00	90.27	86.53	73.88	72.94
HAL	Value Share	0.54	0.50	0.47	0.47	0.50	0.51
POT	Value	157.78	100.00	139.19	144.85	133.23	160.09
POT	Price	131.98	100.00	112.64	112.19	110.80	123.40
POT	Quantity	119.55	100.00	123.57	129.11	120.24	129.74
POT	Value Share	0.12	0.11	0.13	0.13	0.14	0.15
TWL	Value	113.90	100.00	116.49	113.56	94.78	101.23
TWL	Price	109.15	100.00	85.73	83.86	69.27	73.83
TWL	Quantity	104.36	100.00	135.89	135.42	136.82	137.11
TWL	Value Share	0.34	0.40	0.40	0.39	0.36	0.35

Notes: The Fisher index method was used to construct the indices. Further details on index construction and gear decomposition can be found in the text or by contacting ben.fissel@noaa.gov.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region At-sea and Shoreside Production Reports; and ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

6. ALASKA GROUNDFISH PRICE PROJECTIONS

6.1. Introduction

The most recent year for which ex-vessel and first-wholesale prices (Tables 11, 16, 27, and 32) are available is 2017. These prices are largely derived from the Commercial Operators Annual Report (COAR). Because of the report's submission deadline, processing and validation of the data from the report are not completed until July of the following year. Thus, at the time of this report's writing (November 2018), the most recent COAR data available was for the previous year, 2017. To provide recent information, current (i.e., 2018) prices are estimated ("nowcast") using related data that is reported at a higher frequency and provides more contemporaneous information on the likely state of prices for 2018. Ex-vessel prices estimates are based on unadjusted prices[1] on fish ticket through the month of Sept. 2018. First-wholesale price estimates are based on export prices through the month of Aug. 2018, estimated global catch, and exchanges rates for 2018. In addition to the nowcasts, ex-vessel and first-wholesale prices are projected out over the next 2 years (2019-2020). These projections give a probabilistic characterization of the range of future prices.

The species and products for which price projections are made approximately correspond with the prices in Tables 11, 16, 27, and 32 in Section 4 of this document. With the notable exception that first-wholesale estimates are made for all Alaska, and no distinction is made between at-sea and shoreside prices. This corresponds with the export data which make no distinction between sectors, only the custom district of origin. Export data were constrained to exports originating from states Washington and Alaska which tended to provide a better estimate of first-wholesale prices. Ex-vessel prices estimates are only for the shoreside sectors.

Tables 6.1 and 6.2 summarize the price projections for the six years spanning 2015-2020. Prices between 2015-2017 are realized (actual) prices. The summary data provided for the years 2018-2020 are the expected price (mean) and 90% confidence bounds. Confidence bounds give the estimated probability that the price will fall within the bound. Thus, for the 5% bound, 5% of the simulated prices were less than the given value. Similarly, for the 95% bound, 95% of the simulated prices were less (and 5% were greater). Hence, the region between the 5% and 95% bounds can be interpreted as the 90% confidence bound. Smaller confidence bounds indicate less uncertainty in the projections. In general, price projections for the current year, 2018, display a modest degree of volatility. As prices are projected past the current year the confidence bounds grow reflecting increased uncertainty further out in the future.

Methods are briefly outlined in Section 6.3. Sections 6.4 and 6.5 examines the individual ex-vessel and product price projections for 2018-2020. For these projections a more detailed characterization of the forecast distribution is given by the mean, median and 40%, 60%, 80%, and 90% confidence bounds. Figures plot the price projection results as well as historical realized prices.

6.2. Tabular Summary of Price Projection Results

[1]Unadjusted prices do not account for year-end bonuses

Species	Region	Gear	stat.	2015	2016	2017	2018	2019	2020
pollock	BSAI	trawl	mean	0.154	0.139	0.137	0.15	0.151	0.149
pollock	BSAI	trawl	conf.int.90				[0.15,0.15]	[0.11,0.2]	[0.1,0.21]
pollock	GOA	trawl	mean	0.119	0.083	0.087	0.116	0.115	0.116
pollock	GOA	trawl	conf.int.90				[0.11,0.12]	[0.08,0.15]	[0.07,0.18]
pacific cod	BSAI	trawl	mean	0.234	0.249	0.296	0.37	0.369	0.37
pacific cod	BSAI	trawl	conf.int.90				[0.37,0.37]	[0.22,0.55]	[0.21,0.62]
pacific cod	BSAI	fixed	mean	0.263	0.278	0.332	0.406	0.395	0.394
pacific cod	BSAI	fixed	conf.int.90				[0.4,0.41]	[0.26,0.58]	[0.22,0.65]
pacific cod	GOA	trawl	mean	0.26	0.27	0.329	0.393	0.406	0.385
pacific cod	GOA	trawl	conf.int.90				[0.39,0.4]	[0.29,0.55]	[0.23,0.62]
pacific cod	GOA	fixed	mean	0.306	0.302	0.336	0.447	0.458	0.438
pacific cod	GOA	fixed	conf.int.90				[0.44,0.45]	[0.34,0.6]	[0.27,0.66]
sablefish	GOA	fixed	mean	4.064	4.743	5.314	4.005	4.379	4.824
sablefish	GOA	fixed	conf.int.90				[3.92,4.09]	[3.19,5.65]	[3.41,6.54]

Table 6.1: Groundfish Ex-vessel Price Projection Summary

Species	Product	stat.	2015	2016	2017	2018	2019	2020
pollock	surimi	mean	1.115	1.178	1.317	1.296	1.38	1.35
pollock	surimi	conf.int.90				[1.24,1.35]	[0.99,1.89]	[0.94,1.89]
pollock	roe	mean	2.148	2.789	2.837	3.119	3.148	3.041
pollock	roe	conf.int.90				[2.82,3.42]	[2.2,4.4]	[1.83,4.88]
pollock	fillet	mean	1.285	1.295	1.141	1.224	1.27	1.244
pollock	fillet	conf.int.90				[1.19,1.26]	[1.01,1.58]	[0.89,1.69]
pollock	deep-skin fillet	mean	1.557	1.646	1.492	1.543	1.543	1.556
pollock	deep-skin fillet	conf.int.90				[1.51,1.58]	[1.3,1.8]	[1.24,1.93]
pollock	head and gut	mean	0.622	0.604	0.459	0.543	0.485	0.503
pollock	head and gut	conf.int.90				[0.46,0.63]	[0.36,0.63]	[0.37,0.67]
pacific cod	fillet	mean	2.654	3.318	3.445	3.81	3.85	3.885
pacific cod	fillet	conf.int.90				[3.66,3.96]	[3.1,4.71]	[2.91,5.09]
pacific cod	head and gut	mean	1.347	1.279	1.57	1.639	1.663	1.692
pacific cod	head and gut	conf.int.90				[1.58,1.7]	[1.22,2.18]	[1.15,2.42]
sablefish	head and gut	mean	6.945	8.015	8.856	7.81	8.194	8.832
sablefish	head and gut	conf.int.90				[7.41,8.21]	[6.65,9.95]	[6.84,11.3]
yellowfin (bsai)	head and gut	mean	0.484	0.553	0.657	0.64	0.643	0.649
yellowfin (bsai)	head and gut	conf.int.90				[0.61,0.67]	[0.5,0.81]	[0.47,0.88]
rock sole (bsai)	head and gut with roe	mean	0.891	0.995	1.241	1.189	1.135	1.111
rock sole (bsai)	head and gut with roe	conf.int.90				[1.14,1.24]	[0.85,1.49]	[0.77,1.57]
rock sole (bsai)	head and gut	mean	0.493	0.561	0.655	0.552	0.575	0.573
rock sole (bsai)	head and gut	conf.int.90				[0.5,0.6]	[0.4,0.81]	[0.38,0.85]
arrowtooth	head and gut	mean	0.65	0.82	1.148	0.793	0.943	0.992
arrowtooth	head and gut	conf.int.90				[0.7,0.89]	[0.67,1.29]	[0.7,1.36]
atka mackerel	head and gut	mean	1.08	1.036	1.49	1.336	1.328	1.355
atka mackerel	head and gut	conf.int.90				[1.16,1.51]	[0.9,1.9]	[0.81,2.16]
rockfish	head and gut	mean	1.042	0.926	1.125	1.049	1.05	1.075
rockfish	head and gut	conf.int.90				[0.95,1.14]	[0.74,1.45]	[0.67,1.67]

Table 6.2: Groundfish Product Price Projection Summary

6.3. Summary of Price Projection Methods

Prices are estimated using a two-step procedure. The same basic procedure is used for both ex-vessel and first wholesale nowcasts and projections The first step nowcasts the current year 2018 prices based on currently available (as of Oct. 2018) partial year information. The second step projects prices forward using model simulations to give a probabilistic characterization of the range of future prices.

Current year first-wholesale prices (2018) were nowcast using export prices which are available with a minimal time lag of up to three months. Export prices through August 2018 were available for the current nowcasts. Export prices were obtained from the NMFS Science and Technology trade database. Nowcast models also incorporate 2018 exchange rate data and global catch estimates when they were determined to increase predictability. Global catch estimates for 2018 were obtained from the 2018 International Groundfish Forum. The data were used in a regression to estimate 2018 annual unit value first-wholesale prices of major species and product forms calculated from the COAR and published in Tables 16 and 32 of this report. The statistical relationship between export prices and first-wholesale prices was fairly strong for most products. The relationship tends to be stronger for product where a large share of the production volume is exported.

Ex-vessel prices (2018) were nowcasts were made for shoreside pollock, pacific cod, and sablefish for the predominant gear types used to harvest these species. Nowcasts were made using available fish-ticket prices through September 2018. These data were obtained through the Alaska Fisheries Information Network (AKFIN) from the V_ELLR_SLOG_PRODUCT data base. Data were filtered to the major delivered product forms fit for human consumption and stratified by gear types accordingly. Prices are calculated as the remunerations received at the time of landing divided by the delivered volume. Because of this, these prices do not account for end-of-year bonuses or other post-season adjustments to price. The data were used in a regression to estimate 2018 annual unit value ex-vessel prices calculated from the COAR and published in Tables 11 and 27 of this report. By contrast, COAR based ex-vessel prices do account for end of bonuses and other post-season adjustments to price. The statistical relationship between raw partial year fish-ticket prices and annal COAR based ex-vessel prices was strong for the species and gear types presented.

Price projections for the years 2019-2020 were made using a suite of canonical time series models to estimate returns (the percent change in price). The primary suite of models used were within the class of ARMA time series models (Hamilton, 1994). Two exponential smoothing models were also used, however, these tended to contribute little to the price projections (Hyndman & Athanasopoulos, 2013). Changes in price return volatility (a measure of the dispersion of the return distribution) over time were also modeled. Confidence bounds for the estimated models were constructed using residual resampling methods. Simulations created a probabilistic distribution of potential returns that are consistent with historical deviations from the models. Price projections from the suite of models were then combined using weights that were determined by model fit. Prices were calculated from returns and statistics such as the mean and percentiles for confidence bounds were calculated from the forecast distribution. A detailed description of the price projection methods is available in the NOAA Technical Memorandum (Fissel, 2014). Only a small component of the future prices (2019-2020) was forecastable by the time series models, a feature that is common in price forecasts for commodities, and projections largely reflect the long-run trends and mean reversion estimated by the models. The primary value of these projections is to provide a credible range of potential future prices based on historical variation.

6.4. Ex-vessel Price Projections

6.4.1 Alaska Pollock Ex-vessel Prices

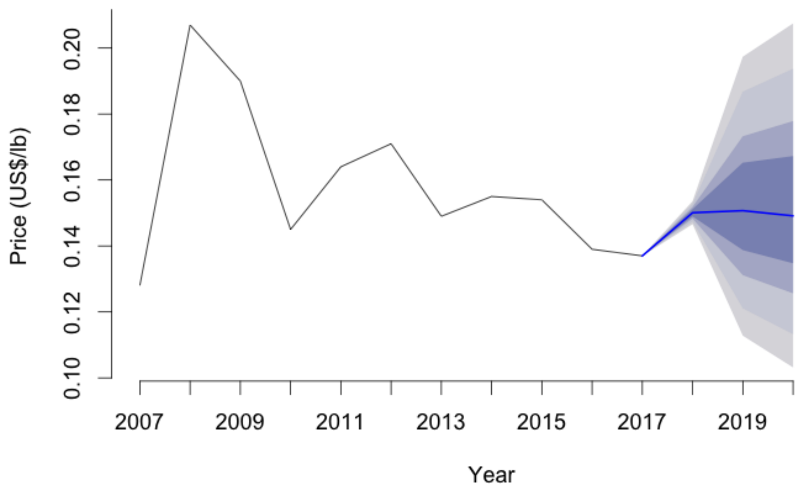

Figure 6.1: Pollock BSAI Trawl Ex-vessel Price Projections and Confidence Bounds

Table 6.3: Projected Mean, Probability Bounds of Pollock BSAI Trawl Ex-vessel Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
2019	0.11	0.12	0.13	0.14	0.15	0.15	0.17	0.17	0.19	0.20
2020	0.10	0.11	0.13	0.13	0.15	0.15	0.17	0.18	0.19	0.21

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pollock BSAI Trawl Ex-vessel Return Volatility Projections

Hist. Avg.	2019	2020	Long-run
18.36	18.36	18.36	18.36

Pollock accounted for 72% of the ex-vessel value for the BSAI catcher vessels in 2017 and is targeted using trawl gear. BSAI trawl pollock retained catch increased 1% in 2017, correspondingly with the TAC. The realized ex-vessel price of BSAI trawl pollock decreased 1.4% to $0.137/lb. This year's price projections for the 2018 BSAI trawl pollock ex-vessel price have a median of $0.15/lb with 95% confidence bounds of $0.146/lb to $0.154/lb. (Figure 6.1). These estimates imply that a price increase in 2018 is highly likely. Catch data through Oct. 2018 show a 1.1% increase in the year-over-year BSAI trawl pollock catch. BSAI trawl pollock ex-vessel price projections for 2019 and beyond based on historical trends indicate that expected prices do not exhibit a significant trend or potential mean reversion, because of the substantial volatility a significant range of potential increases or decreases are plausible.

Pollock accounted for 19% of the ex-vessel value for the GOA catcher vessels in 2017 and is targeted using trawl gear. GOA trawl pollock retained catch increased 5.8% in 2017. The realized ex-vessel price of GOA trawl pollock increased 4.8% to $0.087/lb. This year's price projections for the 2018

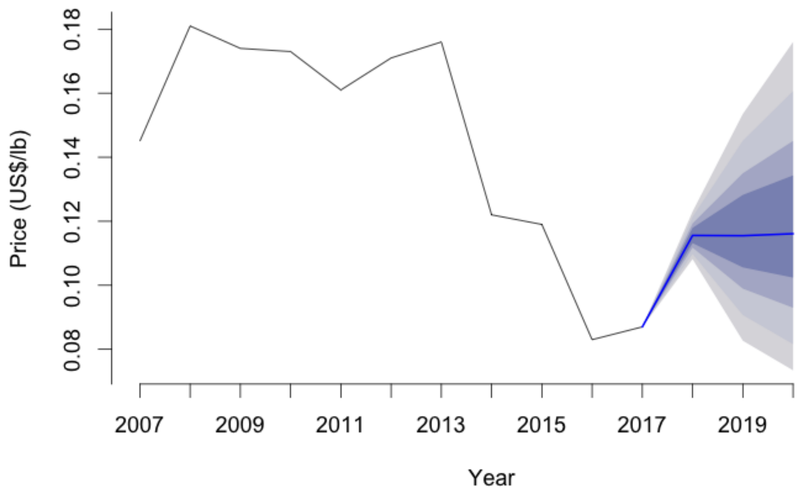

Figure 6.2: Pollock GOA Trawl Ex-vessel Price Projections and Confidence Bounds

Table 6.4: Projected Mean, Probability Bounds of Pollock GOA Trawl Ex-vessel Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12
2019	0.08	0.09	0.10	0.11	0.12	0.12	0.13	0.13	0.15	0.15
2020	0.07	0.08	0.09	0.10	0.12	0.12	0.13	0.15	0.16	0.18

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pollock GOA Trawl Ex-vessel Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
18.71	19.43	19.92	18.29

GOA trawl pollock ex-vessel price have a median of \$0.116/lb with 95% confidence bounds of \$0.107/lb to \$0.125/lb. (Figure 6.2). These estimates imply that a price increase in 2018 is highly likely. Catch data through Oct. 2018 show a 11.1% decrease in the year-over-year GOA trawl pollock catch. GOA trawl pollock ex-vessel price projections for 2019 and beyond based on historical trends indicate that expected prices do not exhibit a significant trend or potential mean reversion, because of the substantial volatility a significant range of potential increases or decreases are plausible.

6.4.2 Pacific cod Ex-vessel Prices

Pacific cod accounted for 21% of the ex-vessel value for the BSAI catcher vessels in 2017 and catches from trawl gear accounted for 41% of the BSAI Pacific cod value. BSAI trawl Pacific cod retained catch decreased 4.2% in 2017. The realized ex-vessel price of BSAI trawl Pacific cod increased 18.9% to \$0.296/lb. This year's price projections for the 2018 BSAI trawl Pacific cod ex-vessel price have a median of \$0.37/lb with 95% confidence bounds of \$0.365/lb to \$0.375/lb. (Figure 6.3). These estimates imply that a price increase in 2018 is highly likely. Catch data through Oct. 2018 show a 11.7% decrease in the year-over-year BSAI trawl Pacific cod catch. BSAI trawl Pacific cod ex-vessel price projections for 2019 and beyond based on historical trends indicate that expected prices do

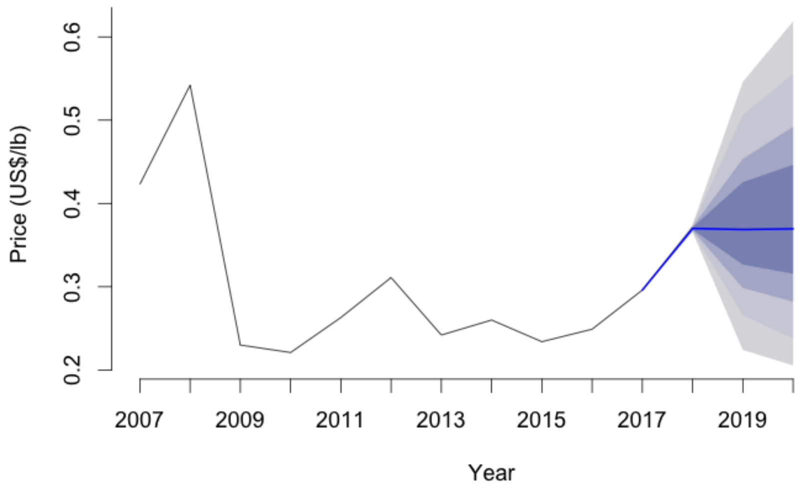

Figure 6.3: Pacific-cod BSAI Trawl Ex-vessel Price Projections and Confidence Bounds

Table 6.5: Projected Mean, Probability Bounds of Pacific-cod BSAI Trawl Ex-vessel Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
2019	0.22	0.27	0.30	0.33	0.37	0.38	0.43	0.45	0.51	0.55
2020	0.21	0.24	0.28	0.32	0.37	0.38	0.45	0.49	0.56	0.62

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pacific-cod BSAI Trawl Ex-vessel Return Volatility Projections

Hist. Avg.	2019	2020	Long-run
22.44	27.33	26.30	24.40

not exhibit a significant trend or potential mean reversion, because of the substantial volatility a significant range of potential increases or decreases are plausible.

Pacific cod accounted for 21% of the ex-vessel value for the BSAI catcher vessels in 2017 and catches from fixed gear accounted for 59% of the BSAI Pacific cod value. BSAI fixed Pacific cod retained catch increased 9.5% in 2017. The realized ex-vessel price of BSAI fixed Pacific cod increased 19.4% to $0.332/lb. This year's price projections for the 2018 BSAI fixed Pacific cod ex-vessel price have a median of $0.406/lb with 95% confidence bounds of $0.399/lb to $0.413/lb. (Figure 6.4). These estimates imply that a price increase in 2018 is highly likely. Catch data through Oct. 2018 show a 9.9% increase in the year-over-year BSAI fixed Pacific cod catch. BSAI fixed Pacific cod ex-vessel price projections for 2019 and beyond based on historical trends indicate that expected prices do not exhibit a significant trend or potential mean reversion, because of the substantial volatility a significant range of potential increases or decreases are plausible.

Pacific cod accounted for 17% of the ex-vessel value for the GOA catcher vessels in 2017 and catches from trawl gear accounted for 27% of the GOA Pacific cod value. GOA trawl Pacific cod retained catch decreased 15.6% in 2017. The realized ex-vessel price of GOA trawl Pacific cod increased 21.9% to $0.329/lb. This year's price projections for the 2018 GOA trawl Pacific cod ex-vessel price

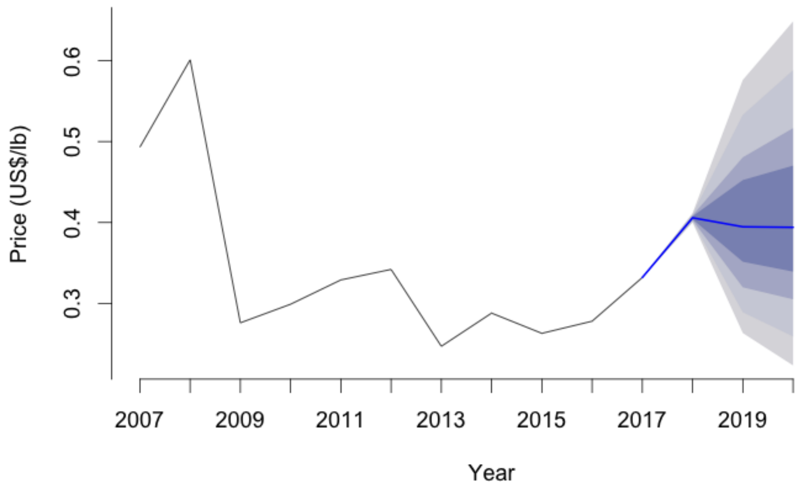

Figure 6.4: Pacific-cod BSAI Fixed Gear Ex-vessel Price Projections and Confidence Bounds

Table 6.6: Projected Mean, Probability Bounds of Pacific-cod BSAI Fixed Gear Ex-vessel Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.40	0.40	0.40	0.40	0.41	0.41	0.41	0.41	0.41	0.41
2019	0.26	0.29	0.32	0.35	0.39	0.40	0.45	0.48	0.53	0.58
2020	0.22	0.26	0.31	0.34	0.39	0.40	0.47	0.52	0.59	0.65

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pacific-cod BSAI Fixed Gear Ex-vessel Return Volatility Projections

Hist. Avg.	2019	2020	Long-run
25.93	26.11	26.15	26.28

have a median of \$0.393/lb with 95% confidence bounds of \$0.385/lb to \$0.402/lb. (Figure 6.5). These estimates imply that a price increase in 2018 is highly likely. Catch data through Oct. 2018 show a 75.9% decrease in the year-over-year GOA trawl Pacific cod catch. GOA trawl Pacific cod ex-vessel price projections for 2019 and beyond based on historical trends indicate that expected prices do not exhibit a significant trend but may show some mean reversion in 2020, because of the substantial volatility a significant range of potential increases or decreases are plausible.

Pacific cod accounted for 17% of the ex-vessel value for the GOA catcher vessels in 2017 and catches from fixed gear accounted for 73% of the GOA Pacific cod value. GOA fixed Pacific cod retained catch decreased 31.2% in 2017 The realized ex-vessel price of GOA fixed Pacific cod increased 11.3% to \$0.336/lb. This year's price projections for the 2018 GOA fixed Pacific cod ex-vessel price have a median of \$0.447/lb with 95% confidence bounds of \$0.440/lb to \$0.455/lb. (Figure 6.6). These estimates imply that a price increase in 2018 is highly likely. Catch data through Oct. 2018 show a 70.2% decrease in the year-over-year GOA fixed Pacific cod catch. GOA fixed Pacific cod ex-vessel price projections for 2019 and beyond based on historical trends indicate that expected prices do/not exhibit a significant] trend but may show some mean reversion in 2020, because of the substantial volatility a significant range of potential increases or decreases are plausible.

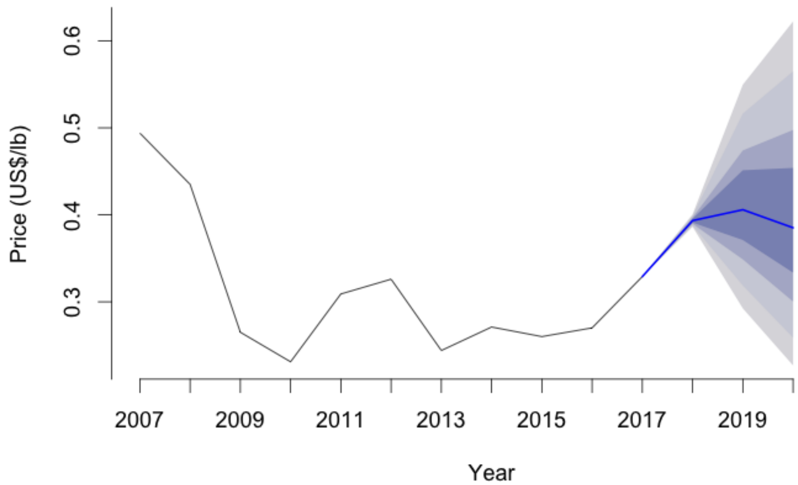

Figure 6.5: Pacific-cod GOA Trawl Ex-vessel Price Projections and Confidence Bounds

Table 6.7: Projected Mean, Probability Bounds of Pacific-cod GOA Trawl Ex-vessel Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.39	0.39	0.39	0.39	0.39	0.39	0.40	0.40	0.40	0.40
2019	0.29	0.32	0.35	0.37	0.41	0.41	0.45	0.47	0.52	0.55
2020	0.23	0.26	0.30	0.33	0.39	0.39	0.45	0.50	0.56	0.62

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pacific-cod GOA Trawl Ex-vessel Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
20.58	20.59	20.51	20.58

6.4.3 Sablefish Ex-vessel Prices

Sablefish accounted for 58% of the ex-vessel value for the GOA catcher vessels in 2017 and is targeted primarily using fixed gear. GOA fixed gear sablefish retained catch increased 10.1% in 2017 The realized ex-vessel price of GOA fixed gear sablefish increased 12% to $5.314/lb. This year's price projections for the 2018 GOA fixed gear sablefish ex-vessel price have a median of $4.004/lb with 95% confidence bounds of $3.917/lb to $4.109/lb. (Figure 6.7). These estimates imply that a price decrease in 2018 is highly likely. Catch data through Oct. 2018 show a 4.5% increase in the year-over-year GOA fixed gear sablefish catch. GOA fixed gear sablefish ex-vessel price projections for 2019 and beyond based on historical trends indicate that expected prices an increasing trend, because of the substantial volatility a significant range of potential increases or decreases are plausible.

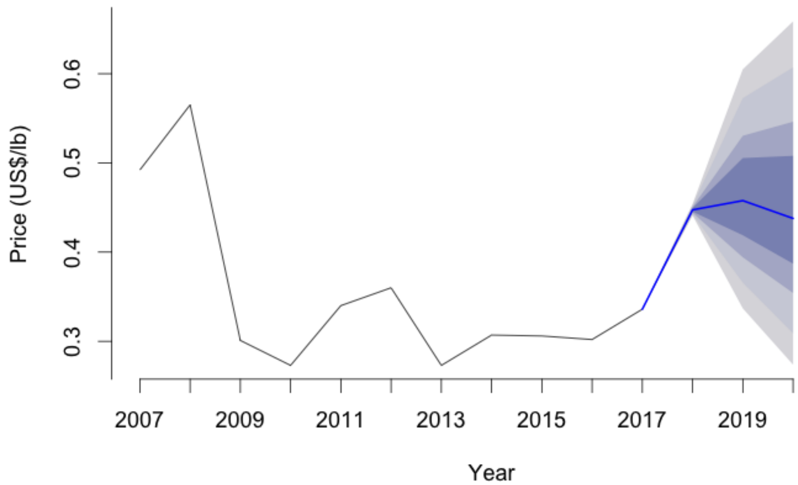

Figure 6.6: Pacific-cod GOA Fixed Gear Ex-vessel Price Projections and Confidence Bounds

Table 6.8: Projected Mean, Probability Bounds of Pacific-cod GOA Fixed Gear Ex-vessel Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.44	0.44	0.44	0.45	0.45	0.45	0.45	0.45	0.45	0.45
2019	0.34	0.37	0.39	0.42	0.46	0.46	0.51	0.53	0.57	0.60
2020	0.27	0.31	0.35	0.39	0.44	0.45	0.51	0.55	0.61	0.66

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pacific-cod GOA Fixed Gear Ex-vessel Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
19.70	19.27	19.40	19.94

6.5. First-Wholesale Product Price Projections

6.5.1 Alaska Pollock

In the North Pacific FMP groundfish fisheries 57% of the wholesale value came from Alaska pollock in 2017 (Tables 15 and 31). The primary products produced from pollock are surimi, fillets and roe. Fillets have been divided into deep-skin fillets and all other fillets (which are simply labeled fillets).

Pollock Surimi First-Wholesale Prices

The production of pollock surimi increased in 2017 and the first-wholesale price increased 12% to \$1.32/lb. The price increase was consistent with the increase estimated last year but was outside last year's estimated 95% confidence bounds for the 2016 price which were \$1.15/lb and \$1.22/lb with a median of \$1.19/lb. The current first-wholesale surimi 2018 price projection 90% confidence bounds are \$1.23/lb and \$1.36/lb with a median of \$1.30 (Figure 6.8; Table 6.10). Surimi export

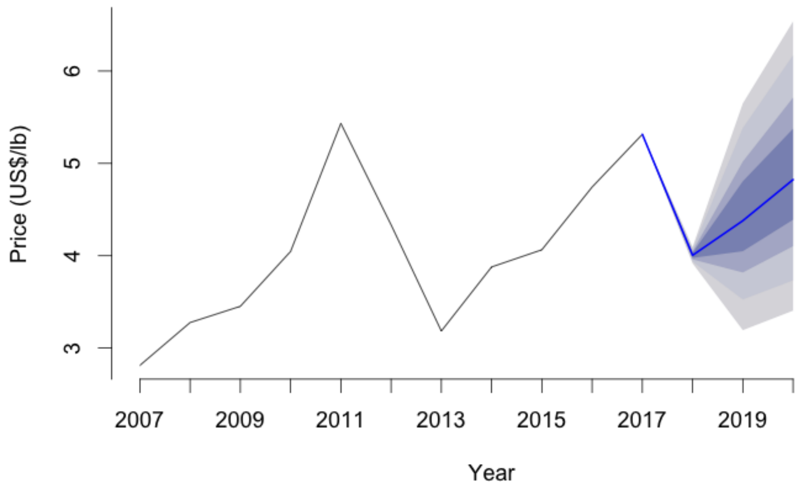

Figure 6.7: Sablefish GOA Fixed Gear Ex-vessel Price Projections and Confidence Bounds

Table 6.9: Projected Mean, Probability Bounds of Sablefish GOA Fixed Gear Ex-vessel Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	3.92	3.94	3.96	3.98	4.00	4.00	4.03	4.05	4.07	4.09
2019	3.19	3.53	3.82	4.05	4.38	4.44	4.81	5.02	5.38	5.65
2020	3.41	3.73	4.10	4.39	4.82	4.87	5.37	5.71	6.17	6.54

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Sablefish GOA Fixed Gear Ex-vessel Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
17.61	17.46	17.34	17.75

prices tend to provide a reasonably good prediction of the state of surimi prices. The median of the 2018 nowcast is close to the realized 2017 price indicating that 2018 prices are likely to be stable, but could increase or decrease. These projections are consistent with production data through Oct. 2018 which show a small 0.4% decrease in year-over-year surimi production. For 2017 and beyond, if prices are consistent with estimated trends then prices will fluctuate around a slightly increasing trend. Volatility projections suggest that the recent level of volatility will persist in the near-term and are consistent with the historical average.

Pollock Fillet First-Wholesale Prices

The production of pollock fillets decreased 12% in 2017 and the price decreased 12% to $1.14/lb. Media reports indicate that head-and-gut and fillet prices tended to be low throughout the year. The price decrease was consistent with the decrease estimated last year but was outside last year's estimated 95% confidence bounds which had a median of $1.27 and was outside 95% confidence bounds of $1.26 and $1.29. Current projections for the 2018 fillet price have 95% confidence bounds of $1.18/lb to $1.27/lb with a median of to $1.22/lb (Figure 6.9). These estimates indicated that

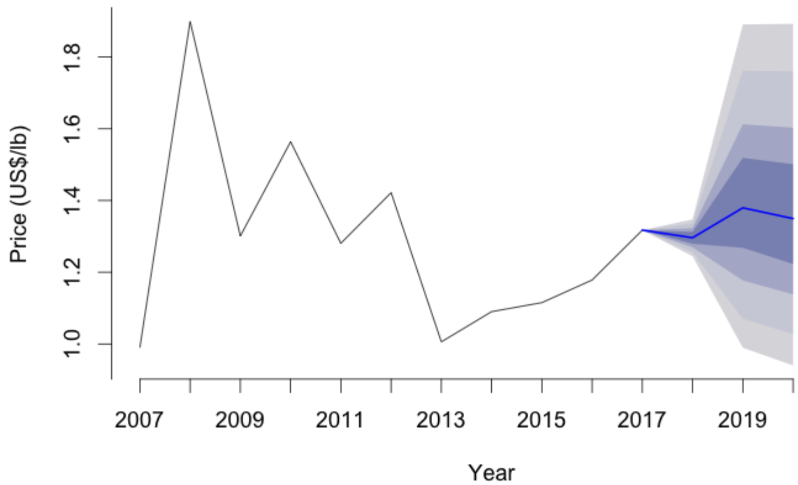

Figure 6.8: Pollock Surimi Wholesale Price Projections and Confidence Bounds

Table 6.10: Projected Mean, Probability Bounds of Pollock Surimi Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	1.24	1.26	1.27	1.28	1.30	1.30	1.31	1.32	1.34	1.35
2019	0.99	1.07	1.18	1.27	1.38	1.39	1.52	1.61	1.76	1.89
2020	0.94	1.03	1.14	1.22	1.35	1.36	1.50	1.60	1.76	1.89

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pollock Surimi Wholesale Return Volatility Projections

Hist. Avg.	2019	2020	Long-run
19.88	20.31	20.38	20.67

that reported prices for 2018 will increase. These estimates are consistent with currently available market information. Production data through Oct. 2018 show that year-over-year fillet production is up 9% in 2018. Estimated fillet prices beyond 2017 indicate that based on previous trends fillet prices may increase slightly but not substantially. Volatility projections indicate that there is no expected change in the future volatility.

The volume of deep-skin fillets produced increased 24% and prices decreased 9% to $1.49/lb in 2017. The price decrease was consistent with the decrease estimated last year but was outside last year's estimated 95% confidence bounds $1.61/lb to $1.65/lb with a median of $1.63/lb. Current estimates for the 2018 deep-skin fillet price have 95% confidence bounds of $1.50/lb to $1.59/lb with a median estimate of $1.54/lb (Figure 6.10). These estimates indicated that it's likely that next year's reported prices for 2017 will increase. Production data through Oct. 2018 indicate an 2.5% decrease in year-over-year production data. Mean estimates of deep-skin fillet prices for 2017 and beyond indicate that based on the historical trend deep-skin fillet prices may increase slightly but not substantially. Volatility estimates indicate that return volatility is consistent with the historical average.

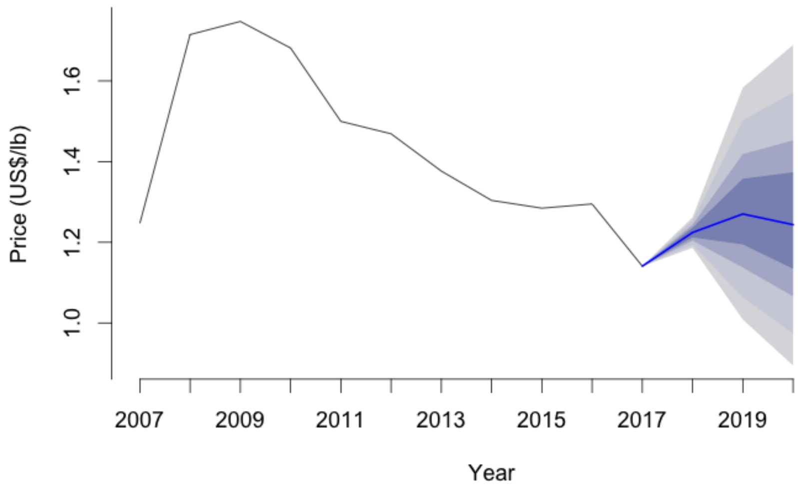

Figure 6.9: Pollock Fillet Wholesale Price Projections and Confidence Bounds

Table 6.11: Projected Mean, Probability Bounds of Pollock Fillet Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	1.19	1.19	1.20	1.21	1.22	1.22	1.24	1.24	1.25	1.26
2019	1.01	1.06	1.14	1.19	1.27	1.28	1.36	1.42	1.50	1.58
2020	0.89	0.97	1.07	1.13	1.24	1.25	1.37	1.45	1.57	1.69

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pollock Fillet Wholesale Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
14.42	14.42	14.42	14.42

Pollock Roe First-Wholesale Prices

Pollock roe production increased 31% in 2017 and prices increased 2% to $2.84/lb. Last year's projection estimated a 6% decrease in price for 2017 and the realized price of $2.84/lb was above the range of prices projected which had 95% confidence bounds of $2.53/lb and $2.74/lb and a median of $2.63/lb. The first-wholesale pollock roe price is projected to increase in 2018 with a median estimate of $3.12/lb and 95% confidence bounds of $2.76/lb and $3.48/lb (Figure 6.11). The lower bound of the 2018 confidence interval is below the 2017 price which indicates that while an increase in roe prices a slight decrease is possible. Production data through Oct. 2018 indicate that 2018 roe production is up 32% year-over-year and production is close to 2014 levels. There is considerable volatility in pollock roe returns which is expected to persist.

Pollock H&G First-Wholesale Prices

Pollock head and gut (H&G) production increased 9% in 2017 and prices decreased 24% to $0.46/lb. A comparison to the previous year is not available because this is the first year of published H&G price projections. The first-wholesale pollock H&G price is projected to increase in 2018 with a

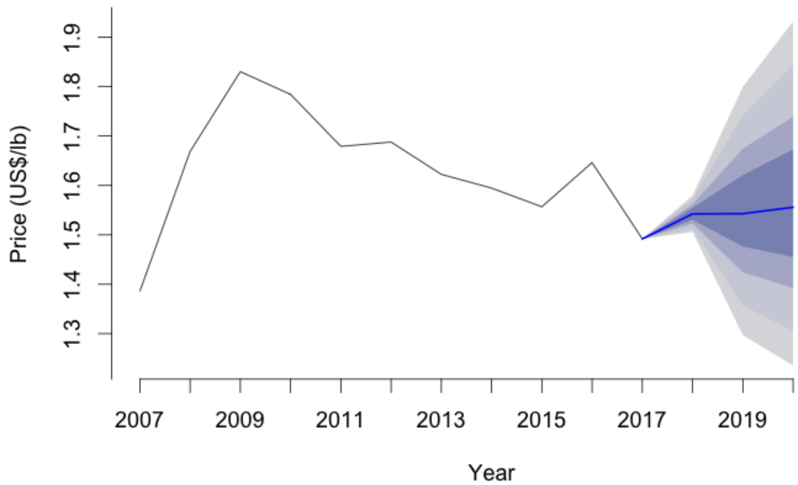

Figure 6.10: Pollock Deep-skin-fillet Wholesale Price Projections and Confidence Bounds

Table 6.12: Projected Mean, Probability Bounds of Pollock Deep-skin-fillet Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	1.51	1.51	1.52	1.53	1.54	1.54	1.55	1.56	1.57	1.58
2019	1.30	1.36	1.42	1.48	1.54	1.55	1.62	1.67	1.74	1.80
2020	1.24	1.31	1.39	1.46	1.56	1.56	1.67	1.74	1.84	1.93

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pollock Deep-skin-fillet Wholesale Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
10.39	10.39	10.39	10.39

median estimate of $0.54/lb and 95% confidence bounds of $0.44/lb and $0.65/lb (Figure 6.12). Production data through Oct. 2018 indicate that 2018 H&G production is up 0.5% year-over-year. Export data on which projections are based do not have a distinct H&G code which contributes to the considerable volatility in H&G projections.

6.5.2 Pacific Cod First-Wholesale Prices

Pacific cod is mainly produced into the H&G product form, though fillets constitute a significant portion of the output, particularly for shoreside processors (Tables 15 and 31).

Pacific Cod H&G First-Wholesale Prices

Production of Pacific cod H&G decreased 8% in 2017 and prices increased 23% to $1.57/lb. This was above last year's estimate which projected a price increase of 8% in 2017 to $1.39/lb. The realized price of $1.57/lb was also above the range of prices projected which had 95% confidence bounds of

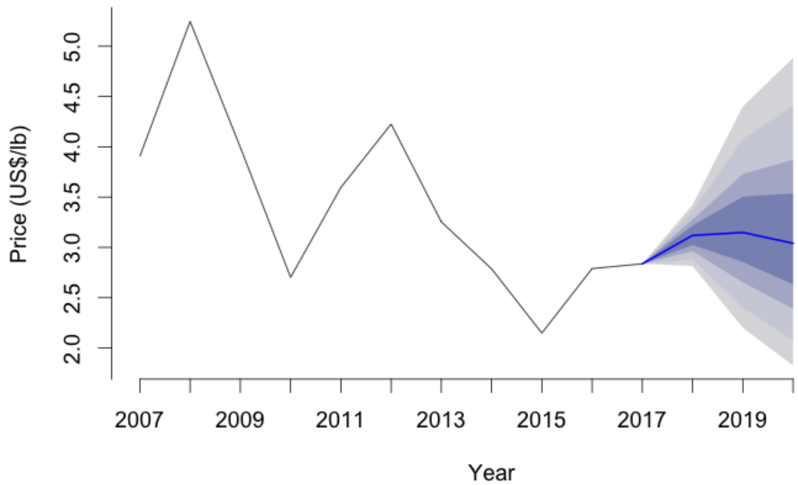

Figure 6.11: Pollock Roe Wholesale Price Projections and Confidence Bounds

Table 6.13: Projected Mean, Probability Bounds of Pollock Roe Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	2.82	2.88	2.96	3.02	3.12	3.12	3.22	3.27	3.36	3.42
2019	2.20	2.40	2.65	2.86	3.15	3.16	3.50	3.73	4.07	4.40
2020	1.83	2.08	2.39	2.63	3.04	3.06	3.54	3.87	4.40	4.88

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pollock Roe Wholesale Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
21.91	21.34	21.82	22.11

$1.30/lb and $1.47/lb and a median of $1.39/lb. The 2018 price projections indicate a more modest increase in H&G prices for 2018 with an estimated price of $1.64/lb and 95% confidence bounds ranging from $1.57/lb to $1.71/lb. (Figure 6.13). Production data through Oct. 2018 show a 17% reduction in the year-over-year production of H&G, which is attributable to reduced catch levels. Media reports indicate that cod prices have been strong as a result of reductions in supply. Current projection are consistent with this information. H&G price projections for 2019 and beyond display a slight trend up, but also confidence bouinds show a wide range of potential future prices reflecting the significant historical and projected volatility in the H&G cod price.

Pacific Cod Fillet First-Wholesale Prices

Production of Pacific cod fillets increased 7.6% in 2017 as prices rose 4% to $3.45/lb. This was consistent with last year's price projection which estimated a $3.47/lb and 95% confidence bounds of $3.34/lb and $3.60/lb. The current projections for the 2018 first-wholesale cod fillet have 95% confidence bounds of $3.63/lb and $3.99/lb with a median of $3.81/lb (Figure 6.14), indicating that 2018 prices will increase. Production data through Oct. 2018 show a 24.4% reduction in the year-over-year production of fillets, which is attributable to reduced catch levels. Media reports

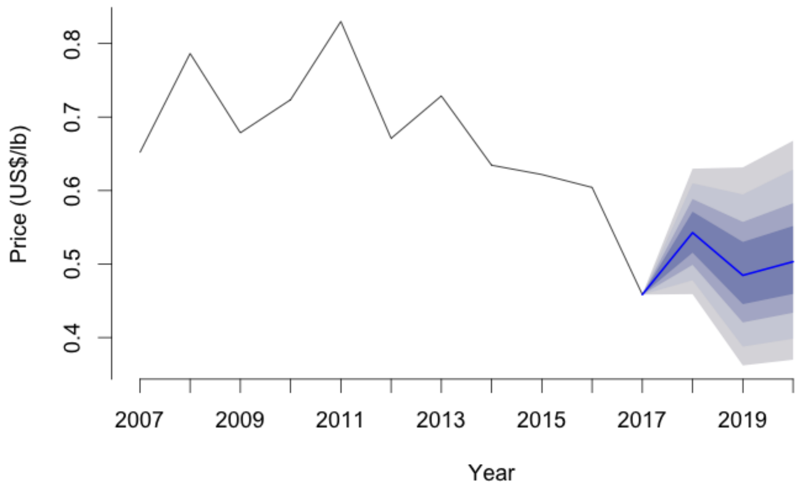

Figure 6.12: Pollock Head-and-gut Wholesale Price Projections and Confidence Bounds

Table 6.14: Projected Mean, Probability Bounds of Pollock Head-and-gut Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.46	0.48	0.50	0.52	0.54	0.54	0.57	0.59	0.61	0.63
2019	0.36	0.39	0.42	0.45	0.48	0.49	0.53	0.56	0.59	0.63
2020	0.37	0.40	0.43	0.46	0.50	0.51	0.55	0.58	0.63	0.67

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pollock Head-and-gut Wholesale Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
14.73	14.65	14.32	16.54

indicate that cod prices have been strong as a result of reductions in supply. Current projection are consistent with this information. Fillet price projections for 2019 and beyond display a slight trend up, but also confidence bouinds show a wide range of potential future prices reflecting the significant historical and projected volatility in the cod fillet price.

6.5.3 Sablefish H&G First-Wholesale Prices

Sablefish is mostly produced into the head-and-gut (H&G) product form at the first-wholesale level, comprising approximately 97% of the value from sablefish products.

Sablefish H&G production in 2017 increased 11%, correspondingly with the sablefish TAC. The realized price of sablefish H&G in 2017 increased 10% to $8.86/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of $8.09/lb to $8.57/lb with a median of $8.31/lb, placing the realized price above the projected range. This year's price projections for the 2018 first-wholesale sablefish H&G price have 95% confidence bounds of $7.34/lb to $8.28/lb with a median of $7.81/lb which imply that a price decrease in 2018 is highly likely (Figure 6.15). The decrease in price implied by the model is the result of a decrease in the export

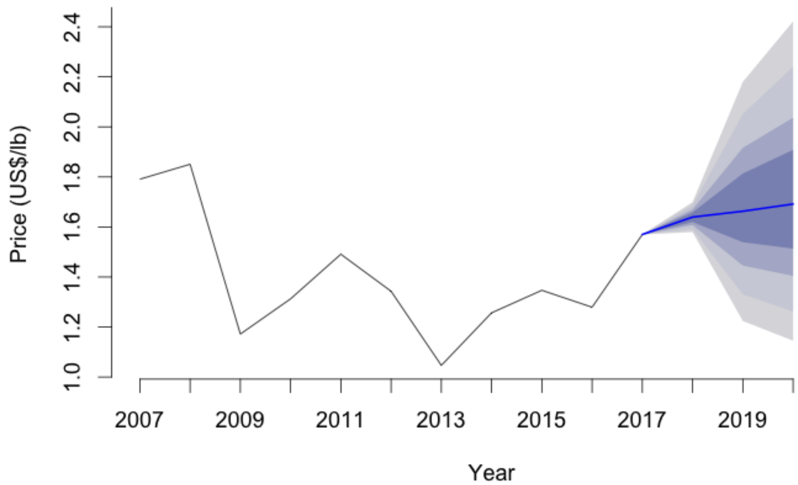

Figure 6.13: Pacific-cod Head-and-gut Wholesale Price Projections and Confidence Bounds

Table 6.15: Projected Mean, Probability Bounds of Pacific-cod Head-and-gut Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	1.58	1.59	1.61	1.62	1.64	1.64	1.66	1.67	1.69	1.70
2019	1.22	1.33	1.45	1.54	1.66	1.68	1.81	1.92	2.05	2.18
2020	1.15	1.26	1.40	1.51	1.69	1.70	1.91	2.04	2.24	2.42

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pacific-cod Head-and-gut Wholesale Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
17.36	17.86	17.79	17.65

price. Production data through Oct. 2018 show 7.6% increase in the year-over-year production of sablefish H&G, which is attributable to increased catch levels. Sablfish H&G price projections for 2019 and beyond show prices reverting back to their recent upward trend with a modest increase in volatility.

6.5.4 Atka Mackerel H&G First-Wholesale Prices

Approximately 90% of the Alaska caught Atka mackerel production volume is processed as head-and-gut (H&G).

The Atka mackerel first-wholesale H&G production increased 16% in 2017 and price increased 44% to $1.49/lb. Price projections from last year had 95% confidence bounds of $0.93/lb and $1.19/lb with a median of $1.06/lb and correctly projected an increase in the 2017 price, however, the increase in the realized 2017 price was above the confidence bounds. Current projections for the 2018 Atka mackerel H&G price have 95% confidence bounds of $1.13/lb to $1.54/lb with a median of $1.34/lb (Figure 6.15). These estimates indicated that next year's reported prices for 2018 are expected

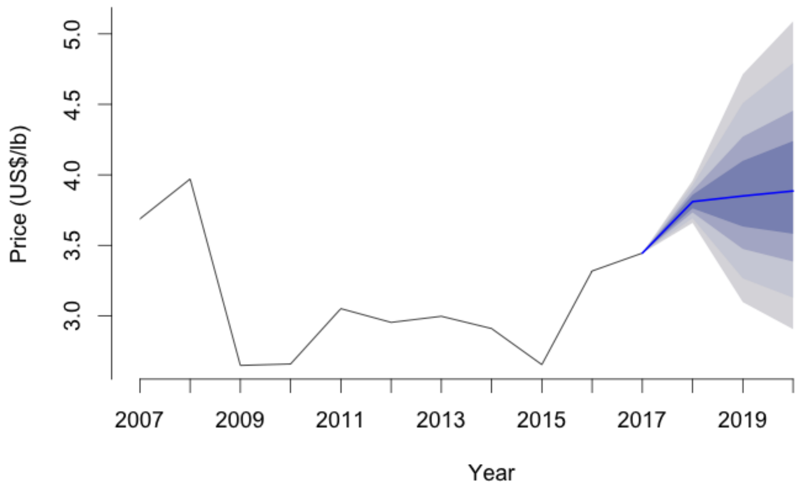

Figure 6.14: Pacific-cod Fillet Wholesale Price Projections and Confidence Bounds

Table 6.16: Projected Mean, Probability Bounds of Pacific-cod Fillet Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	3.66	3.69	3.73	3.76	3.81	3.81	3.86	3.89	3.93	3.96
2019	3.10	3.27	3.47	3.63	3.85	3.87	4.10	4.27	4.51	4.71
2020	2.91	3.13	3.39	3.58	3.89	3.91	4.24	4.46	4.79	5.09

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Pacific-cod Fillet Wholesale Return Volatility Projections

Hist. Avg.	2019	2020	Long-run
13.63	13.24	13.88	14.85

to remain stable or decrease. Production data through Oct. 2018 show a 0.3% decrease in the year-over-year production of H&G with stable catch levels. Atka mackerel H&G price projections for 2019 and beyond show level median prices with moderate volatility.

6.5.5 Flatfish First-Wholesale Prices

The two largest flatfish species in terms of market value and volume are yellowfin and rock sole in the BSAI. Arrowtooth flounder is the predominant species caught in the GOA and in also caught in significant quantities in the BSAI. The market shares for other flatfish fisheries are comparatively smaller. Flatfish are primarily processed into the head-and-gut (H&G) product form.

Yellowfin Sole H&G First-Wholesale Prices

The yellowfin sole first-wholesale H&G production decreased 1% in 2017 and the first-wholesale price was $0.66/lb, an increase of 19% from 2016. This price is above with the price projection from last year's report that estimated that prices would increase only 2% with 95% confidence

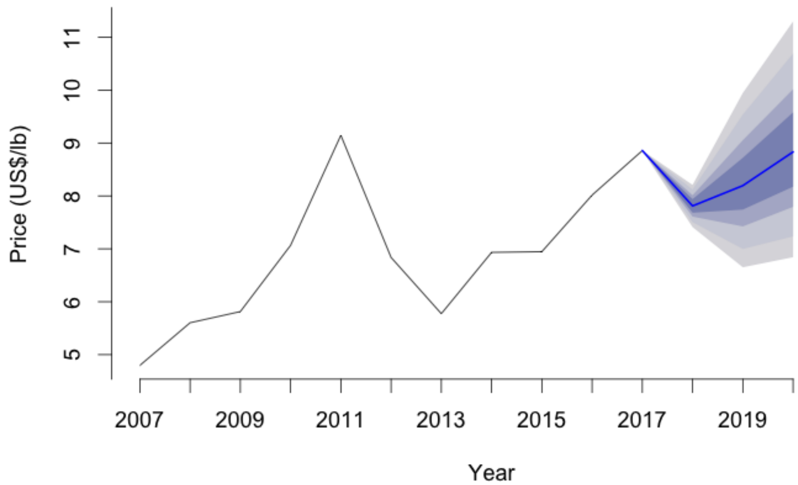

Figure 6.15: Sablefish Head-and-gut Ex-vessel Price Projections and Confidence Bounds

Table 6.17: Projected Mean, Probability Bounds of Sablefish Head-and-gut Ex-vessel Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	7.41	7.51	7.61	7.68	7.81	7.81	7.94	8.01	8.12	8.21
2019	6.65	7.00	7.42	7.74	8.19	8.22	8.72	9.05	9.54	9.95
2020	6.84	7.24	7.79	8.18	8.83	8.88	9.58	10.02	10.69	11.30

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Sablefish Head-and-gut Ex-vessel Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
12.06	12.40	12.47	12.30

bounds of $0.53/lb and $0.61/lb and a median of $0.56/lb. This year's projection for 2018 yellowfin sole H&G prices estimate a median price of $0.64/lb with 90% confidence bounds of $0.60/lb and $0.68/lb (Figure 6.17). Production data through Oct. 2018 show 7.7% increase in the year-over-year production of H&G. Projections for future prices inidcate that prices are expected to remain stable with marginal increases going forward as prices revert back to the recent price levels.

Rock Sole H&G First-Wholesale Prices

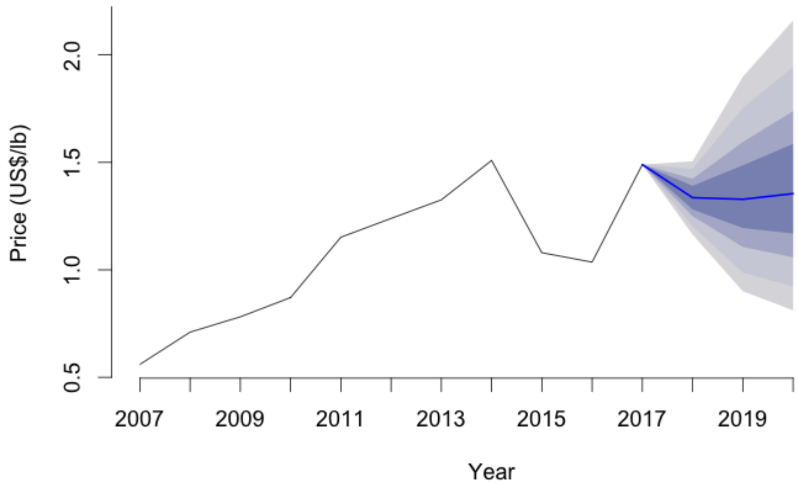

Figure 6.16: Atka-mackerel Head-and-gut Wholesale Price Projections and Confidence Bounds

Table 6.18: Projected Mean, Probability Bounds of Atka-mackerel Head-and-gut Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	1.16	1.20	1.25	1.28	1.34	1.34	1.39	1.42	1.47	1.51
2019	0.90	0.99	1.11	1.19	1.33	1.34	1.49	1.59	1.75	1.90
2020	0.81	0.92	1.06	1.17	1.35	1.36	1.59	1.74	1.94	2.16

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Atka-mackerel Head-and-gut Wholesale Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
23.32	22.22	21.88	27.56

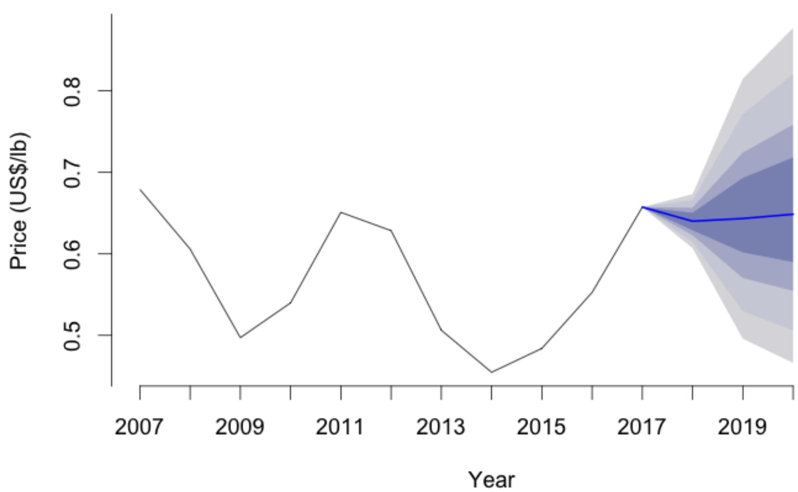

Figure 6.17: Yellowfin-(BSAI) Head-and-gut Wholesale Price Projections and Confidence Bounds

Table 6.19: Projected Mean, Probability Bounds of Yellowfin-(BSAI) Head-and-gut Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.61	0.61	0.62	0.63	0.64	0.64	0.65	0.66	0.67	0.67
2019	0.50	0.53	0.57	0.60	0.64	0.65	0.69	0.72	0.77	0.81
2020	0.47	0.51	0.55	0.59	0.65	0.65	0.72	0.76	0.82	0.88

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Yellowfin-(BSAI) Head-and-gut Wholesale Return Volatility Projections

Hist. Avg.	2019	2020	Long-run
13.72	15.15	12.45	13.71

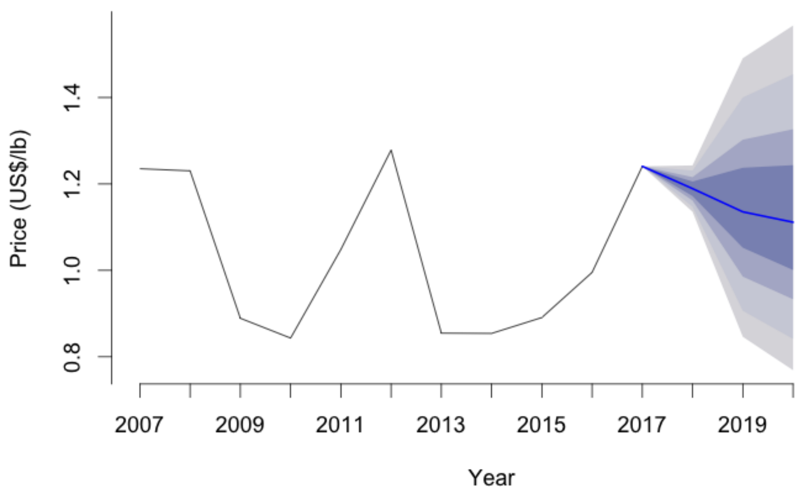

Figure 6.18: Rock-sole-(BSAI) Head-and-gut-with-roe Wholesale Price Projections and Confidence Bounds

Table 6.20: Projected Mean, Probability Bounds of Rock-sole-(BSAI) Head-and-gut-with-roe Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	1.14	1.15	1.16	1.17	1.19	1.19	1.21	1.22	1.23	1.24
2019	0.85	0.91	0.99	1.05	1.14	1.15	1.24	1.30	1.40	1.49
2020	0.77	0.84	0.93	1.00	1.11	1.12	1.24	1.33	1.45	1.57

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Rock-sole-(BSAI) Head-and-gut-with-roe Wholesale Return Volatility Projections

Hist. Avg.	2019	2020	Long-run
17.91	17.88	17.85	17.81

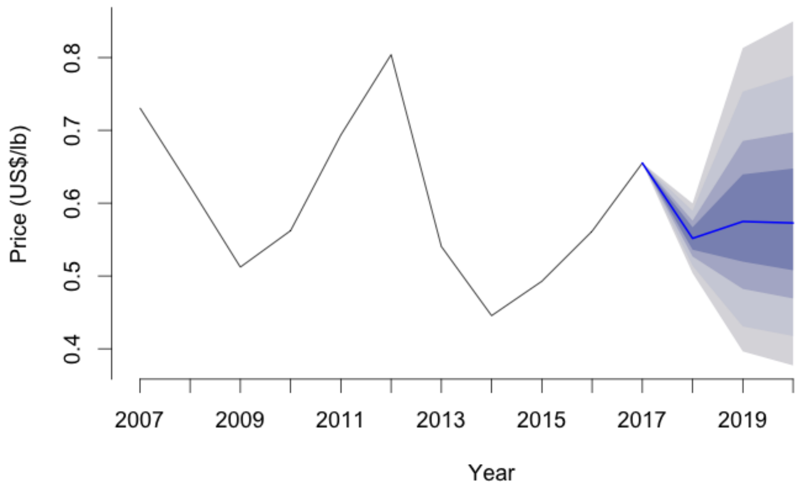

Figure 6.19: Rock-sole-(BSAI) Head-and-gut Wholesale Price Projections and Confidence Bounds

Table 6.21: Projected Mean, Probability Bounds of Rock-sole-(BSAI) Head-and-gut Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.50	0.51	0.53	0.54	0.55	0.55	0.57	0.58	0.59	0.60
2019	0.40	0.43	0.48	0.52	0.57	0.58	0.64	0.69	0.75	0.81
2020	0.38	0.42	0.47	0.51	0.57	0.58	0.65	0.70	0.78	0.85

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Rock-sole-(BSAI) Head-and-gut Wholesale Return Volatility Projections

Hist. Avg.	2019	2020	Long-run
22.21	22.11	22.32	22.42

The majority of rock sole is processed into two product forms; H&G with roe is a higher priced product with slightly different price dynamics than the other product form H&G (without roe) (Figures 6.18 and 6.19).

The first-wholesale production of rock sole H&G with roe decreased 35% in 2017 and the price increased 25% to $1.24/lb. This was above last year's median projected rock sole H&G with roe price of $1.00/lb and was above the 95% confidence bounds of $0.90/lb and $1.13/lb. This year's projection for the 2018 rock sole H&G with roe price has a median of $1.19/lb with 95% confidence bounds of $1.13/lb and $1.25/lb (Figure 6.18) indicating prices could decrease or remain stable. Production data through Oct. 2018 show a 37% decrease in the year-over-year production of H&G with roe. The price projection for 2019 and beyond show the median expected revert back to the long-run average, though confidence bounds are significant.

The first-wholesale production of rock sole H&G (without roe) decreased 19% in 2017 the price in 2016 increased 17% to $0.66/lb. This was above last year's median projected price of $0.57/lb and was above the upper bound of the estimated 95% confidence bound which were $0.52/lb and $0.62/lb. This year's projections estimate the 2018 rock sole H&G (without roe) median price will decrease with a median estimate of $0.55/lb with confidence bounds ranging from $0.50/lb to $0.61/lb

(Figure 6.19). Production data through Oct. 2018 show a 19% decrease in the year-over-year production of H&G for 2018. The price projection for 2019 and beyond does not exhibit a significant trend and remains basically flat, though confidence are quite large.

Arrowtooth Flounder H&G First-Wholesale Prices

Arrowtooth flounder are primarily produced into the head-and-gut (H&G) product form.

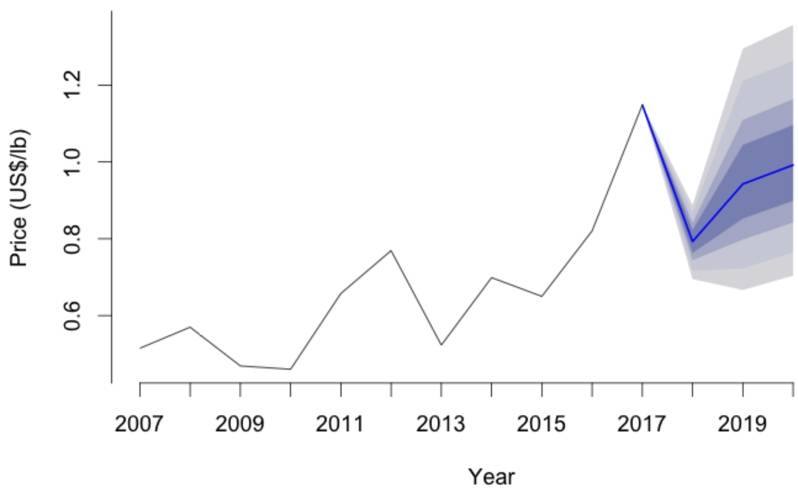

Figure 6.20: Arrowtooth Head-and-gut Wholesale Price Projections and Confidence Bounds

Table 6.22: Projected Mean, Probability Bounds of Arrowtooth Head-and-gut Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.70	0.72	0.74	0.76	0.79	0.79	0.82	0.84	0.87	0.89
2019	0.67	0.72	0.80	0.85	0.94	0.95	1.04	1.11	1.21	1.29
2020	0.70	0.77	0.84	0.90	0.99	1.00	1.10	1.16	1.26	1.36

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Arrowtooth Head-and-gut Wholesale Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
21.82	19.93	19.25	30.13

The first-wholesale production of arrowtooth H&G increased 29% in 2017 and the price increased 40% to $1.15/lb. This was outside last year's estimated 95% confidence bounds of $0.64/lb and $0.87/lb, and a median $0.74/lb. This year's price projections for the 2018 arrowtooth H&G price have 95% confidence bounds of $0.68/lb and $0.91/lb with median of $0.79/lb indicating that prices are expected to decrease.Production data through Oct. 2018 show 39% decrease in the year-over-year production of H&G for 2018. Export data aggregate arrowtooth into a general flatfish category which can reduce the accuracy of the model depending on how well year-over-year changes in the arrowtooth price match changes for this general flatfish group.

6.5.6 Rockfish H&G First-Wholesale Prices

Rockfish fisheries have historically been aggregated into a species complex in this report. Species within the complex include northern rockfish, Pacific Ocean perch, rougheye rockfish, shortraker rockfish, dusky rockfish and thornyhead rockfish. The only rockfish species defined in the export data is Pacific Ocean perch (POP) which is used to nowcast current first-wholesale prices for the aggregate rockfish complex. Price projections are included here to provide the best available estimates of prices given the information available. Rockfish are primarily produced into the head-and-gut (H&G) product form.

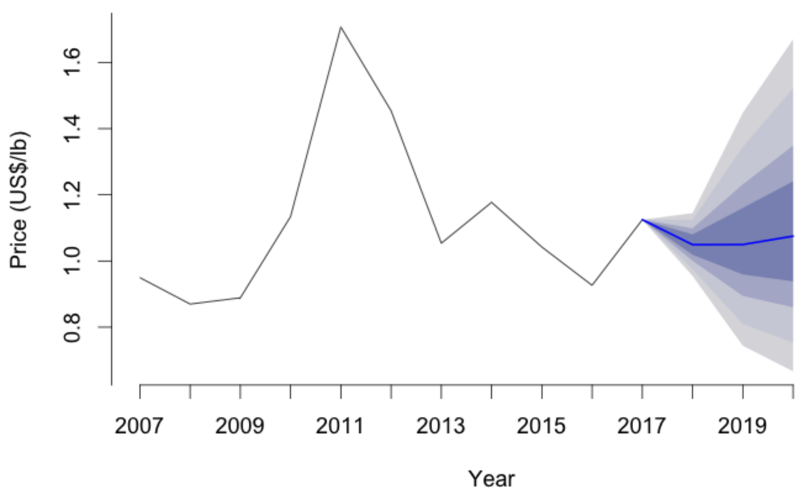

Figure 6.21: Rockfish Head-and-gut Wholesale Price Projections and Confidence Bounds

Table 6.23: Projected Mean, Probability Bounds of Rockfish Head-and-gut Wholesale Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	mean	Median	70%	80%	90%	95%
2018	0.95	0.98	1.00	1.02	1.05	1.05	1.08	1.10	1.12	1.14
2019	0.74	0.81	0.89	0.96	1.05	1.06	1.16	1.23	1.34	1.45
2020	0.67	0.75	0.86	0.94	1.08	1.08	1.24	1.35	1.52	1.67

At the 'Lower' and 'Upper' bounds x% of the simulated prices were less. The confidence bounds are the regions between the 'Upper' and 'Lower' bounds.

Rockfish Head-and-gut Wholesale Return Volatility Projections			
Hist. Avg.	2019	2020	Long-run
19.22	20.36	17.72	19.07

First-wholesale rockfish H&G prices increased 21% to $1.13/lb in 2017. This was above the last year's 95% confidence bounds of $0.84/lb and $1.01/lb. Projections for the 2018 price have 95% confidence bounds of $0.94/lb and $1.17/lb with a median of $1.05/lb indicating that 2018 prices are expected to decrease or remain stable.

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7. WHOLESALE MARKET PROFILES FOR ALASKA GROUNDFISH

The Alaska Groundfish Wholesale Market Profiles was prepared for Alaska Fisheries Science Center (AFSC) by McDowell Group in collaboration with AFSC and Pacific States Marine Fisheries Commission. This section is an extract from the full Profiles report.

Note: AKFIN and COAR data used in the Profiles report may not match other figures in the Economic SAFE exactly because different versions of the data sets were used independently in the analysis.

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This section of the *Economic Status Report of the Groundfish Fisheries off Alaska, 2017* is extracted from the content in the larger and more comprehensive Alaska Groundfish Wholesale Market Profiles (forthcoming) The following section of the report covers the primary wholesale products for Alaska pollock, Pacific cod, sablefish, yellowfin sole, rock sole, Atka mackerel, Pacific Ocean perch, and arrowtooth. The full Alaska Groundfish Wholesale Market Profiles report contains more extensive analysis and covers additional species and products not contained here, including Pacific halibut, king crab and snow crab.

The profiles provide an overview of the wholesale markets related to primary Alaska groundfish species and/or products. Most of the wholesale data and analysis outside of this section pertains to first wholesale markets. This section and the Market Profiles report provide a broader analysis on wholesale markets from production to consumers. Each profile in this series contains detailed information about key markets and competing supply for individual species or products, while this chapter contextualizes Alaska groundfish production and versus the rest of the world. Each profile characterizes wholesale production volume and value, product mix, supply chain, competing supply, and key markets.

7.1. Global Groundfish Production & Key Markets

7.1.1 Global Whitefish and Other Marine Fish Production

Alaska's groundfish fisheries are of particular global importance thanks to their production of whitefish; Alaska produces approximately 21 percent of global marine wild-harvest whitefish annually. Whitefish generally refers to non-oily species like cod, pollock, haddock, hake, whiting, and benthic flatfish species, such as sole, plaice, flounder, and halibut (Table 7.1). These species - primarily caught in wild fisheries - also compete in global seafood markets with notable aquaculture species such as tilapia and pangasius. Though there are different perceptions of quality and price premiums within this range of species, they are all competitors and may be substituted depending on price and availability.

Globally, 9.7 million metric tons of whitefish were harvested in 2016, with Alaska pollock being the largest component of this group at 3.5 million metric tons (Table 7.1). Following Alaska pollock, 2.8 million metric tons of hakes, hoki, lings, and whitings were harvested. While the majority of production of these high-volume species is used for meat, surimi production is also a critically important product. Roe, fish meal, fish oil, and other ancillary products are also produced in significant volumes from these wild marine fish species.

After pollock and hakes/hoki/lings/whiting, the next most important whitefish species group is cod/haddock, with a total global harvest of 2.1 million metric tons. The vast majority of these fish are used to produce fillets that could represent a substitute for key Alaska groundfish species on a general level, especially in European and North American markets. While consumers generally will not substitute imported whitefish species for less expensive and traditionally palatable domestic species, frozen seafood manufacturers increasingly develop products and packaging that allows them to use multiple species for the same product, permitting them greater sourcing options and the ability to lower costs.

In addition to whitefish, Alaska's groundfish fisheries produce significant volumes of rockfish, Pacific Ocean perch, sablefish, and Atka mackerel (Table 7.2). Though these species also have white flesh,

Table 7.1: Global Whitefish Production, in Metric Tons, 2016

Species	2016 Harvest Volume (mt)	Alaska Pct. Of Global Production (2016)	Primary Uses
Pollock	3,476,149	44%	Meat, Surimi, Meal/Oil
Hakes, Hoki, Lings, and Whiting	2,813,434	0%	Meat, Surimi, Meal/Oil
Cod[1] and Haddock	2,106,327	15%	Meat
Sole, Flounder, and Plaice	715,493	33%	Meat
Saithe	298,086	0%	Meat
Other Whitefish (Whitefish and Cod Varieties)	84,085	0%	Meat
Halibuts and Turbots	212,433	5%	Meat
Total Wild Whitefish (Capture Fisheries)	**9,706,007**	**21%**	
Tilapias and Cichlids (Farmed and Capture)	6,685,921	0%	Meat
Pangasius (Farmed)	1,757,843	0%	Meat
Total - Tilapias and Pangasius	**8,443,764**	**-**	
Total Wild Whitefish, Tilapia, and Pangasius	**18,149,771**	**11%**	

Notes: Global harvest/production data for 2017 is not yet available.
1. Pacific and Atlantic cod only.

Source: FAO, compiled by McDowell Group.

they are treated separately due to their oil content and where they compete within the overall seafood hierarchy; rockfish would most closely compete with "snappers" while sablefish compete directly with the ultra-premium Antarctic and Patagonia toothfish. Alaska harvested more than 18 percent of the world's snappers, rockfish, sablefish, and Antarctic/Patagonia toothfish in 2016.

Table 7.2: Global Production of Snappers/Rockfish and Sablefish/Toothfish, in Metric Tons, 2016

Species	2016 Harvest Volume (mt)	Alaska Pct. Of Global Production (2016)	Primary Uses
Snappers and Rockfish (Includes Pacific Ocean Perch)	360,757	18%	Meat
Sablefish and Antarctic/Patagonia Toothfish	46,886	21%	Meat
Total Wild Snappers, Rockfish, and Toothfish	**119,965**	**20%**	

Source: FAO, compiled by McDowell Group.

7.1.2 Alaska's Position in the Global Whitefish Market

Alaska produces a fraction of global whitefish production and is thus highly impacted by global macroeconomic trends, trade policies, and competing whitefish supply. In terms of supply, Russia (cod/pollock/flatfish), China (tilapia), Norway (cod), Japan (pollock/cod), New Zealand (hoki), and Vietnam (pangasius) are the biggest competitors for Alaska's high-volume whitefish species. Other species like POP and Atka mackerel have both defined export markets and limited competition where Alaska is the primary export supplier and generally accounts for a larger percent of global supply. As a result, species substitution is less common in markets for these species with price driven by local demand dynamics, currency fluctuations, and Alaska harvest volume. Once almost exclusively dependent on the Japanese market, black cod markets have expanded around the world, and is now well-known and sought-after by chefs and discerning consumers.

7.1.3 Alaska Groundfish Production and Market Summary

In 2016, 2.2 million mt of groundfish were harvested off Alaska, with roughly two-thirds of this volume made up of pollock. Table 7.3 summarizes production volume, value, key markets, and the percentage of global production for Alaska groundfish species and products. Alaska accounts for a significant share of global whitefish production. The U.S. domestic market has grown in importance for Alaska's groundfish fisheries, with Europe, Japan, China, and South Korea remaining key export markets for Alaska groundfish.

Table 7.3: Alaska Groundfish Production and Market Summary, 2017.

Species/Product	First Wholesale Value ($millions)	Alaska Production (mt)	Key Markets
Pollock – Fillets	$480	173,000	Europe
Pollock – Surimi	595	207,000	Japan/Korea
Pollock – Roe	121	19,500	Japan
Pollock – Other	242	205,000	China*
Pacific Cod	510	137,000	U.S.
Soles, Flounders, and Plaice	230	135,000	China*
Pacific Halibut	117	9,300	U.S.
Sablefish	124	6,600	Japan
Rockfish	16	6,000	U.S.
Pacific Ocean Perch[1]	64	26,000	China*
Atka Mackerel	128	42,200	Japan
Other	7	3,300	Korea

Notes: *Denotes re-export market. Alaska production figures are rounded.
1. While Pacific Ocean perch is also considered a rockfish, it is separated here due to its volume and that it is almost exclusively exported.

Source: AKFIN, ADF&G (COAR), and McDowell Group estimates.

Export markets buy about 69 percent of Alaska's total groundfish production, and an even larger percentage of surimi, roe, fish meal, and other groundfish products. China is the largest wholesale market for groundfish, accounting for 24 percent of estimated sales volume in 2017, with the largest single export product being flatfish. However, the vast majority of Alaska groundfish exported to

China is re-exported to Europe, the U.S., and Japan. Japan is the second largest overall market for Alaska groundfish due to the high volume of pollock roe, surimi, and cod which enter the market. Europe is particularly important for pollock fillets, surimi, and H/G Pacific cod production, though its importance has been somewhat diminished due to the recent abundance of its own whitefish harvests.

With an estimated 31 percent of Alaska groundfish production remaining in the U.S. – and a great deal more processed in China and re-exported back the U.S. – the U.S. is the largest consumer of Alaska groundfish. This position could remain steady or increase in coming years due to tariffs and technical trade barriers imposed on China and Vietnam, and the persistent strength of the U.S. dollar.

7.2. Alaska Pollock Product Market Profiles

Pollock or walleye pollock (*Gadus chalcogrammus*) is currently the largest single-species fishery in the world, with stocks concentrated in the North Pacific Ocean.[1] Pollock are commercially harvested by several countries, but U.S. (Alaska) and Russia are the largest producers by a wide margin. Pollock harvests in Alaska are significant on a national scale, accounting for 28 percent of total U.S. commercial fishery in 2017. Alaskan pollock accounted for 63 percent of Alaska's groundfish production volume and 57 percent of first wholesale value in 2017 (Table 7.4). Alaskan pollock is processed into fillets, surimi, roe, head/gut (H&G), fish meal, fish oil, and other products. Europe, Japan, and U.S. are the primary consumer markets.

Table 7.4: Summary Profile of Alaskan Pollock Wholesale Production and Markets, 2017.

Value and Volume		Key Products	Fillets	Surimi	Roe	Meal	Other
First Wholesale Production (mt)	604,426	Pct. of Value	33%	41%	8%	7%	11%
Pct. of Global Pollock Harvest	45%	Key Markets	Japan	Europe	US	Korea	China
First Wholesale Value ($millions)	$1,438	Pct. of 1st Sales	18%	24%	23%	17%	14%
Pct. Change in Value from 2013-2017	3.2%	YoY Change	13%	-6%	-9%	-14%	16%
Pct. of Alaska Groundfish Value	57%	Competing Species: Russian pollock, hake, hoki, tropical surimi, & cod.					

Alaskan Pollock Production

Wholesale Production and Value Summary

Pollock is one of the most valuable fisheries in Alaska, and even the world, due to its tremendous volume, production versatility, and white, mild-flavored flesh. Virtually all edible pollock products are frozen before being sold into wholesale markets. Alaska pollock harvests yielded 604,426 mt of processed product in 2017, with a first wholesale value of $1.44 billion (Figure 7.1).

[1]Note: Differentiating pollock by its place of origin, primarily Russia or Alaska, can be confusing due to the widespread use of the name Alaska pollock. To avoid confusion, we use the term "pollock" to refer to Gadus chalcogrammus from any country/place. References to pollock from a specific place are called out by name (e.g. "Alaskan pollock" or "Russian pollock").

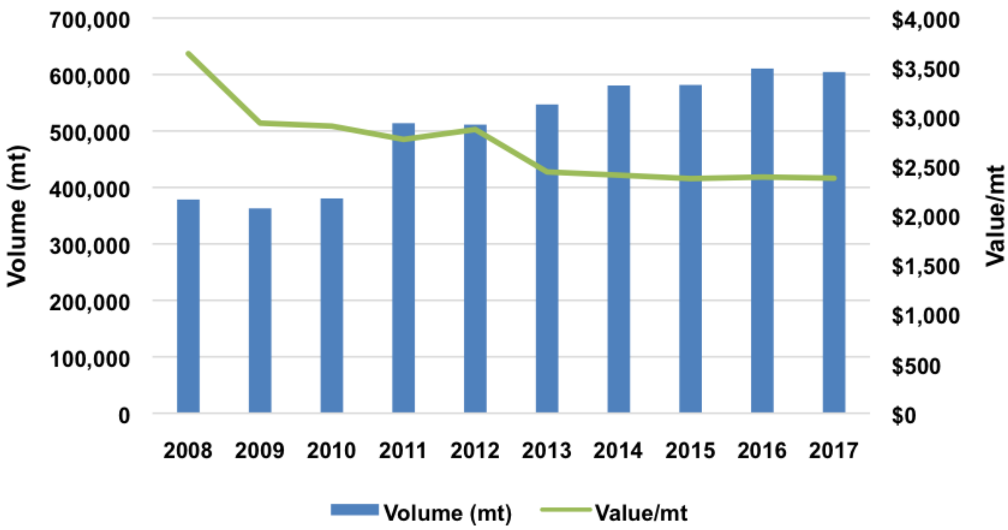

Figure 7.1: First Wholesale Volume and Value for Alaskan Pollock, 2008-2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Value ($millions)	$1,378	$1,065	$1,106	$1,424	$1,468	$1,336	$1,399	$1,381	$1,460	$1,438

Source: AKFIN.

Alaskan pollock yield five primary product types: surimi, fillets, head/gut, roe, and fish meal/oil (Figure 7.2). In 2017 34 percent of that volume was surimi, followed by 29 percent fillet, 11 percent fish meal, 10 percent H&G, 3 percent roe, and the remainder in other products such as minced meat, fish oil, and organs.

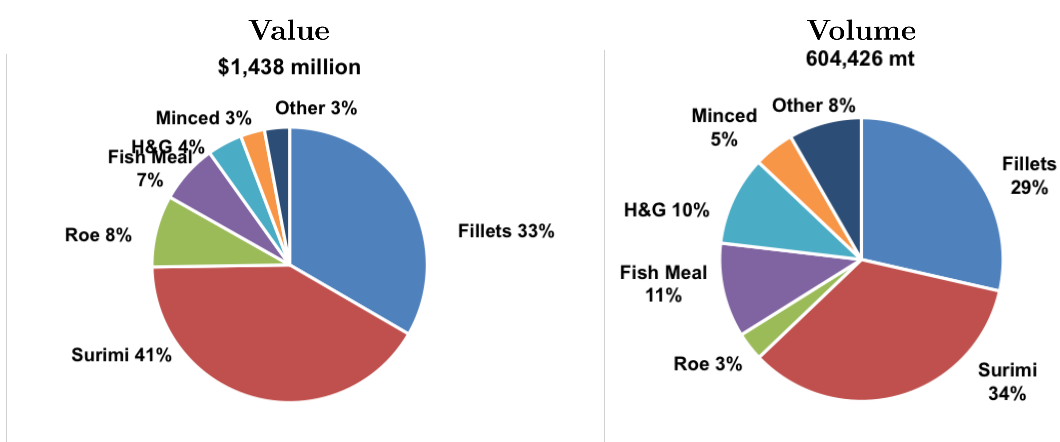

Figure 7.2: Alaskan Pollock First Wholesale Production Volume and Value, by Product Type, 2017
Notes: Percentages may not sum to 100 percent due to rounding.
Source: AKFIN.

Fillets typically provide the most revenue of any product type, though surimi topped the list in 2017. Together fillets and surimi accounted for 75 percent of Alaskan pollock's first wholesale value in 2017. Although roe is only 3 percent of the production volume, it accounts for 8 percent of the fish's value and typically has the highest profit margin per unit of production. Fish meal/oil, minced meat, and other ancillary products account for 10 percent of the value, while head/gut production is 7 percent.

7.2.1 Alaskan Pollock Fillets

Pollock fillets function as a whitefish commodity for production of fish sticks/fingers, breaded fillets, and other value-added frozen whitefish fillet products. The majority of Alaskan pollock fillets are processed into frozen blocks of skinless or deep-skinned fillets. Pollock fillets are also produced at secondary processing facilities in China and Europe using imported H&G product. However, the fish must be thawed and re-frozen after processing, creating what is known as twice-frozen fillets. Once-frozen and twice-frozen Alaska pollock fillets compete in most of the same markets, but once-frozen product sells at a premium due to its higher quality and purity. Whether the fish is processed in Alaska or abroad, the primary product forms are skinless/boneless fillets (PBO) and deep-skinned fillets.

The two primary markets for fillets are the U.S. and Europe. Pollock fillets are primarily used in frozen, generic whitefish products, such as fish sticks/fingers, breaded fish fillets/patties, and other value-added frozen products. They are popular in quick service restaurants such as McDonald's and Long John Silver's. Frozen products made from pollock fillets are widely available in most European and North American grocery stores.

Supply Chain

When pollock is landed in Alaska, it enters one of the most complex supply chains of any groundfish species. Landed fish are first headed and gutted. Heads and other offal are turned into fish meal/oil or retained for other niche markets. Pollock meat is generally used to make either surimi or fillets. The majority of Alaska's once-frozen fillet production is exported to secondary processing companies in Europe, while a lesser amount goes to similar companies in the U.S. Most H&G production is exported to China for twice-frozen fillet production. European and Brazilian processors import significant volumes of twice-frozen fillets from China and other countries. Secondary processors manufacture a range of breaded, coated, salted, and other products, mostly for high-volume retail, foodservice, or distribution companies.

Fillet Production Analysis

Fillets accounted for 29 percent of all Alaskan pollock production volume in 2017. Fillets were the second most valuable pollock product form in 2017 in terms of total revenue, after surimi. Fillet production declined slightly in 2017, due to an increasing emphasis on surimi (and despite increased harvest levels). The average wholesale value per mt decreased more or less steadily from 2013 to 2017, declining 13 percent over the period (Figure 7.3). This decline was, in part, influenced by competition from Russian pollock and other market factors. The price decline was greater for skinless/boneless fillets (-17 percent) compared to deep skin fillets (-8 percent) – helping explain deep skin's relative increase in production over this period. Skinless/boneless fillet production decreased 9 percent between 2013 and 2017, while deep-skinned fillet production increased 14 percent to a record high.

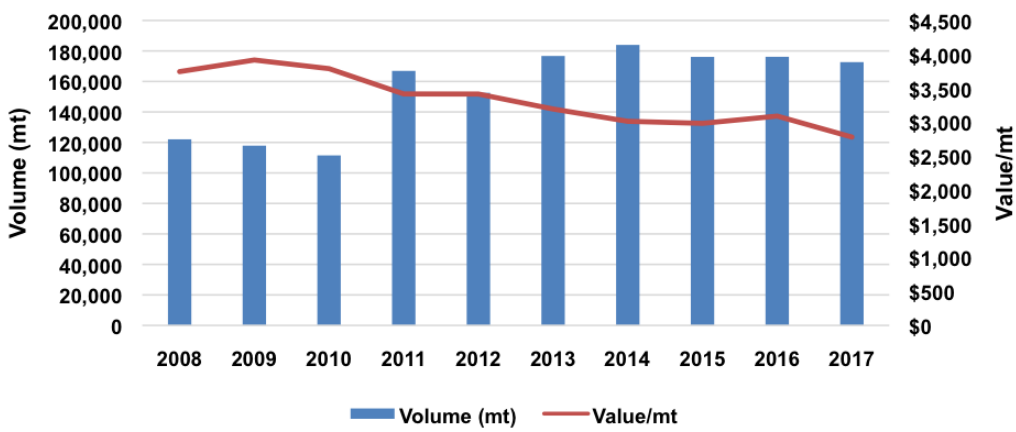

Figure 7.3: First Wholesale Volume and Value for Alaskan Pollock Fillets, 2008-2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Value ($millions)	$457	$462	$422	$570	$521	$564	$554	$525	$544	$480

Source: AKFIN.

Due mostly to lower fillet prices, the total value of Alaska pollock fillet production decreased 15 percent from 2013 through 2017. Export data for 2018 show a rebound in fillet prices to close to $3,000 per mt. Similarly, trade press reports 2018 A-season prices for once-frozen PBO blocks at $3,000/mt with contracts for 2019 A-season starting at $3,500/mt.[2] While these prices represent a sharp increase, from a long-term perspective they can be seen as a return to the norm.

Fillet Market Analysis

Export markets are critically important to Alaska's pollock industry. It is estimated that export markets buy nearly three-quarters of all Alaskan pollock fillet production (Table 7.5). Almost two-thirds of all Alaskan pollock fillets go directly to European markets. In addition, the majority of Alaskan pollock fillets exported to China are eventually re-exported to Europe.

Estimates indicate that domestic market purchases decreased steadily over the 2013 to 2017 period – both in volume (61,865 mt to 41,981 mt) and as a percent of Alaska's total fillet production (from 35 percent to 24 percent). This indicates comparatively strong export markets, primarily in Europe where demand could be increasing in part due to high cod prices driving substitution, among other factors.

Europe Europe is the world's largest market for pollock fillets. European countries account for 80 to 90 percent of all U.S. pollock fillet export value. European markets imported 97,897 mt of Alaskan pollock fillets in 2017, worth $257 million (Figure 7.4). Alaskan pollock fillets are primarily exported to Europe via Germany and the Netherlands. Most secondary processing into finished products occurs in Germany, France, and Poland. Germany is the largest consumer of pollock fillets, although France and the U.K. are also major consumer markets in Europe. Europe has a long history of whitefish consumption, so the presence of pollock as an affordable substitute to

[2]https://www.undercurrentnews.com/2018/11/19/only-way-is-up-for-pollock-prices-in-2019/

Table 7.5: Sales of Alaskan Pollock Fillets to Key Markets (mt), 2013-2017

Market	2013	2014	2015	2016	2017	Pct. of Total (5-yr. Avg.)
Europe[1]	103,787	119,972	109,487	107,465	97,897	61%
China*	4,632	4,526	5,615	9,021	18,474	5%
South Korea*	848	839	2,726	5,828	1,351	1%
Canada	1,689	1,164	760	551	6,482	1%
Japan	903	277	1,131	980	2,643	1%
Australia	929	1,096	1,158	1,100	1,213	1%
Other Countries	2,064	3,943	3,276	2,763	2,635	2%
Total Exports	**114,852**	**131,819**	**124,153**	**127,708**	**130,694**	**71%**
U.S. (Estimated)[2]	61,865	52,151	51,956	48,469	41,981	29%
Total Production	**176,717**	**183,970**	**176,109**	**176,177**	**172,675**	**100%**
Percent Exported	65%	72%	70%	72%	76%	

Notes: Data pertains to primary exports only, does not portray product which may be re-exported to other markets. * Denotes countries which primarily re-process and/or re-export product to other markets.
1 Includes all countries in the European Single Market.
2 Estimated based on annual production less calendar year exports.

Source: ASMI Export Database, AKFIN, and McDowell Group estimates.

cod is common in most countries. Overall consumption of finished product is mostly a function of population, the prevalence of modern grocery stores, and median household incomes.

The total volume of exports to Europe have remained more or less steady in recent years, though export value/mt has continued a steady, long-term decline as export prices declined 24 percent from $3,455 to $2,630 from 2010 to 2017.

Europe imports between 270,000 and 310,000 metric tons of pollock fillets per year from China, Alaska, and Russia. Alaskan once-frozen pollock fillets accounted for more than a third (37 percent) of all pollock fillets imported into Europe over the past five years. The balance comes from China - mostly re-processed, twice-frozen fillet block made from Russian pollock - or directly from Russia as single-frozen fillet blocks.

Several major European retailers have committed to only selling certain seafood products from sustainable fisheries, certified by the Marine Stewardship Council (MSC). Until Russia's Sea of Okhotsk pollock fishery was certified in 2013, Alaska's pollock fisheries were the only source for certified pollock fillets. MSC certification of Russia's Sea of Okhotsk fishery led to increased competition in key European markets, a slump in wholesale prices, and a declining premium for once-frozen Alaska's pollock fillets. While fillet prices have increased in 2018, Russia's increasing production of once-frozen fillet blocks is an important trend with significant potential to impact the value of Alaska's pollock fillet production going forward.

United States The U.S. domestic market is the second-largest consumer of Alaska pollock fillets in the world. In contrast to Europe, Americans consume more pollock through foodservice channels

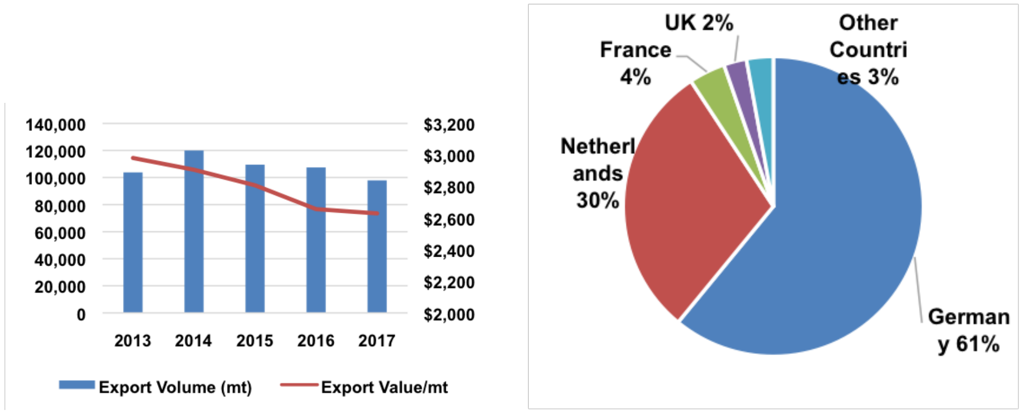

Figure 7.4: Exports of Alaskan Pollock Fillets to Major European Markets, 2013-2017.

	2013	2014	2015	2016	2017
Export Volume (mt)	103,787	119,972	109,487	107,465	97,897
Export Value ($000s)	$309,385	$348,675	$307,437	$285,547	$257,466
Average Export Value per Metric Ton ($US)	**$2,981**	**$2,906**	**$2,808**	**$2,657**	**$2,630**

Source: ASMI Export database, compiled by McDowell Group.

than retail outlets. Pollock is the primary whitefish species used in most generic fried fish sandwiches, although it is becoming more common to see the species name identified in product messaging.

The U.S. market consumed an average of 93 thousand mt of pollock fillets per year from 2013-2017, with domestic supply decreasing over this period to 68 thousand mt consumed in 2017 (Table 7.6). The main factor behind declining U.S. pollock supply is a steady decrease in pollock imports. Imports declined 52 percent from more than 55 thousand mt in 2013 to 26 thousand mt in 2017. As a result of declining imports, the share of domestic pollock fillet consumption originating from Alaska has increased, from an estimated 53 percent in 2013 to 61 percent in 2017.

Table 7.6: Estimated U.S. Pollock Fillet Market Supply (mt), 2013-2017

Year	Alaskan Pollock Fillet Production	Imports	Exports	Est. U.S. Supply	Est. Once-Frozen Product from Alaska	Pct. Alaskan
2013	176,717	55,105	114,852	116,970	61,865	53%
2014	183,970	49,833	131,819	101,984	52,151	51%
2015	176,109	44,532	124,153	96,488	51,956	54%
2016	176,177	32,000	127,708	80,469	48,469	60%
2017	172,675	26,361	130,694	68,342	41,981	61%
2013-2017 Avg.	**177,130**	**41,566**	**125,845**	**92,851**	**51,284**	**55%**

Notes: Figures may not sum due to rounding.

Source: NMFS OST, AKFIN, ASMI Export Database, and McDowell Group estimates.

Pollock fillets are usually put through a secondary manufacturing process before reaching American consumers. Most fillets are bought by companies unaffiliated with harvesting companies in Alaska or Russia. However, there is some integration in the U.S. market. Alaska's largest pollock producer, Trident Seafoods, owns 29 percent of the pollock quota in Alaska. Trident sells a variety of finished products to retailers, including pollock fillets, burgers, and fish sticks through a variety of stores including Costco.

Competing Supply

Alaskan pollock's primary competition comes from Russian-origin twice-frozen pollock fillets. The vast majority of Russian pollock production is exported as a frozen H&G product to China, where it is thawed, filleted, then re-frozen and exported to other countries. Once-frozen fillet production in Russia is limited by minimal processing capacity, though such production is expected to grow due to a major government-backed initiative.

Roughly half of Russia's pollock harvests occur in the Sea of Okhotsk. MSC certification of the Sea of Okhotsk fishery in 2013 significantly increased the impact of Russian production on Alaska by opening up Russian-origin products to key European fillet markets that require MSC certification. Russian production is expected to decline slightly in the coming years, while Alaska production is expected to increase slightly (Figure 7.5). However, a variety of other efforts are underway to increase the value of Russian pollock production and exports. Fillet production increased 34 percent from 2015 to 2016 (from 40,200 mt to 53,700 mt) and is projected by some to triple from 2016 to 2025 with the construction of more than 20 fish processing facilities and 33 fishing vessels, as well as the launch of a new marketing and supply chain organization known as "The Russian Fish."[3]

Other whitefish species such as cod, haddock, saithe, hake, hoki, sole, tilapia, and pangasius also impact the market for Alaska pollock fillets as potential substitutes in the global fillet market.

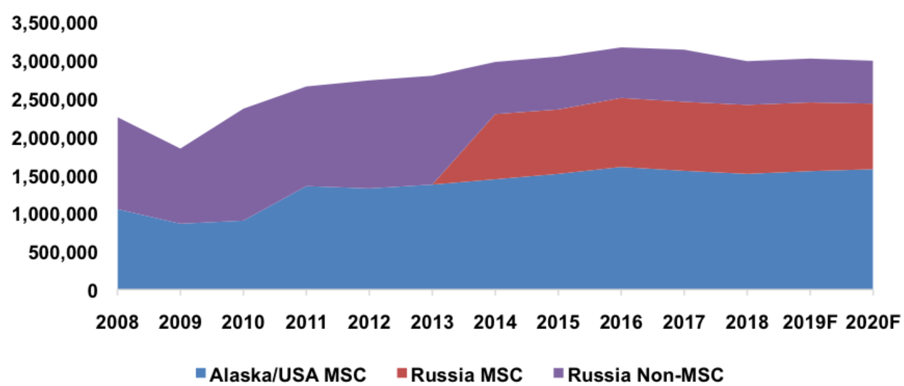

Figure 7.5: Russian and Alaska Pollock Harvests, 2008-2018 and 2019-2020 Forecasts
Source: FAO, NOAA OST, AKFIN, Groundfish Forum, NPFMC TACs, and McDowell Group estimates.

[3] https://www.intrafish.com/marketplace/1659121/russia-planning-aggressive-expansion-of-value-added-exports
https://www.seafoodsource.com/news/supply-trade/new-campaign-to-refresh-marketing-supply-chain-efforts-in-russia

7.2.2 Alaska Pollock Surimi

Surimi accounted for 34 percent of Alaska's pollock wholesale production volume and 41 percent of wholesale production value in 2017. More than 207,000 mt of pollock surimi, worth $595 million, was produced in Alaska in 2017. Japan, Europe, South Korea, and the U.S. are key surimi markets. Surimi can be made from a variety of fish, but Alaska pollock surimi is sought after for its white color, binding ability, abundance, and mild flavor.

The term surimi refers to the intermediate product used in the production of surimi seafood products. Surimi is an odorless, protein-rich, wet paste that is an intermediate product used in the production of a variety of surimi seafood products (such as imitation crab meat). Pollock surimi is made using finely minced meat that has been repeatedly rinsed and mixed with additives such as salt, starch, and sugar, and then frozen and packaged. The quality of surimi is determined by its gel strength, color (the whiter, the better), and purity. Surimi technology has improved over the years, with the yield increasing from 12 percent to over 30 percent. Surimi production is standard in nearly all of the Alaska's major shoreside and at-sea processing facilities that focus on pollock. Grades of surimi commonly available from Alaska processors include (in descending order of quality) SA, FA, AA, KA, KB, KC, and RA. Demand for surimi made with only "natural" additives has been increasing in recent years, due to shifting consumer preferences and an increasing focus on product development.

There are hundreds of surimi seafood product varieties produced by secondary processors. The broad categories include kamakobo (steamed), chikuma (broiled), satsuma-age (fried), and seafood analogs (e.g. imitation crab sticks).

Supply Chain

Alaskan pollock surimi blocks are produced by catcher-processors with onboard surimi processing capacity and by shoreside processors that take deliveries of unprocessed pollock from catcher vessels. Alaska processors sell frozen surimi blocks to secondary processors (some of which may be affiliated with the primary processing company) and distribution companies in Asia, the U.S., and Europe. Secondary processors use surimi blocks from Alaska to create surimi seafood products tailored to various end markets.

Surimi Production Analysis

In 2017, surimi accounted for 34 percent of Alaskan pollock production volume and 41 percent of first wholesale value. Surimi production reached 207,300 mt last year and had a value of $595 million (Figure 7.6). Production volume has typically ranged from 150,000 to 200,000 mt annually (except for a drop in 2008-2010), driven primarily by harvest volumes. Surimi production volume is also driven by the relative demand for surimi versus fillets, though surimi production as percentage of total pollock production has been relatively steady. From 2008 through 2017, this percentage has ranged from 24 to 35 percent. In recent years, surimi production has grown steadily as harvests levels and surimi prices increased.

Wholesale value is more variable, as the price of Alaskan pollock surimi can vary from year to year depending on global surimi market conditions. Average surimi material prices were $2.87 per kilo in 2017, up 10 percent from the previous year. Preliminary data from 2018 indicates that the trend of

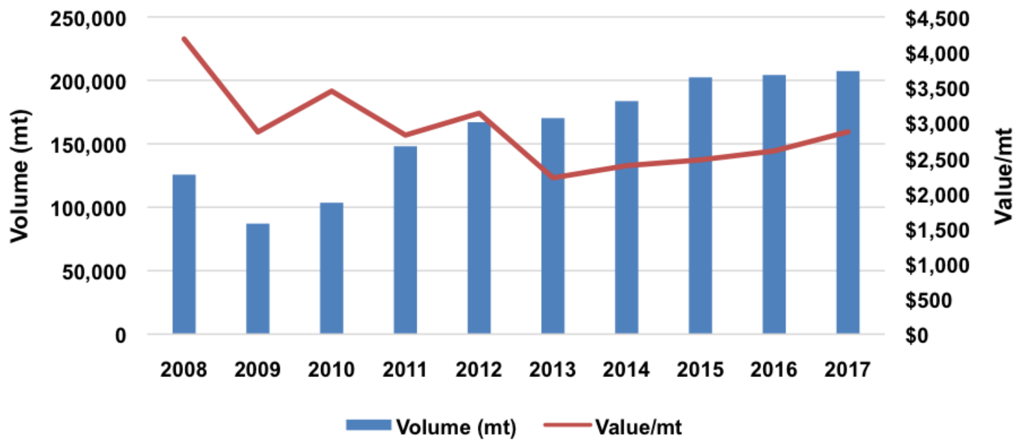

Figure 7.6: Wholesale Production Volume and Value for Alaskan Pollock Surimi, 2008-2017.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Value ($millions)	$526	$250	$357	$418	$524	$378	$439	$500	$531	$595

Source: AKFIN.

increasing surimi wholesale prices has continued, with export prices in the first nine months of 2018 up 10 percent over the same period in 2017.

Key Market Analysis

Approximately 90 percent of Alaskan pollock surimi is sold to export markets (Table 7.7). In 2017, Japan and South Korea imported 70 percent of all Alaskan pollock surimi production. The remaining markets included Europe, U.S., China, and Thailand. Europe is a larger market than the export data below suggests, importing significant volumes of surimi from South Korea (containing Alaskan pollock as well as surimi made from other species). U.S. surimi exports in 2017 were 10 percent above the previous four-year average.

The global production of raw surimi material totaled approximately 820,000 metric tons in 2017, down from the 850,000 mt produced in 2016.[4] The decline is attributed primarily to declining tropical fish harvests – the source of nearly two-thirds of global surimi production. Alaska's pollock fishery accounts for roughly a quarter of global surimi production. Japan is the largest market for surimi, though other Asian countries such as China and Korea are important and growing surimi consumers.

The 820,000 mt of raw surimi produced in 2017 was converted into an estimated 3 million metric tons of surimi seafood products. China was the largest producer of end products – despite consuming less surimi raw material than Japan – due to a lower average percentage of seafood in their surimi seafood products.

Japan Japan is the world's largest end market for surimi seafood products, consuming a third of global surimi production. Large companies and artisanal shops in Japan process over 1,000 different

[4]Future Seafood Group (via Undercurrent News).

Table 7.7: U.S. Exports of Alaskan Pollock Surimi by Country (mt), 2013-2017

Country	2013	2014	2015	2016	2017	% Change over 2013-2016 Avg.	% of Total (2013-2017)
Japan	56,292	71,889	81,830	69,184	74,554	7%	37%
South Korea	61,448	56,847	60,407	71,113	71,570	15%	33%
Europe	35,626	25,324	22,697	27,832	26,419	-5%	14%
Thailand	530	1,198	2,395	4,831	7,746	246%	2%
China	1,466	1,281	2,008	2,194	3,280	89%	1%
Other Countries	5,546	4,366	2,176	2,862	1,712	-54%	2%
Total Exports	**160,907**	**160,906**	**171,513**	**178,016**	**185,281**	**10%**	**89%**
U.S. (Estimated)	9,352	22,750	30,870	26,215	22,060	-1%	11%
Total Production	**170,259**	**183,656**	**202,383**	**204,230**	**207,341**	**9%**	**100%**
Percent Exported	**95%**	**88%**	**85%**	**87%**	**89%**	**-**	**-**

Notes: Reflects direct exports only. Does not reflect final market destination.

Source: ASMI Export Database and AKFIN.

surimi products. Consumption has declined since the mid-1970s, but has stabilized since 2010 at roughly 570,000 mt of surimi seafood products per year.[5]

Japan directly imported 37 percent of Alaskan pollock surimi produced from 2013 to 2017, averaging 70,750 mt of direct imports worth $156 million per year (Table 23). Including product routed through Korea and other countries, more than half of Alaska's total pollock surimi production is estimated to go to the Japanese market.

Alaska accounted for 47 percent of Japan's imported surimi volume between 2013 and 2017 (Table 7.8). Competing suppliers include Thailand, India, China, and Vietnam. Thailand's tropical surimi production has declined in recent years and India has increased market share as a lower cost producer with access to substantial resources.

South Korea The U.S. exported 71,570 mt (worth $177 million) of Alaskan pollock surimi to South Korea in 2017, which accounted for 39 percent of Alaskan pollock surimi exports (Table 23). Some of the exports to Korea are likely held in bonded, duty-free cold storage warehouses before being shipped to other markets (primarily Japan, Europe, and Russia). Despite the prevalent re-export trade, South Korea is the second-largest buyer of Alaska surimi in terms of a single country (in most years). The 2012 Korea-U.S. Free Trade Agreement has deepened the economic ties between Korea and the U.S. and increased consumption of U.S. pollock surimi.

[5] (Park, 2014)

Table 7.8: Japan Surimi Imports from Major Producers (mt), 2013-2017

Exporter	2013	2014	2015	2016	2017	Pct. of Total (5-yr. Avg.)
U.S. (Alaska)	99,525	117,827	124,018	110,320	137,681	47%
India	28,083	33,969	38,177	33,323	38,407	14%
Thailand	36,661	34,159	30,342	29,296	22,412	12%
China	13,459	19,078	17,898	19,303	17,416	7%
Vietnam	12,122	16,753	16,327	15,883	15,356	6%
All Others	34,875	37,599	35,096	33,369	31,287	14%
Total	**224,725**	**259,386**	**261,857**	**241,496**	**262,560**	-
Pct. from Alaska	**44%**	**45%**	**47%**	**46%**	**52%**	-

Source: Japan Trade Statistics (Ministry of Finance), compiled by McDowell Group.

South Korea imported roughly 130,000 mt of all surimi varieties in 2017, or about half as much import volume as Japan. Vietnam and China are the country's top surimi suppliers, while Alaska accounted for 19 percent of total surimi imports.[6] Korea is one of the largest manufacturers of surimi seafood products after China and Japan, supplying its own domestic market and other international markets.

Europe Europe is a large market for Alaskan pollock surimi. Alaska producers exported 26,419 mt of surimi worth $58 million to Europe in 2017 (Table 23). Direct exports of Alaskan pollock surimi accounts for approximately half of the market's total surimi base consumption (~50,000 mt annually). Processors in France, Spain, Lithuania, and Poland produce surimi seafood products for the European market, with relatively little importation of foreign surimi seafood products.[7] Spain and France are Europe's largest surimi consumers, accounting for more than 70 percent of the region's total consumption.

United States The United States market for surimi is dominated by imitation crab products. Seven surimi processors operate in North America, consuming roughly 35,000 mt of surimi raw material (mostly Alaska pollock but also whiting/hake and other species) to produce an estimated 100,000 mt of surimi seafood products. American surimi producers have focused on product innovation in recent years. A promising market entrant is Trident Seafoods' surimi noodles, set to be released at Costco in early 2019. The U.S. also imports surimi seafood products from Japan and other countries, though trade data do not allow for a detailed analysis of these product flows.

Competing Supply

Pollock surimi accounted for about a quarter of global surimi production in 2017 (Figure 7.7). Virtually all pollock surimi is produced in Alaska or comes from Alaskan fisheries, though Russian processors plan to start producing pollock surimi in significant quantities in the coming years.

[6] https://www.undercurrentnews.com/2018/12/10/pollock-surimi-cant-meet-global-demand-as-tropical-supply-continues

[7] https://www.eumofa.eu/documents/20178/114144/MH+3+2018.pdf/04031fe1-af72-4ce0-9890-a4a15a41ec8f

Tropical surimi dominates global surimi production, accounting for about two-thirds of total production. China, Vietnam, Thailand, and India are the largest tropical surimi producers.

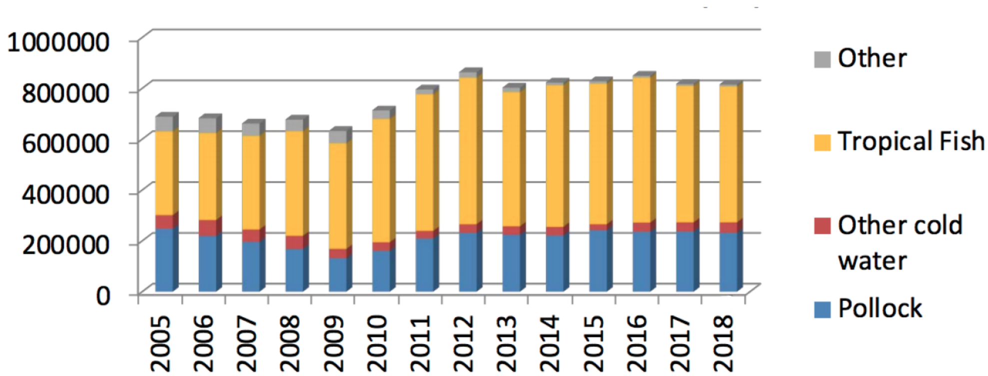

Figure 7.7: Global Surimi Production (mt), by Source Species, 2005-2018
Source: Future Seafood Group (via Undercurrent News). 2018 is an estimate.

Surimi is made from a variety of fish species. Alaskan pollock is the most widely used species accounting for 25 percent of global surimi supply, but other types of surimi utilize a range of other fish. Tropical fish species account for 68 percent of surimi production, with threadfin bream (*Nemipterus japonicus*) is the most common of these species .

Many countries have active fisheries that support surimi production. In terms of a single country, the U.S. is the second-largest surimi producer in the world. China, India, and Southeast Asia (including Thailand and Vietnam) are key tropical surimi producers. After a decade of steady growth, Vietnam has overtaken China as the largest tropical surimi producer, with more than 150,000 mt of production each of the last five years. Production in India has also grown steadily, while Chinese and Thai production has declined in recent years (likely due to overfishing).[8]

It should be noted that surimi production statistics are not universally tracked. Although FAO compiles data on minced fish and surimi production, the manner in which data is categorized do not allow for comprehensive production accounting. As a result, industry estimates (which are based on public and private data) are a more reliable source of information.

7.2.3 Alaska Pollock Roe

Pollock roe commands the highest price of all major pollock products at $6.21 per kilo and was worth $121 million (wholesale value) in 2017. It accounted for 8 percent of Alaskan pollock's total wholesale value but only 3 percent of production volume (19,517 mt). Pollock roe is consumed as a condiment/flavoring and during holidays in Japan. South Korea is the world's only other sizeable market.

Pollock roe production occurs when the fish are spawning, typically during the late winter and early spring. Roe is extracted during the gutting process and rapidly frozen before deterioration occurs. Roe prices are tied to the quality of the roe, which varies greatly. Lower grade roe might have defects such as discoloring, broken skeins, or roe maturity (eggs are too young or too old). Product

[8] `https://www.undercurrentnews.com/2018/12/10/pollock-surimi-cant-meet-global-demand-as-tropical-supply-continues`

processed at sea tends to command higher prices. Pollock roe is traditionally sold to wholesale buyers in frozen block form, packed into 49.5-lb. cases each containing three blocks of roe.

Supply Chain

Pollock roe is an export product. Frozen Alaskan pollock roe is sold at auctions in Seattle, WA, while Russian pollock roe is often sold at auctions held in Busan, South Korea. However, larger volumes of Alaska product is also sold directly to buyers through negotiated contracts. "Direct sales" have become more common in recent years, based on pricing discovered through the auction process. The pollock roe supply chain is vertically integrated for large companies that maintain a pipeline from the raw material all the way to distribution in markets in Japan and South Korea. After frozen pollock roe is exported to Asia, it eventually undergoes secondary processing. Japan, Korea, China, and Thailand are common destinations, where it is processed by defrosting and brining the roe in spices or salt.[9]

Alaska Production Analysis

Alaska pollock roe is an important element of the pollock product mix. Although it is a low-volume product, roe assumes the highest unit price of any pollock product. In 2017, 19,517 metric tons was produced (roughly in line with the ten-year average) worth $121.2 million and was 8 percent of the species' wholesale value (Figure 7.8). Pollock roe production is primarily a function of overall harvest volume; however, it can fluctuate significantly based on roe recovery/maturity and harvest distribution.

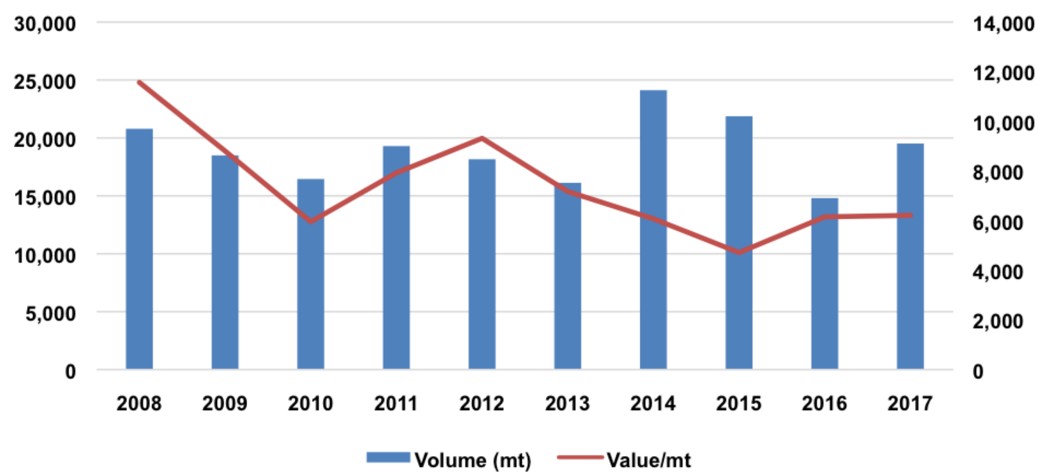

Figure 7.8: Wholesale Production Volume and Value/mt for Alaskan Pollock Roe, 2008-2017.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Value ($millions)	$240	$163	$98	$153	$169	$116	$146	$103	$91	$121

Source: AKFIN.

Historically (prior to 2007), roe often accounted for one-third to one-fifth of Alaska pollock's total first wholesale value. However, the percentage of roe value compared to all Alaskan pollock products

[9] Industry Interview

has declined significantly in recent years. Since 2013, roe has only generated 6 to 9 percent of total first wholesale value. Pollock roe prices have decreased steadily over the last decade due to weakening traditional markets and a lack of new markets. Roe market development is a top priority of the Alaska pollock industry.

Key Roe Market Analysis

Virtually all Alaskan pollock roe is exported to Japan or South Korea. In 2017, exports totaled 18,471 mt worth $112 million (Table 7.9). Japan is the dominant market, absorbing more than 80 percent of finished Alaskan pollock roe exports. South Korea is the only other sizeable market, but the majority of frozen pollock roe sold to Korea is held in cold storage and exported on to the Japanese market. Exports to Europe jumped in 2017; the product entered the market through the Netherlands, though the final market is unclear. Efforts to develop other pollock roe markets outside of Japan have been largely unsuccessful, but given stagnant Japanese consumption patterns, finding additional roe markets is extremely important to the long-term health of Alaska's pollock industry.

Table 7.9: Exports of Alaskan Pollock Roe by Country (mt), 2013-2017

Export Destination	2013	2014	2015	2016	2017	Pct. Change from 4 Yr. Avg.
Japan	6,544	11,212	10,460	5,457	8,426	0%
South Korea	7,414	9,792	9,281	8,295	9,260	6%
China	901	754	505	258	148	-76%
Other	108	20	33	50	637	1109%
Export Volume	**14,967**	**21,778**	**20,279**	**14,060**	**18,471**	**4%**
Export Value ($Million)	**$114**	**$153**	**$152**	**$111**	**$112**	**-16%**
Avg. Export Price/Kilo	**$7.63**	**$7.02**	**$7.50**	**$7.90**	**$6.05**	**-19%**

Source: ASMI Export database, compiled by McDowell Group.

Japan Japan is the world's primary pollock roe market with imports of 42,051 mt in 2017, worth $285 million (Table 7.10). Alaskan product accounted for 42 percent of the import volume between 2013 and 2017. Russia is the country's largest pollock roe supplier. Imports of Alaskan product fluctuate from year to year but 2017 saw shipments matching the prior four-year average. Total Japanese pollock roe imports increased 9 percent versus the prior four-year average.

The value of roe is function of production volume in Russia and Alaska, as well as the strength or weakness of the yen. However, due to static demand, an aging population in Japan, and a lack of market diversification, the long-term value of pollock roe is an area of concern and market development is a top priority for the Alaska pollock industry.

South Korea South Korea is the second largest consumer of pollock roe, but it also is an intermediary buyer. Russia and Alaska sent 49,745 mt of pollock roe to South Korea per year during this period (Table 7.11). Korean import statistics suggest the Korean market consumes approximately a quarter to a third of total pollock roe imports (with most of the rest ending up in Japan). Alaska supplies an estimated 19 percent of the Korean domestic market. Korea is known

Table 7.10: Japan Pollock Roe Imports (mt), 2013-2017

Exporter	2013	2014	2015	2016	2017	Pct. of Total (5-yr. Avg.)
Russia	21,008	24,916	21,958	20,367	24,434	57%
U.S. (Alaska)	13,158	19,720	18,440	14,400	17,357	42%
Others	237	163	185	154	259	1%
Total	**34,403**	**44,800**	**40,582**	**34,921**	**42,051**	**-**
Pct. from Alaska	**38%**	**44%**	**45%**	**41%**	**41%**	**-**

Notes: Includes minor amounts of cod roe and roe from other related species.

Source: Japan Trade Statistics (Ministry of Finance), compiled by McDowell Group.

for having less traditional tastes than Japan, and the market will accept small sized roe that is less marketable in Japan.

Table 7.11: South Korean Pollock Roe Trade (mt), 2013-2017

	2013	2014	2015	2016	2017	5-yr. Average
Exports Reported by Major Producers						
Russia	39,972	39,488	42,118	35,991	47,116	40,937
Alaska	7,414	9,792	9,281	8,295	9,260	8,808
Total	**47,386**	**49,280**	**51,399**	**44,286**	**56,376**	**49,745**
Actual Imports by Major Producer						
Russia	11,838	12,008	12,202	12,271	12,334	12,131
Alaska	3,425	3,061	2,955	2,334	2,368	2,829
Total	**15,263**	**15,069**	**15,157**	**14,605**	**14,702**	**14,959**
Export/Import Difference	**32,123**	**34,211**	**36,242**	**29,681**	**41,674**	**34,786**

Source: Global Trade Atlas, compiled by McDowell Group.

7.2.4 Alaska Pollock Headed and Gutted

In 2017, headed and gutted (H&G) products accounted for 10 percent of total pollock production volume and 4 percent of the species' total first wholesale value. H&G production averaged $80 million in value over the last five years (2013-2017). H&G pollock is frozen in blocks and the majority is exported to China for secondary processing into twice-frozen fillets.

H&G pollock is produced primarily by Alaska processors that handle pollock as part of a large mix of species and do not have the space or volume needed to invest in fillet and/or surimi processing lines. H&G production is also a way to handle smaller pollock (these are also sometime diverted to fish meal or sold as frozen blocks of whole fish).

Product Description and Supply Chain

Virtually all H&G Alaskan pollock is sent abroad for further processing. The primary destination is China, where it is a raw material used to produce frozen fillet blocks and salted fillets for markets in Europe, the U.S., and Brazil. Secondary processors in Europe (fillet products) and Korea/Japan (likely surimi) also import significant volumes. Finally, there are anecdotal reports that some dressed and whole/round product is routed through China to markets in Africa.

Production Analysis

In 2017, H&G pollock production totaled 61,605 mt – in line with average volumes since 2009 (Figure 7.9). Over the last decade, H&G production has generally represented around 10 percent of total Alaskan pollock production volume (with the exception of big years in 2009 and 2010). H&G production value, though, was down 31 percent since 2009 due to a steady drop in prices. In 2017, H&G pollock value per mt dropped below $1,000 – an unprecedented low in recent times.

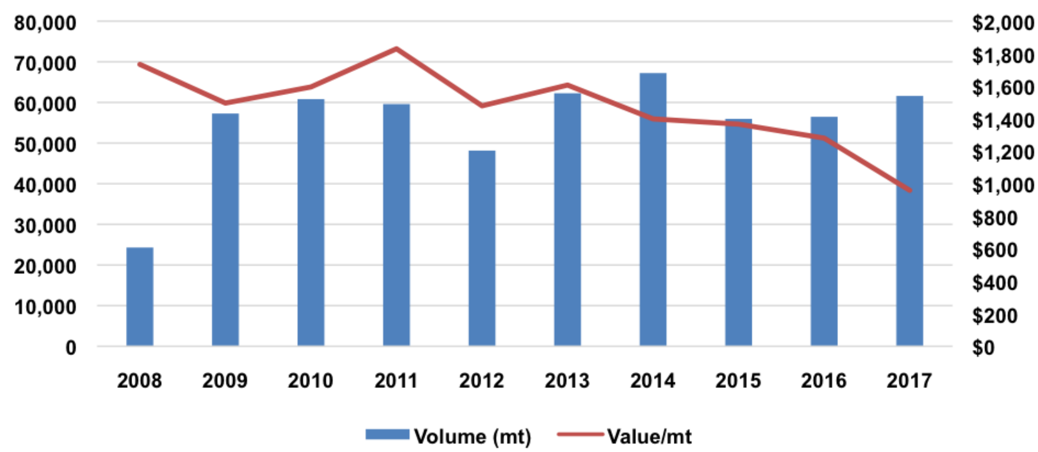

Figure 7.9: Wholesale Production Volume and Value for H&G Alaskan Pollock, 2008-2017.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Value ($millions)	$42	$86	$97	$109	$71	$100	$94	$76	$72	$59

Source: AKFIN.

Key H&G Market Analysis

Headed and gutted Alaskan pollock is primarily exported to China for reprocessing: the country bought 72 percent of exported Alaskan product between 2015 and 2017 (Table 7.12). South Korea and Ukraine also import substantial volumes of H&G Alaskan pollock. Virtually all of Alaska's H&G pollock production is sold to export markets, primarily to countries that perform secondary processing to produce whitefish fillets or surimi.

China The majority of Alaskan H&G pollock is sent to China for secondary processing, due to lower production costs. In 2017, China reported imports of 54,489 mt of Alaskan H&G/whole pollock (Table 7.13). This product, along with Russian H&G pollock is processed into fillets and other salted or breaded products for re-export to Europe, the U.S., and Brazil. At this point, most product joins the global pollock fillet supply as a twice frozen product.

Table 7.12: Alaskan Pollock H&G Exports (mt), by Country, 2015-2017

Exporter	2015	2016	2017	Pct. of Total (2015-2017)
China	44,729	51,757	54,489	72%
Ukraine	664	3,296	10,029	7%
South Korea	5,885	10,748	6,886	11%
Thailand	3,291	3,842	2,543	5%
Other Countries	4,077	4,342	2,140	5%
Total Exports	**58,646**	**73,985**	**76,087**	

Source: Global Trade Atlas

Table 7.13: China Imports of Frozen H&G Pollock by Country (mt), 2015-2017

Country	2015	2016	2017
Russia	560,516	556,927	595,097
U.S.	44,729	51,757	54,489
Japan	18,064	9,275	4,598
Other	2,025	7,104	12,147
Total	**625,334**	**625,063**	**666,331**

Source: Global Trade Atlas.

More than half of China's frozen pollock fillets are re-exported to Europe. The U.S. is the next largest market, accounting for 10 percent of re-exports while South Korea and Brazil are also important.

Competing Supply

The largest pollock harvests come from Alaska and Russia, with combined TACs over three million metric tons. The vast majority of Russian pollock is exported or sold to domestic buyers as an H&G product, while most Alaskan pollock is filleted directly or used in surimi production. Alaskan H&G pollock supply is somewhat dictated by relative value of once-frozen pollock fillets over twice-frozen pollock and other whitefish fillets, as well as processing production costs in Alaska relative to other areas.

7.3. Pacific Cod Market Profile

Pacific cod (*Gadus macrocephalus*) is a whitefish found in the coastal Pacific Ocean from Alaska to California, with the largest concentrations found in the Gulf of Alaska and Bering Sea. One of the largest of the Alaska groundfish species, Pacific cod are highly valued for their mild, white flesh and are primarily processed into fillet and H&G products. Final cod products include fillets and fish sticks destined for international and domestic markets. In 2016, Alaska's Pacific cod accounted for 18 percent of the total global cod harvest. In 2017, Alaska cod harvest and production volumes declined slightly over the previous year but increased prices driven by global supply constraints pushed the first wholesale value up to a 12-year peak of $510 million (Table 7.14).

Table 7.14: Summary Profile of Alaska Pacific Cod Wholesale Production and Markets, 2017

Value and Volume		Key Products	H&G	Fillet	Other	
First Wholesale Production (mt)	136,990	Pct. of Value	67%	25%	8%	
Pct. of Global Cod Harvest (2016)	18%	Key Markets	China	Europe	U.S.	Other
First Wholesale Value ($millions)	$510	Pct. of 1^{st} Sales	28%	10%	44%	17%
Pct. of Alaska Groundfish Value	20%	YoY Value Change	-6%	-14%	25%	-6%
Production Volume Exported	65%	Competing Species: Russian Pacific cod and Atlantic cod				

Alaska Pacific Cod Production Summary

In 2017, Alaska's processors produced 136,990 mt of Pacific cod products, valued at $510.2 million (Figure 7.10). Production volume in 2017 was the lowest since 2010, closely tracking lower TACs and harvests. Despite lower volumes, 2017 production value rose to a 12-year high of $510 million due to an exceptionally strong market. Price increases are generally understood to be the result of strong demand combined with a reduction in Pacific and Atlantic cod harvest volume, as well as a reduction in the haddock quota in the Barents Sea. Strong cod pricing continued throughout 2018 and enters 2019 near peak 2008 levels.

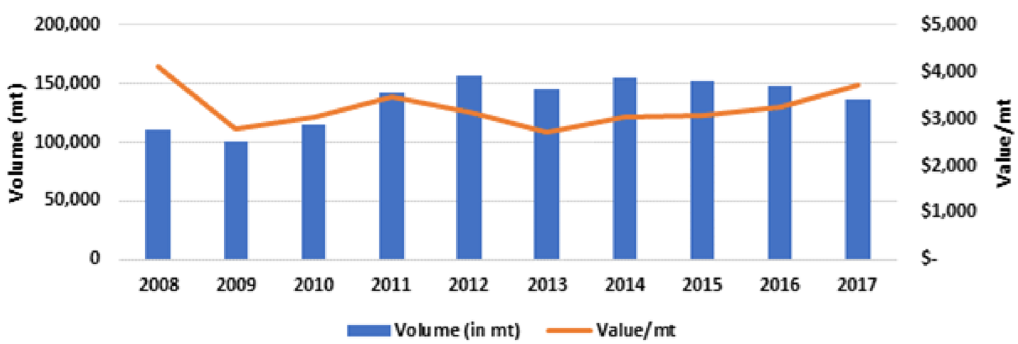

Figure 7.10: First Wholesale Volume and Value/mt for Alaska Pacific Cod, 2008-2017.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Value ($millions)	$457	$280	$351	$498	$496	$398	$471	$467	$480	$510

Source: AKFIN.

H&G product accounted for 72 percent of production volume (98,489 mt) in 2017, and 67 percent of first wholesale value ($341 million) (Figure 7.11). Fillets accounted for 12 percent by wholesale volume (16,538 mt) and 25 percent of first wholesale value ($127 million). Other products (e.g., roe, milt, fish meal) collectively made up 16 percent of wholesale volume with 21,963 mt valued at $42.5 million.

Product Analysis and Supply Chain: Head and Gut and Fillets

Alaska's Pacific cod harvest is primarily processed as H&G, with a significant shore-based production focus on fillets. Most H&G cod is frozen and exported for secondary processing in China, Europe, and Japan. Single-frozen Alaska cod fillets are a high-value product destined primarily for domestic markets. Fillet product forms include frozen shatterpacks, blocks, IQF, and a small amount of fresh.

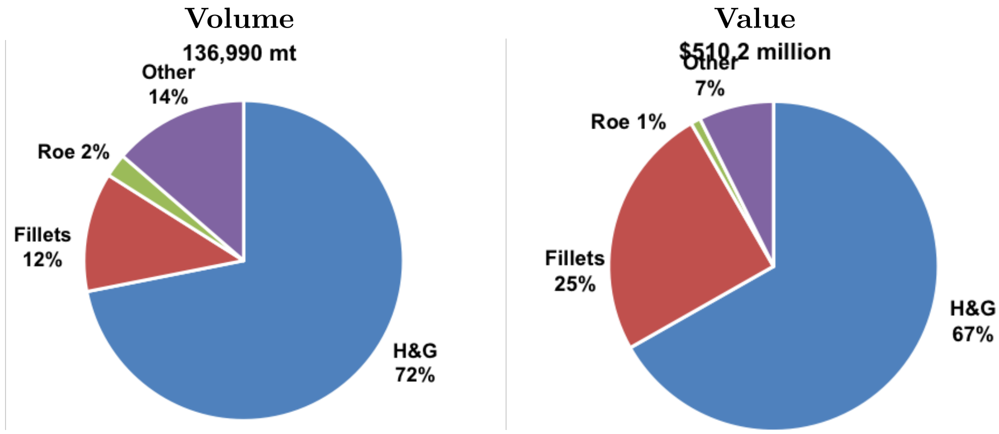

Figure 7.11: Volume and Value of Pacific Cod Wholesale Production in Alaska, by Product Type, 2017.
Source: AKFIN.

Final products (after secondary processing) include fillets, frozen portions, salted cod, and value-added products sold in restaurants, grocery stores, and in food service. The largest final markets for Alaska's cod are in Europe and the U.S. In many end markets, cod is not differentiated at the consumer level between Pacific cod or Atlantic cod.

Headed and Gutted (H&G)

H&G products – which make up nearly three-quarters of Alaska's cod production – follow complex supply chains spread across numerous markets. Most frozen H&G product is exported, and the largest reprocessing market is China, which re-exports the bulk of their cod imports to the U.S. and Europe. Cod sent to Japan and Europe is reprocessed and consumed in those regions. Some H&G product distributed to domestic U.S. market is thawed and filleted and sold thawed without refreezing, known as the refresh market. Other U.S. processors create fillet blocks to produce breaded or coated sticks and portions.

Fillets

Alaska processors produced 16,538 mt of cod fillets in 2017, worth $127 million. Most Alaska cod fillets are packaged as shatterpacks, consisting of frozen fillet blocks with individual fillets separated by plastic sheets, making them easier to separate without the need for the entire block to be thawed.

Key Market Analysis

Head and Gut

In 2017, Alaska Pacific cod H&G exports totaled 86,043 mt, representing 96 percent of Alaska's cod exports (Table 7.15).[10] H&G exports have been relatively stable in recent years, though 2017 saw a decrease of 12 percent over 2016, primarily due to reduced harvest levels. China is the largest importer of Alaska's Pacific cod, most of which is reprocessed for export to the U.S. and Europe. In 2017, China imported 47,975 mt of cod from Alaska. The next largest export markets are Japan, Europe, and South Korea.

Table 7.15: Sales of H&G Alaska Pacific Cod to Key Markets (mt), 2013-2017

Market	2013	2014	2015	2016	2017	Pct. of Total (2013-2017)
China*	45,841	55,181	56,419	55,428	46,483	48%
Europe[1]	20,922	17,973	18,619	15,894	13,903	16%
Japan*	10,908	16,338	13,995	13,865	13,914	13%
South Korea*	7,686	5,388	8,939	8,951	7,404	7%
Canada	1,347	1,038	1,237	1,208	1,701	1%
Other Countries	3,473	1,792	2,948	2,595	2,636	2%
Total Exports	**90,178**	**97,711**	**102,157**	**97,940**	**86,043**	**88%**
U.S. (Estimated)[2]	12,760	15,714	17,496	9,169	12,446	12%
Alaska Production	**102,938**	**113,425**	**119,653**	**107,109**	**98,489**	

Notes: Data pertains to primary exports only, does not portray product which may be re-exported to other markets.
* Denotes countries which primarily re-process and/or re-export product to other markets.
1 Europe refers to the major European export destinations: France, Denmark, Spain, Netherlands, Germany, Italy, and Portugal.
2 Estimated based on annual production less calendar year exports.

Source: AKFIN, NOAA OST, ASMI Export Database, and McDowell Group estimates.

Fillet

In 2017, Alaska processors produced 16,538 mt of Alaska Pacific cod fillets (single-frozen) worth $127 million (Table 7.16). The vast majority of this production is sold into the U.S. domestic market. The rest is exported, with China the largest single export market in recent years. In 2017, cod fillets made up 4 percent of the value of Alaska's cod exports, down from 12 percent in 2010. The period 2010 to 2013 saw South Korea and Japan shift fillet demand to H&G and substantial declines in demand from Portugal and Spain.

[10] ASMI Export Database. Some cod exports are comingled with other fish and not distinguishable by species in export data, including fish meal, organs, and other ancillary products. H&G represent 96 percent of distinguishable cod exports.

Table 7.16: Sales of Alaska Pacific Cod Fillets to Key Markets (mt), 2013-2017

Market	2013	2014	2015	2016	2017	Pct. of Total (5-yr. Avg.)
China*	852	759	1,489	1,017	1,491	7%
Canada	1,004	588	796	731	595	5%
Portugal	201	80	507	188	586	2%
Spain	25	63	117	114	289	1%
South Korea	0	66	42	58	57	0%
Other	439	576	313	289	158	2%
Total Exports	**2,521**	**2,132**	**3,264**	**2,397**	**3,176**	**16%**
U.S. (Estimated)[1]	15,975	16,136	9,403	15,502	13,362	84%
Alaska Production	**18,496**	**18,268**	**12,667**	**17,900**	**16,538**	

Notes: Data pertains to primary exports only, does not portray product which may be re-exported to other markets.

* Denotes countries which primarily re-process and/or re-export product to other markets.

[1] Estimated based on annual production less calendar year exports.

Source: AKFIN, NOAA OST, ASMI Export Database, and McDowell Group estimates.

United States The U.S. is by far the most important market for Alaska's single-frozen Pacific cod fillets, purchasing 74 to 88 percent of Alaska production over the last five years and absorbed 13,362 mt in 2017 (Table 7.17). The U.S. also imported 74,022 mt of cod in 2017 (Pacific and Atlantic cod combined), valued at $513.7 million. Of this, frozen fillets accounted for 75 percent of import volume. China comprises the majority import market with 79 percent of U.S. cod fillet import volume (2017), much of the remainder are Atlantic fillets from Iceland.

Table 7.17: Total Cod Imports into U.S. Market, Volume and Value, 2013-2017

	2013	2014	2015	2016	2017	Pct. Change YoY 2017
Volume (mt)	59,850	66,495	67,757	70,670	74,022	4.7%
Value ($millions)	$341.46	$393.02	$430.70	$465.97	$513.73	10.2%
Value/kilo ($)	$5.71	$5.91	$6.36	$6.59	$6.94	5.3%

Source: NOAA OST.

China China imports H&G cod (both Pacific and Atlantic) as raw material for reprocessing into twice-frozen fillet blocks, frozen portions, and value-added products such as battered or breaded portions. In 2017, Alaska exported 47,975 mt of cod to China, representing 35 percent of Alaska cod production volume and 24 percent of China's total cod imports (Atlantic and Pacific cod) (Table 7.18).

Double-frozen Chinese-produced cod fillets (Pacific and Atlantic cod) are reexported to the rest of the world, with the U.S., Europe, and Canada being the largest markets. Other markets for Chinese cod include countries like Japan and Brazil. Due to present trade disputes with China and the risk of escalating tariffs on cod products reprocessed in China, there is the risk of dramatic supply chain disruptions in 2019 and beyond.

Table 7.18: Primary Export Markets for Chinese Twice-Frozen Cod Fillets (mt), 2013-2017.

	2013	2014	2015	2016	2017	Percent Change, 2013-2017
U.S.	38,899	44,756	43,369	44,384	46,985	21%
U.K.	20,705	24,634	20,767	20,218	20,769	0%
Germany	12,220	16,232	15,269	15,711	15,038	23%
Spain	8,223	11,710	11,081	11,462	10,732	31%
France	5,643	5,943	6,085	7,230	8,378	48%
Canada	4,568	4,918	4,654	6,945	8,001	75%
Sweden	4,691	6,831	6,393	5,908	5,949	27%
Japan	3,735	3,579	3,182	3,234	3,168	-15%
Netherlands	4,083	3,183	2,430	2,816	2,512	-38%
Other	15,525	16,833	13,644	13,923	11,257	-27%
Total	**188,292**	**138,619**	**126,874**	**131,831**	**132,789**	**-29%**

Notes: Figures may not sum due to rounding.

Source: Global Trade Atlas.

Japan & South Korea Japan and South Korea are also important markets for Alaska H&G cod. In 2017, 14,247 mt of Alaska cod products were exported to Japan and 7,460 mt were exported to South Korea (Table 7.19). Due to its role in warehousing and reprocessing, it is unclear how much H&G cod exported to South Korea remains in the country for domestic consumption. Both Japan and Korea are consumers of cod byproducts, including roe and cod milt.

Table 7.19: Alaska Pacific Cod Export Volume to Major Asian Markets (mt), 2013-2017.

Export Market	2013	2014	2015	2016	2017
Japan					
Fillet	59	46	50	15	36
H&G	10,751	16,289	13,995	13,853	13,866
Other	311	236	69	219	345
South Korea					
Fillet	0	66	42	58	57
H&G	7,686	5,343	8,916	8,951	7,404
Other	275	82	2,143	0	0
Grand Total	**19,083**	**22,061**	**25,216**	**23,097**	**21,707**
Pct. of Alaska Cod Exports	**20%**	**21%**	**23%**	**23%**	**24%**

Source: ASMI Export Database.

Europe In 2017, approximately 18 percent of Pacific cod exports from Alaska were directly exported to the European market, down from 23 percent in 2013 and 40 percent in 2010 (Table 7.20).[11] This is due largely to the decline in exports to Portugal, Norway, and the Netherlands resulting from the dramatic increase in Atlantic cod harvests during this period. Nevertheless, Europe is

[11] ASMI Seafood Export Database

still an important end-market for Alaska's cod and while direct exports may represent a modest percentage of the total, a great deal of Alaska's cod is routed through China or South Korea before being sold into Europe.

The EU protects its domestic cod producers by maintaining higher duties on imported cod fillets, whereas frozen H&G cod can generally be imported into the EU with no tariff. Therefore, Alaska exports relatively little fillet production to the EU.

Table 7.20: European Imports of Cod Fillets from Major Producers (mt), 2015-2017.

Exporter	2015	2016	2017
China*	70,312	72,257	70,485
U.S. (Alaska)	721	513	959
Russia	26,652	25,503	42,567
Iceland	25,762	36,344	32,475
Norway	10,024	9,178	9,251
Total	**133,471**	**143,795**	**155,737**

Notes: Totals may not sum due to rounding. * Denotes re-exporter.

Source: Global Trade Atlas and ASMI Export Database.

Competing Supply

The two main species of cod, Pacific cod (*Gadus macrocephalus*) and Atlantic cod (*Gadus morhua*), are found in the northern hemispheres of the Atlantic and Pacific Oceans. While there are some slight differences, as *Gadus* whitefishes, they are considered almost identical substitutes for each other. In 2016, it is estimated that 477,387 mt of Pacific cod and 1,329,450 mt of Atlantic cod were harvested globally, with some of the largest Atlantic cod harvests coming from the Barents Sea (Figure 7.12). After years of supply increases, quotas in Alaska and Europe are below their peaks and projected to decline further in coming years, buoying prices. This trend is also reinforced by decreases in the haddock quota, which competes with cod as a lower-priced alternative. As cod prices have increased due to growing demand and/or supply constraints, pollock, the largest single species fishery in the world, has also served as a substitute for cod.

7.4. Sablefish Market Profile

Sablefish (*Anoplopoma fimbria*), also known as black cod, is a premium whitefish with a high oil content and delicate texture. Sablefish are among the most valuable species harvested in Alaska, accounting for 4.9 percent of Alaska groundfish first wholesale value in 2017 and just 0.7 percent of first wholesale production volume. In 2017, Alaska processors produced 6,593 million mt in wholesale sablefish products (nearly all H&G), valued at $123.8 million (Table 7.21). Sablefish has long been prized by Japan, which today remains its primary market. Sablefish has also developed important markets in the U.S., China, Hong Kong, Europe, and the United Arab Emirates, among others.

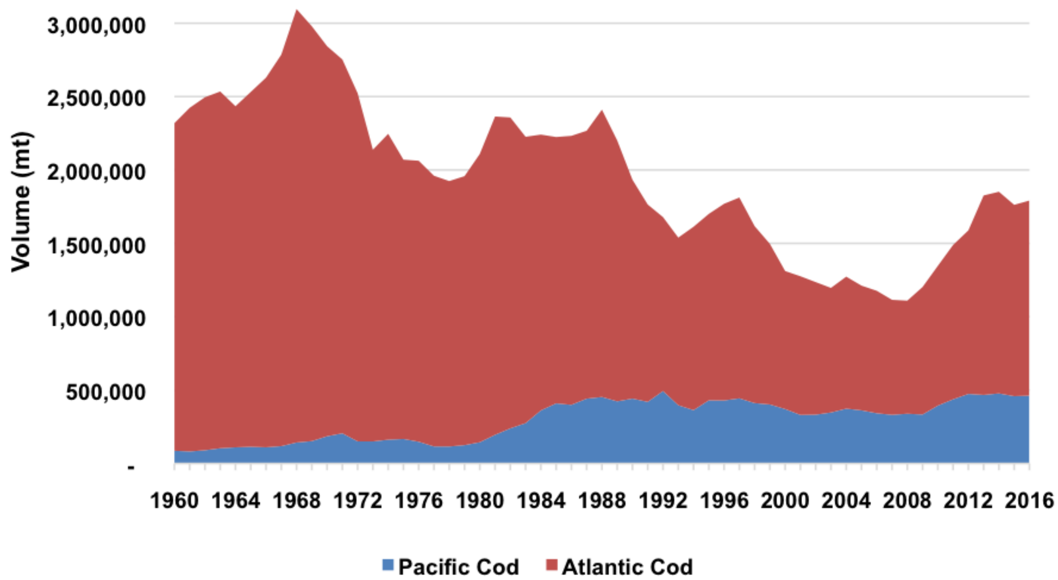

Figure 7.12: Global Supply of Pacific and Atlantic Cod (mt), 1960-2016

Source: FAO.

Table 7.21: Summary Profile of Sablefish Wholesale Production and Markets, 2017

Value and Volume		Key Products	H&G	Other	
First Wholesale Production (mt)	6,593	Pct. of Value	97%	3%	
Pct. of Global Sablefish Harvest (2016)	57%	Key Markets	Japan	Hong Kong	Others
First Wholesale Value ($millions)	$123.8	Pct. of 1st Sales	65%	10%	25%
Pct. Change in Value from 2013-2016	27.5%	YoY Change	21%	-25%	0%
Pct. of Alaska Groundfish Value	4.9%	Competing Species: Patagonia toothfish (Chilean Seabass)			

Product Description

The dominant sablefish wholesale product is IQF frozen H&G (Eastern cut) fish, often sold in 50-pound boxes. Relatively small amounts of heads, collars, fillets, and other products are also produced. Combined, non-H&G production made up just 7 percent of production volume in 2017.

Following harvesting and primary processing, the majority of product is sold as frozen H&G fish to high-volume distributors in Japan and other Asian countries. Product sold into the U.S. domestic market is filleted by primary processors in Alaska or by secondary processors/distributors. Regardless of whether sablefish is exported or sold domestically, it typically passes through one or two distributors before being sold to consumers at the retail level.

Sablefish prices and markets are sensitive to the size of the fish, with larger sablefish worth much more than smaller fish. Wholesale price per pound for the largest fish can be more than double those for smaller fish. Unfortunately, smaller sablefish have become a larger portion of the harvest in recent years – a trend that is expected to continue due to significant recruitment in recent age classes and other factors affecting fish size. Small sablefish are difficult to sell into higher-end export markets, like Japan, but there is a market in China as well as a growing domestic market.

Alaska Sablefish Production

Between 2008 and 2013, first wholesale volume of sablefish products averaged just under 8,000 mt annually (Figure 7.13). Subsequently, production has fallen further due to lower harvest levels, hitting a low of less than 6,000 mt in 2016 followed by a modest rebound in 2017. The value of Alaska sablefish production peaked in 2011 ($147 million) due to exceptionally strong prices and large harvest volumes. After dropping substantially from 2011 levels, the average first wholesale value per mt of sablefish products climbed more than 50 percent from 2013 to 2017, reaching an average value/mt of $18,784 (based on production of 6,593 mt worth $123.8 million).

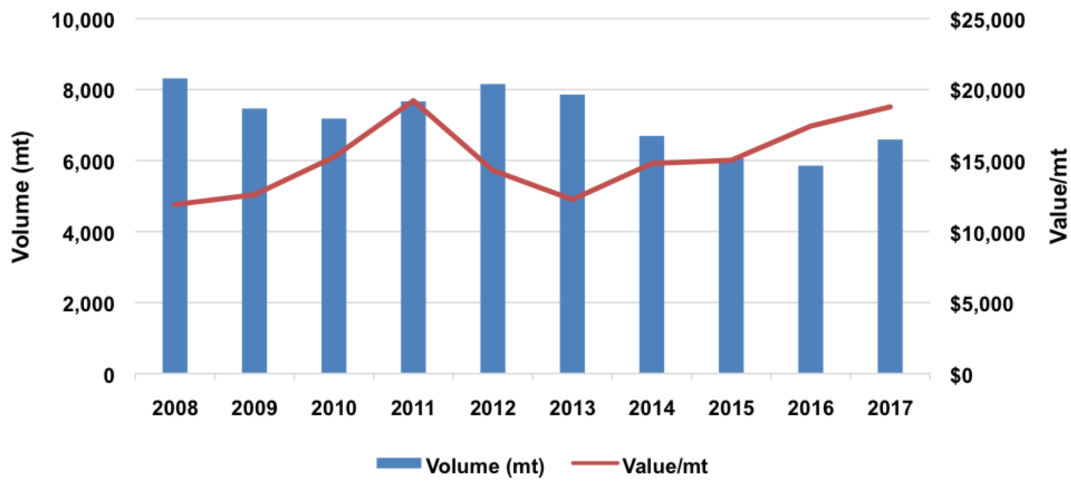

Figure 7.13: First Wholesale Volume and Value of Alaska Sablefish, 2008-2017.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Value ($millions)	$99.0	$94.0	$109.5	$147.4	$116.7	$96.3	$99.1	$91.1	$102.1	$123.8
Volume (mt)	8,315	7,467	7,183	7,667	8,156	7,859	6,696	6,062	5,856	6,593

Source: AKFIN.

Market Profile and Analysis

Japan is the primary market for Alaska's sablefish, generally accounting for 70 to 80 percent of total exports by volume (Table 7.22). China was the second-largest international market by volume in 2017, following several years of growth. However, when measured by value, Hong Kong was the second-most important international market after Japan, a position the country has held for several years. In contrast to Mainland China, which imports a greater volume of lower-value small sablefish for reprocessing, Hong Kong imports a greater percentage of larger fish; these imports serve both Hong Kong foodservice and retail markets as well as re-export markets in Southern China and other SE Asia countries. As a free port, exports to Hong Kong are not subject to Chinese tariffs (though presumably they would be if re-exported to China).

While exports to the Netherlands and the United Arab Emirates are modest, the volume and value of sablefish exports to these countries more than doubled over the 2013 to 2017 period. Other niche export markets exist in similarly wealthy, seafood-eating countries such as Singapore, the U.K., and South Korea.

Table 7.22: Estimated Export Volume and Value of Alaska-harvested Sablefish, 2013-2017.

Country	2013	2014	2015	2016	2017
Export Value ($millions)					
Japan	$62.0	$52.4	$45.8	$44.5	$54.1
Hong Kong	$4.7	$5.1	$7.4	$10.5	$7.9
China	$2.2	$2.4	$5.5	$6.1	$7.6
Netherlands	$0.5	$0.8	$0.7	$1.3	$2.8
United Arab Emirates	$0.8	$1.1	$2.4	$1.5	$2.5
Other	$11.4	$9.8	$12.0	$12.0	$8.0
Total	**$81.6**	**$71.5**	**$73.8**	**$76.0**	**$82.9**
Export Volume (mt)					
Japan	5,893	4,477	4,137	3,374	3,787
China	194	187	353	441	563
Hong Kong	340	282	397	490	333
Netherlands	71	68	54	70	151
United Arab Emirates	57	57	117	68	112
Other	837	637	840	731	486
Total	**7,391**	**5,710**	**5,898**	**5,174**	**5,432**

Source: ASMI Export Database.

Japan The primary market for sablefish is Japan, a country that pioneered the commercial harvest of the species in Alaska. The Tokyo Central Wholesale Market plays an important role in sablefish markets.[12] Between 1987 and 2013, an estimated 37 percent of Japan sablefish imports (from all countries) were sold at this market. Prices observed at the Tokyo Central Wholesale Market function as a price index, impacting sablefish values globally. The United States is the primary supplier of sablefish to the Japanese market, accounting for 91 percent of imports between 2012 and 2017; Canadian supply accounted for the remainder (Table 7.23). Currency rates are an important factor impacting sablefish markets. When the yen is relatively strong against the dollar, Japanese buyers are able to purchase more U.S.-sourced sablefish.

United States The estimated size of the U.S. market for sablefish increased from about 3,200 MT to 7,200 MT between 2013 and 2017, due to increased imports and reduced exports (Table 7.24). Imports grew from 269 MT in 2013 to 1,756 MT in 2017, due to increased supply from Canada. Concurrently, export volume of U.S. sablefish declined as a result of reduced landings, high prices, and a relatively weak yen which affected shipments to Japan.[13]

[12] `https://www.st.nmfs.noaa.gov/Assets/commercial/market-news/sablefishSupplyMarket2014.pdf`

[13] https://www.seafoodnews.com/Story/971116/Near-Record-Prices-for-Sablefish-May-Mean-Much-Lower-Consumption-in-Japan

Table 7.23: Japan Frozen H&G Sablefish Imports, by Major Trade Partner, 2012-2017.

	2012	2013	2014	2015	2016	2017
			Import Value ($millions)			
U.S.	$106.9	$90.3	$87.6	$74.8	$83.8	$86.9
Canada	$11.4	$9.0	$8.9	$11.4	$8.4	$8.9
Total	**$118.2**	**$99.3**	**$96.6**	**$86.2**	**$92.2**	**$95.7**
			Import Volume (mt)			
U.S.	8,324	7,655	6,514	5,749	5,691	5,258
Canada	789	725	668	841	544	481
Total	**9,113**	**8,380**	**7,182**	**6,590**	**6,235**	**5,739**
Import Value/mt	**$12,973**	**$11,850**	**$13,443**	**$13,078**	**$14,793**	**$16,681**
Avg. Yen/USD Exchange Rate	**¥80**	**¥98**	**¥106**	**¥121**	**¥109**	**¥112**

Notes: Volume is in product-weight terms.

Source: Global Trade Atlas and St. Louis Federal Reserve Bank (currency rates).

Table 7.24: Estimated U.S. Sablefish Market Size, in Metric Tons, 2013-2017

Year	Est. U.S. Wholesale Production	U.S. Imports	U.S. Exports	Est. U.S. Market Size
2013	11,609	269	8,670	3,208
2014	10,411	696	6,665	4,442
2015	10,385	1,406	6,664	5,127
2016	9,899	1,747	5,577	6,069
2017	11,140	1,756	5,733	7,163
Five-year Average	**10,689**	**1,175**	**6,662**	**5,202**

Notes: An average recovery rate of 65 percent is used in this analysis.

Source: McDowell Group estimates, based on data from NMFS and AKFIN.

Global Production and Competing Supply

The United States and Canada account for nearly all global production of sablefish.[14] Alaska is the primary supplier, contributing an annual average of 63 percent between 2012 and 2016 (Figure 7.14). Harvest from other West Coast states accounted for 26 percent of global supply. Of these, Oregon was the most important, followed by California and Washington. Canada (British Columbia) contributed 11 percent to global supply between 2012 and 2016.

Patagonia toothfish (*Dissostichus eleginoides)* is the primary competitor with sablefish. The whitefish has a high oil content and is also known as Chilean seabass or *mero* in Japan. Between 2012 and 2016, the global supply of Patagonia toothfish ranged from about 21,700 MT to 25,600 MT. These figures do not include illegal, unreported, or unregulated (IUU) harvests. In the early 2000s, up to half of Patagonia toothfish harvests were estimated to be IUU landings. Although fisheries management has improved, IUU harvests are likely happening today, though at a smaller scale.

[14] Between 2000 and 2016, Russia periodically produced small volumes of sablefish. The highest annual volume for this period was 50 MT harvested in 2002; average annual harvest was 15 MT.

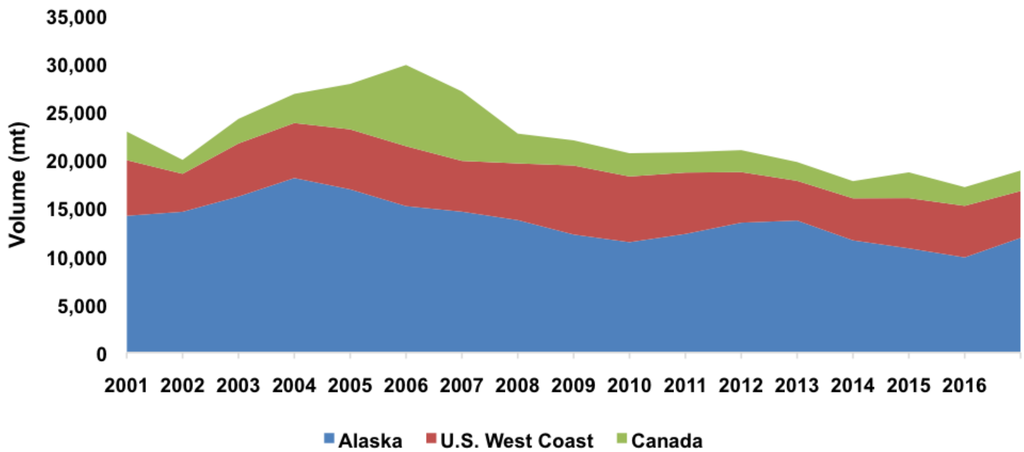

Figure 7.14: Global Supply of Sablefish, in Metric Tons, 2001-2016.
Source: FAO; NMFS OST; AKFIN Production Database.

7.5. Yellowfin sole, Rock sole, Atka mackerel, and Pacific Ocean perch Market Profiles

Alaska's flatfish fisheries for soles and plaice in the BSAI and GOA, while comprised of more than 10 different species, are dominated by three species of sole (yellowfin, rock, and flathead) and plaice; other species harvested in smaller volumes include Greenland turbot, rex sole, butter sole, Dover sole, and starry flounder. Due to the many harvest and market similarities across this group, this section will treat many species with similar market aspects collectively while including additional detail for the four key species. Alaska's flatfish harvests include considerable volumes of Arrowtooth flounder; this species is covered in separate profile and not discussed in detail here.

Yellowfin sole (Limanda aspera) is the most abundant commercial flatfish in the eastern Bering Sea and the world's largest single flatfish fishery by volume, representing 14 percent of the global flatfish harvest. Overall, the species represented 48 percent of the first wholesale value of all Alaska flatfish in 2017 with a first wholesale value of $110.8 million (Table 7.25).[15] The vast majority of this production is frozen H&G product destined for export to China for reprocessing or export to South Korea for reprocessing and domestic consumption.

Table 7.25: Summary Profile of Yellowfin Sole Wholesale Production and Markets, 2017.

Value and Volume		Key Products	H&G	Whole Round	Other
First Wholesale Production (mt)	77,102	Pct. of Value	89%	11%	0%
Pct. of Global Flatfish Harvest (2016)	14%	Key Markets	China	South Korea	Other
First Wholesale Value ($millions)	$110.8	Pct. of 1st Sales	65%	13%	22%
Pct. of Alaska Groundfish Value	4.4%	YoY Change	-20%	-2%	22%
Pct. of Alaska Flatfish Volume	57%	Competing Species: Other flatfish, tilapia, whitefish			

Rock sole (Lepidopsetta polyxystra), the second most abundant BSAI/GOA flatfish by wholesale volume (after yellowfin sole), accounted for 14 percent of the total first wholesale value of Alaska

[15] "Flatfish" includes all comparable BSAI/GOA flatfish species, including arrowtooth flounder and turbot. It does not include Pacific halibut or skate.

flatfish. Alaska is responsible for the vast majority of the global rock sole harvest, producing 20,200 mt in 2017, valued at $31.9 million (Table 7.26). Like yellowfin sole, most of Alaska's rock sole production is exported to China and South Korea, though Japan is also an important export market for females with roe. Rock sole generates a higher unit value per metric ton than yellowfin sole due to export markets for rock sole with roe.

Table 7.26: Summary Profile of Rock Sole Wholesale Production and Markets, 2017

Value and Volume		Key Products	H&G	H&G with Roe	Whole Round
First Wholesale Production (mt)	20,200	Pct. of Value	89%	10%	1%
Pct. of Global Flatfish Harvest (2016)	4%	Key Markets	China	South Korea	Other
First Wholesale Value ($millions)	$31.9	Pct. of 1st Sales	70%	5%	25%
Pct. of Alaska Groundfish Value	1.3%	YoY Change	-1%	-4%	5%
Pct. of Alaska Flatfish Volume	15%	Competing species: Other flatfish, tilapia, whitefish			

Atka mackerel production was valued at $127.8 million in 2017, accounting for 5 percent of the first wholesale value of all Alaska groundfish (Table 7.27). Production value in 2017 was double that of the previous four-year average thanks to a 27 percent increase in harvest volume over 2016 combined with high value/mt nearly equal to the all-time high in 2015. Alaska produced 54 percent of global Atka and Okhotsk mackerel harvests in 2017, and nearly all production was exported to Japan, China, or South Korea as a frozen H&G product. Final consumer products include split/salted and surimi and is largely consumed in Japan, Korea, and China. This market profile summarizes production and markets for Alaska's Atka mackerel fisheries.

Table 7.27: Summary Profile of Atka Mackerel Wholesale Production and Markets, 2017.

Value and Volume		Key Products	H&G	Other	
First Wholesale Production (mt)	42,231	Pct. of Value	91%	9%	
Pct. of Global Harvest (2016)	54%	Key Markets	Japan	China	Korea
First Wholesale Value ($millions)	$127.8	Pct. of Final Sales	58%	14%	9%
Pct. Change in Value from Prior 4-yr Avg.	100%	YoY Change	-16%	-3%	0%
Pct. of Alaska Groundfish Value	5%	Competing Species: Okhotsk Atka mackerel			

Atka mackerel is a key species for Alaska's Amendment 80 fleet, which also targets high volume flatfish (sole/flounder) and rockfish (including Pacific Ocean perch). Atka mackerel accounted for 29 percent of the combined wholesale production value of these target species in 2017.

Pacific Ocean perch (*Sebastes alutus* – also known by the acronym POP) is the most abundant rockfish species in Alaska, comprising 81 percent of all Alaska rockfish production in 2017. Overall, POP represented 2.6 percent of the first wholesale value of all Alaska groundfish in 2017 (Table 7.28). About eighty percent of Alaska's POP is exported to two countries – China (for processing) and Japan (the species' largest consumer market). Alaska POP accounted for 21 percent of global rockfish harvests in 2016. This market profile summarizes production and markets for POP fisheries in Alaska.

POP is a key species for the Amendment 80 fleet, which also harvests high volume flatfish (sole/flounder), Atka mackerel, and other rockfish species. POP accounted for 11 percent of the combined wholesale value of production by the Amendment 80 fleet in 2017.

Table 7.28: Summary Profile of Pacific Ocean Perch Wholesale Production and Markets, 2017.

Value and Volume		Key Products	H&G	Whole	
First Wholesale Production (mt)	26,000	Pct. of Value	91%	9%	
Pct. of Global Rockfish Harvest (2016)	21%	Key Markets	China	Japan	South Korea
First Wholesale Value ($millions)	$64.2	Pct. of Final Sales	53%	30%	5%
Pct. Change in Value from Prior 4-yr Avg.	11.3%	YoY Change	-26%	25%	-20%
Pct. of Alaska Groundfish Value	2.6%	Competing Species: Redfish and other rockfish species.			

Key Market Analysis

China Alaska soles and plaice require hand processing, which is labor-intensive. Due to lower labor costs, China is responsible for reprocessing most Alaska-caught flatfish, with yellowfin and rock sole providing the largest volume. Approximately 80 percent of all China's flatfish exports go to Europe, Japan, and the United States. As China's economy has grown, an increasing number of sole has remained in the domestic market.

Though not reflected in 2017 trade statistics, 2018 has brought a great deal of uncertainty to Alaska's flatfish industry due to its dependence on China and the tariffs and trade disputes between China and the U.S. At this time, the uncertainty surrounding tariffs or other intensifications in a U.S.-China trade dispute has already caused supply chain disruptions, with more U.S. flatfish being processed in the U.S., Poland, and other parts of Southeast Asia. As approximately 25-35 percent of Alaska flatfish product that is exported to China returns to the U.S., many custom-processors of flatfish for the U.S. have been actively looking for new markets and switching to Russian or other non-Alaska product.[16]

From 2015 to 2017, exports to China accounted for 53 percent of all POP production. This includes a strong 2016 when 60 percent of production went to the Chinese wholesale market. Virtually all POP and other rockfish exported to China consists of frozen whole or H&G fish, which is filleted, and re-exported.

Japan Though most Alaska flatfish exports are directed at China, Japan is an important export market, importing 5 percent of Alaska's rock sole production volume in 2017, primarily females with roe intact. Japan, as the largest flatfish export market for China, also imports a great deal of Alaska flatfish reprocessed in China, particularly rock sole roe and flatfish kirimis.

Japan is the largest consumer market for POP. Depending on the product form demanded, importers buy frozen fish from Chinese (fillets) or Alaska (H&G/whole) processors and distribute the product to retailers or food service establishments. Direct exports from Alaska to Japan generally represent a quarter to a third of all Alaska production. Alaska is Japan's largest rockfish/redfish supplier, both in direct terms and product routed through China. Europe is the second largest supplier, followed by domestic production and Russian imports.

The majority of Alaska's Atka mackerel is exported to Japanese markets. Retail wholesale Atka mackerel prices have risen due to declining harvests in Japan. While declining harvest trends in

[16]Per seafood industry representative, 2018.

Japan put Alaska in a better market position, Japanese consumers are extremely flexible when it comes to substituting seafood species. For surimi producers – which historically have used both Atka and horse mackerel[17] for Japan's domestic surimi production – declining harvests and rising prices have already prompted Japanese surimi producers to substitute Atka mackerel with other species for surimi production.

US & Europe The U.S. and Europe consume a large amount of flatfish, much of it processed in China. Both end markets consume sole, plaice, and flounder (often commingled and sold as "flounder" or "sole") in fast food restaurants as well as in grocery stores in the frozen aisle. The U.S. remains China's second largest export market for flatfish, receiving 17,976 mt of flatfish valued at $92.5 million in 2017, an increase of 11 percent over 2015 value.[18]

In Europe, key export markets include the Netherlands, France, Spain, Poland, and Germany, all of which have a seafood processing sector that could further transform and distribute flatfish products across Europe. While Alaska is very dependent on China for reprocessing its flatfish harvest, both the U.S. and Europe have access to other sources of flatfish from across the globe and are thus not fully dependent on China for flatfish products. The EU produces large volumes of competitor species of flatfish that are consumed domestically and exported to the U.S. The U.S. also imports a large volume of flatfish from Canada.

Competing Supply

Global flatfish supply has remained fairly constant over the past two decades after declining significantly from harvest levels attained in the 1980s that exceeded 1.2 million mt annually. In contrast, Alaska's contribution to global production of flatfish has grown steadily from tiny volumes in the 1980s. Alaska flatfish continue to compete with species such as European plaice and dabs, and have remained popular for use in frozen meals and as frozen fillets/kirimis in the U.S., Japan, and Europe. Competition comes from fresh flatfish as well as from fresh/frozen whitefish like tilapia, pangasius, pollock, and cod, among others.

Alaska accounted for 42 percent of global Atka mackerel production between 2014 and 2016, the most recent three years with complete data for global harvest. Historically, Japan is the largest producer but its harvests have declined significantly since 2008 - down 90 percent through 2016.

Global rockfish (including POP and other *Sebastes* species) harvests averaged 218,372 mt from 2012 to 2016 and increased roughly 20 percent over the period. Europe is the largest redfish/rockfish producer, accounting for just over half (52 percent) of total production in 2016. Alaska POP accounted for one-fifth (21 percent) of global rockfish production in 2016, and 88 percent of all rockfish production in the United States.

[17]"Horse mackerel" is a generic name given to a range of species, predominantly from the Carangidae (jack mackerels and scads) family. Fish included in the *Trachurus* (including Atlantic horse mackerel) and *Caranx* genera encompass most of the horse mackerel category.

[18]Global Trade Atlas

8. AMENDMENT 91 CHINOOK BYCATCH ECONOMIC DATA REPORT (EDR) SUMMARY AND ANALYSIS

8.1. Introduction

Amendment 91 (A91) to the BSAI Groundfish Fishery Management Plan was developed by the North Pacific Fisheries Management Council (NPFMC or Council) as a suite of measures intended to promote a system of incentives to minimize bycatch of Chinook salmon in the Bering Sea/Aleutian Islands (BSAI) pollock trawl fishery, primarily established through private contractual arrangements between industry entities participating in the American Fisheries Act (AFA) management program. The Council finalized A91 in 2009, and the final rule was issued by NMFS in 2010 (75 FR 53026 and became effective in September, 2010.[1] The Council subsequently passed a trailing amendment identifying several new recordkeeping and reporting requirements for AFA participants specifically intended to support monitoring and assessment of incentive measures under A91 and industry costs associated with its implementation.

The purpose of this Section of the Economic SAFE is to report detailed results from data collected for the 2012-2017 fishing seasons. The following is intended to contribute information to enable the public, the Council, industry, and other stakeholders to better understand and analyze the impacts of Amendment 91. A general report on A91 implementation is beyond the scope of this report, however, which is limited primarily to summary and synthesis of data collected to-date in the A91 EDR. This information should be viewed in the context of recent Council analyses and other relevant resources, including Chinook catch information and the AFA Cooperative and Incentive Plan Agreement (IPA) reports, and the Council's recent AFA Program Review (Northern Economics, 2017).[2]

8.2. Amendment 91 Economic Data Report (EDR) Background

In developing Amendment 91, the Council determined that fisheries data available through existing sources would be insufficient to adequately monitor the implementation of management measures under the amendment. The Council subsequently recommended a data collection program to supplement existing data and support analysis of the effectiveness of Amendment 91 in reducing Chinook salmon PSC and to assess any changes in operational costs and/or the yield of pollock. The Council's December 2009 purpose and need statement recommended that these data be used to address four components of Amendment 91:

- Understand the effects and impacts of the Amendment 91 IPAs, the higher and lower PSC hard caps, and the performance standard;

[1] An overview of Amendment 91 and other recent and ongoing Council initiatives related to salmon bycatch management in BSAI groundfish fisheries is accessible at https://www.npfmc.org/bsai-salmon-bycatch/.

[2] Council analyses of salmon bycatch in BSAI fisheries are available on the Council's website at https://www.npfmc.org/bsai-salmon-bycatch/. Current and historical Chinook salmon catch information can be found at https://alaskafisheries.noaa.gov/fisheries-catch-landings. AFA Cooperative and IPA Reports are available at https://alaskafisheries.noaa.gov/fisheries-data-reports.

- Evaluate the effectiveness of the IPA incentives in times of high and low levels of salmon PSC, and the effectiveness of the performance standard to reduce salmon PSC;
- Evaluate how Amendment 91 affects where, when, and how pollock fishing and salmon PSC occur; and
- Study and evaluate conclusions drawn by industry in the IPA annual reports.

In its final motion on the trailing amendment on new data collection measures under Amendment 91, the Council recommended new or modified reporting requirements to collect the following:

1. Transaction data for salmon and pollock, including:
    a. IPA and AFA Cooperative reports, summarizing the assignment of Chinook PSC and pollock quota to each participating vessel at the start of each fishing season, and all in-season transfers of Chinook and pollock PSC;
    b. Compensated Transfer Form, to collect the quantity and price of Chinook PSC and quantity of pollock, in all PSC transfers in which there is a monetary exchange for PSC transferred from one party to another;
2. A logbook checkbox, incorporated into exiting AFA vessel logbooks, to collect data at the tow-level regarding movement of the vessel for the primary purpose of Chinook PSC avoidance;
3. A vessel fuel usage survey, to collect average hourly fuel use rates for fishing and transiting as well as quantity and cost of annual fuel purchases to be used to estimate costs of vessels moving to avoid salmon PSC; and
4. A vessel master survey, to determine rationale for decision making during the pollock season (fishing location choices and salmon PSC reduction measures).

Daily Fishing Logbook and AFA Cooperative Report requirements predate Amendment 91, and annual submission of IPAs and IPA Annual Reports were required under the final rule implementing the amendment, in effect since September, 2010. In the Council's final action on the EDR program in 2009, modifications of these (items 1.a and 2 above) were included in addition to the new data collections that comprise the A91 EDR itself (items 1.b, 3, and 4). Modification of the Daily Fishing Logbook (DFL) for BSAI pollock trawl CVs and CPs was intended to identify instances when a vessel fishing for pollock in the BSAI changed fishing locations for the primary purpose of avoiding Chinook salmon PSC. However, vessel movement data collected to-date from CV's is not captured in an electronic database available to analysts, and data reported by CPs has varied greatly in coverage; as such, vessel movement data is not included in this report.[3]

The final rule to implement the above measures went into effect March 3, 2012, and administration of the A91 EDR began in 2013, with a June 1 due date for submission of annual EDR forms reporting data for 2012 operations.[4] The EDR program is comprised of three separate survey forms; submission requirements for the respective forms are contingent on the entity's role and activity in

[3]See this section of the 2017 edition of the Economic SAFE for further details regarding implementation and data quality concerns regarding the A91 EDR and associated reporting requirements.

[4]See **77 FR 5389** (February 3, 2012) for details.

the AFA pollock fishery in a given year, as defined under Amendment 91, and include conditions for certification-only submission with exemption from data reporting portions of respective EDR forms. Requirements are as follows:

- Compensated Transfer Report
  - Certification: An owner or leaseholder of an AFA-permitted vessel and the representative of any entity[5] that received an allocation of Chinook salmon PSC from NMFS must submit a CTR, Part 1, each calendar year, for the previous calendar year.
  - Fully completed CTR: Any person who transferred Chinook salmon PSC allocation after January 20, and paid or received money for the transfer, must submit a completed CTR (Part 1 and Part 2) for the previous calendar year.

- Vessel Fuel Survey
  - An owner or leaseholder of an AFA-permitted vessel must submit all completed Vessel Fuel Surveys for each vessel used to harvest pollock in the Bering Sea in a given year.

- Vessel Master Survey
  - For any AFA-permitted vessel used to harvest pollock in the Bering Sea in the previous year:
    * The vessel master must complete the Vessel Master Survey and the Vessel Master certification following the instructions on the form, and
    * An owner or leaseholder must submit all Vessel Master Surveys and each Vessel owner certification following the instructions on the form.

8.3. Overview of the Annual Amendment 91 EDR Data Submission Process

The Amendment 91 EDR program is managed primarily by the Alaska Fisheries Science Center (AFSC), with support from NMFS Alaska Region, and is administered in collaboration with Pacific States Marine Fisheries Commission (PSMFC). In consultation with NMFS staff, PSMFC annually identifies current contact information for all AFA entities determined to be subject to A91 EDR reporting requirements for the prior year, and distributes notices by certified mail describing the requirements for EDR submission and instructions for accessing the online survey forms using secure login credentials enclosed. Notices are mailed for delivery by April 1 when PSMFC's EDR web portal goes online,[6] with a final submission deadline of June 1. During the EDR submission period, PSMFC staff provides phone support to submitters and monitors form completion and data quality;

[5] In addition to AFA vessel owners, entities potentially receiving allocations of Chinook salmon prohibited species catch (PSC) include AFA Sector entities and Inshore harvest cooperatives, Incentive Plan Agreement (IPA) entities, and CDQ groups. For the sake of clearer exposition, "vessel owners or leaseholders" as a group are referred to collectively as "vessel owners" hereafter in this report, except where a relevant distinction pertains.

[6] A91 EDR forms are required under implementing regulations to be submitted in electronic form. PSMFC has developed an EDR Web portal to facilitate password-secured access to EDR webforms for completion and submission online. Printable EDR forms and instructions for online submission can be accessed at `http://www.psmfc.org/chinookedr/`. Copies of all mailings distributed to EDR submitters by AFSC or PSMFC are available on request from the AFSC Economics and Social Science Research Program.

where data anomalies are identified, PSMFC contacts the submitter to confirm data corrections as appropriate. All A91 EDR data collection procedures for the 2012-2017 fishing years have been completed. Table 8.1 below shows counts of EDR submissions by year, reported separately for vessel owners and AFA entities (which include AFA Incentive Plan Agreement entities, AFA Sector Entities and Harvest Cooperatives, and CDQ groups)), and Table 8.2 reports the number of completed fuel survey and vessel master survey records collected to date, by vessel sector. Note that counts of *EDRs - data submitted* shown for vessel owners in Table 8.1 are substantially fewer than the counts of completed fuel and vessel master surveys shown in Table 8.2; this is due to the flexibility vessel owners have in using PSMFCs EDR web portal to consolidate reporting for one or more vessels onto a single EDR 'package', and the decline in number of *EDRs - data submitted* from 2012 to 2017 reflects increased use of this functionality by individuals that complete and submit EDR forms for multiple vessels. Note that the fuel survey counts shown in Table 8.2 indicate the number of vessels for which fuel survey data was reported each year (i.e., one record per vessel); the higher counts of vessel master surveys reflect cases where two or more individual skippers submitted a vessel master survey for the same vessel, with the number of surveys per vessel declining over time (also note that *Master Survey Count* includes all vessel master surveys submitted, including those that did not provide complete responses to all questions in the survey.)

8.4. Vessel Master Survey Overview and Key Findings

The vessel master survey is comprised of a series of qualitative response questions regarding fishing and bycatch conditions observed by vessel masters during the BSAI pollock fishery, and factors in effect that motivated Chinook bycatch avoidance (survey questions are listed below):[7]

1. *If the vessel participated in an Incentive Plan Agreement, did the IPA affect your fishing strategy? If yes, please describe and discuss what incentives had the largest impact on your strategy.*
2. *Did the amount and/or cost of Chinook PSC allocation available to the vessel lead you to make changes in pollock fishing operations? If yes, please describe.*
3. *How would you compare the Chinook salmon bycatch and pollock conditions during the A and B seasons this year relative to the last two years? Please describe any unique aspects of the season.*
4. *Did Chinook salmon bycatch conditions cause you to delay the start of your pollock fishing or otherwise alter the timing of your pollock fishing for some period during the past A and/or B season? If yes, please describe the Chinook salmon bycatch condition, when it occurred, and any change in your pollock fishing as a result.*
5. *In the past year, did you end a trip and return to port early because of Chinook salmon bycatch conditions? [ ] YES [ ] NO. If YES, please indicate the number of trips that this occurred in each season (use a checkmark to indicate appropriate answer for each season).*
6. *Please describe how any area closures or restrictions for the purpose of reducing Chinook salmon bycatch affected where and how you fished.*

[7] The vessel master survey was designed under Council direction and approval after being requested as a data element by a principle pollock industry trade group, and survey questions were designed with extensive input from the pollock industry.

7. *Please describe how any regulatory or other area closures or restrictions for a purpose other than reducing Chinook salmon bycatch affected where and how you fished.*

8. *Compared to a typical year, did weather or sea ice conditions have more, less or about the same impact on fishing as in a typical year? Please describe especially if there were particularly uncommon conditions at any point this year. If these conditions had an impact on your ability to avoid Chinook salmon bycatch, please describe.*

9. *Were there exceptional factors that affected your pollock fishing this year? For example, were there unusual market or stock conditions, unusual pollock fishing conditions, or maintenance problems? Please describe.*

10. *Separate from an Incentive Plan Agreement, were there other incentives for you to reduce Chinook salmon bycatch? If yes, please describe.*

11. *Did actual or potential bycatch of species other than Chinook salmon cause you to change your harvesting decisions during the pollock season? If yes, please describe.*

An extensive, formal qualitative analysis of survey response data for the years 2012 through 2016 was reported in the 2017 edition of the Economic SAFE Report, survey responses are summarized for the 2012-2017 fishing years. Survey data were analyzed with a grounded theory approach, meaning codes were created based on verbatim statements of respondents (Glaser and Strauss 1967), and frequency statistics were calculated using coded responses for each question. Resource requirements for performing the formal qualitative analysis prohibit annual application, and has not been completed to fully update results to include vessel master survey data for the 2017 fishing year. An informal review of 2017 survey data was performed to identify notable responses that characterized the 2017 pollock fishery distinct from pervious years. These are summarized below, followed by key findings from the formal analysis of survey responses for 2012 to 2016.

Notable findings from the vessel master survey for 2017 include:

- There were few notable differences in reported experiences from last year's SAFE report for the 2016 fishing year.
- Skippers mentioned Steller sea lion rookery closures more frequently than in previous years.
- As in recent years, many skippers noted that Chinook were more difficult to avoid in the A Season.

Key findings from the vessel master survey for 2012-2016, include:

- The Chinook salmon hard cap, rather than IPA, is viewed as the biggest incentive for avoiding salmon bycatch. For the inshore and mothership sectors, salmon saving credits were initially reported as an important incentive in 2012, but reporting of the importance of this incentive declined over the 2012-2016 period.
- Respondents identified many other incentives other than the IPA plan. The most common response was that operators felt a personal or moral obligation to avoid salmon bycatch. Many respondents stated that this was simply the right thing to do and that they took pride in ensuring their bycatch was minimal.

- Operators are reporting that they are increasingly risk adverse in regards to catching salmon. Many of the strategies for avoiding salmon are associated with increased operating costs such as traveling further and fishing in less productive or lower-value areas.
- Respondents increasingly emphasize the role of information sharing and communication as a primary means of reducing salmon bycatch.
- Operators typically are cautious in starting the A season to avoid Chinook in a period when bycatch can be very high, and start the B season as soon as possible to complete their fishing before the fall when more Chinook are present on the fishing grounds.
- Closures (rolling hotspot and other fixed closures) are often associated with increased travel and operating costs; many vessels report avoiding hotspot closures even if they do not apply to them in order to avoid those identified high-salmon areas.
- Other than Chinook, chum salmon is the most likely species that vessels report alters their fishing strategy.
- Most vessel operators stated that they did not experience any exceptional factors that affected their fishing season for any given year (2012-2016) when they were prompted to explain any unusual circumstances. The exceptional factors that were reported had to do with fishing and/or stock conditions. For example, several respondents complained that there were greater populations of smaller pollock on the fishing grounds; this seemed to be particularly problematic for the CV sector in 2015. Also, squid closures, and to a lesser extent herring closures, emerged as a significant factor impacting fishing in the 2015 B season in the CV sector.

8.5. Vessel Fuel Survey: Summary and Results

Vessel operators are required to report the total annual quantity of fuel loaded onto the vessel, the total cost of that fuel, and the average annual rates of fuel consumption while fishing and transiting while engaged in the pollock fishery. Fuel survey data reported for all catcher vessels and catcher-processors active in the 2012-2017 Bering Sea AFA pollock fishery are summarized in Table 8.3 below.

The fuel use results indicate a slight decline in average hourly fuel consumption rates among catcher vessels during 2017, to 74 gallons per hour (gph) while fishing and 50 gph while transiting (both within the range of variation observed in previous years of reporting). Average fuel consumption rates among catcher/processors have been much more variable over the 2012 to 2017 period, with consumption rates for fishing and transiting activity reported for 2016, 297 gph and 282 gph, respectively, both rising to the highest levels observed over the previous four years. During 2017, the CP sector's average rate for fishing activity declined to 285 gph (approximately equal to the average over the sector's rates reported for 2012 through 2015), while CP average fuel rate for vessel transiting increased for a third year, to 288 gph, the highest value reported to-date, and exceeding the average fuel rate reported for 2017 fishing activity. Average annual fuel use and cost for both sectors increased substantially during 2017. In the CP sector, the average quantity of fuel purchased during 2017 increased by 13% to 1.57 million gallons per vessel, the highest quantity reported to-date, while average fuel cost reported for the year increased by 30% from 2016, to $3.3 million. Annual fuel quantities and costs during 2017 saw smaller relative increases in the CV sector, with average gallons per vessel increasing from 2016 by 3% to 120 thousand, and cost per vessel increasing by 16% to $264 thousand. Note that average fuel cost per gallon in each sector can be calculated from fuel survey data (not shown in table), and indicate that average fuel price paid by the CV sector is consistently higher than that paid by the CP sector, with annual average price difference ranging from 10 to 50 cents per gallon, with fuel price paid in the CV sector 17% higher averaging over results reported for 2012 to 2017.

8.6. References

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Table 8.1: Amendment 91 - EDR Submissions (consolidated)

Year	EDRs certified		Certification-only EDRs		EDRs - data submitted		CTR forms completed	
	AFA Entities	Vessel Owners	AFA Entities	Vessel Owners	AFA Entities	Vessel Owners	AFA Entities	Vessel Owners
2012	16	118	16	33	0	85	0	0
2013	16	109	16	24	0	85	0	0
2014	17	103	17	28	0	75	0	0
2015	13	85	13	23	0	62	0	0
2016	13	84	13	19	0	65	0	0
2017	14	82	14	21	0	61	0	0

Notes: The A91 EDR "certification" requirement specified in 50 CFR 679.65(b)(1) encompasses all AFA vessel owners and the designated representatives of all Amendment 91 Incentive Plan Agreements, AFA Sectors, AFA Inshore Harvest Cooperatives, and CDQ groups that receive BSAI pollock allocation: "An owner or leaseholder of an AFA permitted vessel and the representative of any entity that received an allocation of Chinook salmon PSC from NMFS must submit a CTR, Part 1, each calendar year, for the previous calendar year". Using contact information maintained by NMFS Alaska Region, Pacific State Marine Fisheries Commission (PSMFC, acting as NMFS EDR Data Collection Agent) annually distributes notices to all persons subject to the certification requirement, with instructions for submitting an A91 EDR online using an assigned EDR userid and password. Counts of 'EDRs certified' represent the number of EDR userids assigned to vessel owners and AFA entities that were used to complete the A91 EDR certification requirement for each year. Counts of 'Certification-only EDRs' represent the subset of certified EDR submissions for which no completed EDR data forms were required, and 'EDRs - data submitted' reports the number of assigned EDR userids for which one or more EDR data forms were completed. As shown under 'CTR Forms Completed', no compensated transfers of Chinook salmon PSC as defined under 50 CFR 679.65(b)(2) have been reported in the Compensated Transfer Report portion of the A91 EDR data collection.

The general decline in EDR submissions from 2012 to 2017, and in particular, between 2014 and 2015, is primarily the result of changes in administrative procedures implemented by PSMFC to reduce duplication and improve efficiency for EDR submitters, and as information on vessel ownership and management roles has improved. While timely submission of all required A91 EDR forms has varied, overall compliance with A91 EDR requirements has not declined over time, and instances of non-compliance encountered have been incidental and generally resolved with clarified communication. See Fuel Survey counts below for the number vessels for which Vessel Fuel Survey forms have been completed, which been relatively constant from 2012 to current.

The decline in 'EDRs - data submitted' counts over time largely reflects an increase in consolidated vessel owner EDR submissions, in which data forms for multiple vessels are submitted using a single EDR userid. For each AFA vessel, PSMFC assigns a unique EDR userid that is mailed to the vessel owner, such that multi-vessel owners receive notifications and EDR userids for each vessel that they own. For the sake of convenience, the EDR web portal allows a vessel owner to consolidate and submit Vessel Fuel Survey and Vessel Master Survey form data for one or more vessels using one EDR userid. Unused EDR userids associated with consolidated vessel-owner EDR submissions are excluded in counts of 'EDRs-certified' shown in the table. Note that certification-only submissions cannot be consolidated, as reflected by the relative consistency in 'Certification-only EDRs' counts over time.

From the initial implementation of the A91 EDR for calendar year 2012 through 2014, PSMFC assigned and delivered unique EDR userids to all AFA vessel owners identified in AKRO's vessel owner registry, including the primary managing owner and in some cases one or more secondary, non-managerial owner. As information has improved regarding primary versus secondary owners, PSMFC has limited distribution of EDR notifications to primary owners, and the decline from 118 EDRs certified by vessel owners for 2012 to 85 for 2015 reflects this change. Also note that AFA Mothership owners are subject to A91 EDR requirements under 50 CFR 679.65(b), but are exempt from fuel and vessel master data reporting requirements that are limited to pollock harvesting vessels; voluntary submission of fuel and vessel master surveys by owners of AFA motherships for 2012 to 2014 are included in 'EDRs - data submitted' counts for those years.

Source: Amendment 91 Chinook salmon Economic Data Reports.

Table 8.2: A91 EDR Vessel Fuel Survey and Vessel Master Survey Submissions

	Fuel Survey Count		Master Survey Count	
Year	CP	CV+MS	CP	CV+MS
2012	14	92	17	117
2013	15	89	18	115
2014	15	87	18	107
2015	14	83	17	104
2016	14	87	17	100
2017	14	84	17	99

Notes: Combined counts shown under "CV+MS" in the table includes EDR forms submitted on a voluntary basis for AFA Mothership vessels during 2012 through 2014.

Source: Amendment 91 Chinook salmon Economic Data Reports.

Table 8.3: Vessel Fuel Survey Summary Results

		Vessels	Annual average fuel consumption rate (gallons per hour), mean (sd)		Annual Fuel Use, mean (sd)	
	Year		Fishing	Transiting	Gallons (1,000)	Cost ($1,000)
CP	2012	14	284 (40)	255 (59)	1,168 (181)	$4,481 (634)
	2013	15	290 (70)	249 (83)	1,171 (318)	$4,394 (1,114)
	2014	15	277 (61)	249 (79)	1,396 (395)	$4,911 (1,251)
	2015	14	284 (40)	270 (82)	1,438 (368)	$3,348 (727)
	2016	14	297 (32)	282 (85)	1,393 (378)	$2,587 (734)
	2017	14	285 (29)	288 (65)	1,569 (375)	$3,298 (729)
CV	2012	90	75 (38)	51 (30)	160 (99)	$679 (416)
	2013	87	73 (33)	50 (28)	149 (87)	$615 (357)
	2014	85	74 (34)	51 (27)	143 (74)	$562 (291)
	2015	83	76 (36)	52 (29)	131 (52)	$375 (155)
	2016	87	75 (34)	51 (27)	116 (45)	$232 (87)
	2017	84	74 (34)	50 (27)	120 (53)	$264 (111)

Notes: All dollar values are inflation-adjusted to 2016-equivalent value. Data reported for mothership vessels is excluded from the statistics reported in the table above.

Source: Amendment 91 Chinook salmon Economic Data Reports.

9. BERING SEA/ALEUTIAN ISLANDS NON-POLLOCK TRAWL CATCHER-PROCESSOR GROUNDFISH COOPERATIVES (AMENDMENT 80) PROGRAM: SUMMARY OF ECONOMIC STATUS OF THE FISHERY

This report summarizes the economic status of the Bering Sea and Aleutian Islands (BSAI) non-pollock groundfish trawl catcher-processor fleet (referred to in the following as the Amendment 80 fleet) over the period 2008 through 2017, following implementation of the rationalization program in 2008 under Amendment 80 (Amendment 80) to the Fishery Management Plan for Groundfish of the BSAI Management Area (FMP). This report provides additional detail to supplement information provided elsewhere in the Groundfish SAFE Economic Status Report; a general overview of the program and results of a set of economic performance metrics calculated for the fishery for the period 2005-2007 (the pre-program reference period) and annually for 2008-2017 are provided in the Economic Performance Metrics for North Pacific Groundfish Catch Share Programs section of the report (see especially Figures 11.31-11.40 and accompanying text). In addition, details regarding catch, production, and value of BSAI and Gulf of Alaska groundfish species allocated to Amendment 80 fleet are provided in Section 4 of the Annual Fishery Statistics section.

As a requirement of the Amendment 80 program designed by the North Pacific Fishery Management Council (Council), annual economic reports are submitted to NMFS by vessel owners and QS permit holders, providing detailed data on vessel costs, earnings, employment, quota transfers, and capital improvements. The Economic Data Report (EDR) program is a mandatory annual reporting requirement for Amendment 80 entities, and supplements data provided by in-season monitoring and data collection programs, including eLandings catch accounting and the North Pacific Groundfish Observer program. Beginning with implementation of the Amendment 80 program in 2008, EDR data collection program has collected annual economic census data, with the most recent available data representing results from the 2017 calendar year of operations.[1]

Among the goals of Amendment 80 is improving economic incentives to increase retention and utilization, and reduce bycatch by the commercial catcher-processor (CP) fleet using trawl gear in the non-pollock groundfish fisheries. The structure of the program was developed to encourage fishing practices and use of vessel capital with lower discard rates and to mitigate the costs of increased retention requirements[2] by improving the opportunity to increase the value of harvest species while improving operational efficiency and lowering costs.

The BSAI non-pollock groundfish trawl CP sector is composed of vessel-entities representing the 24 CPs with history of harvesting groundfish in the BSAI, but that did not qualify for inclusion in

[1] The EDR program is managed collaboratively by Alaska Fisheries Science Center (AFSC) and Pacific States Marine Fisheries Commission (PSMFC), with guidance and oversight from the Council. Further information regarding the data collection program, including protocols and results of data quality assessment and controls, is provided in database documentation available from the AFSC's Economic and Social Sciences Research Program (ESSR).

[2] Concurrent with passage of Amendment 80, the Council also developed a groundfish retention standard (GRS) program for Amendment 80 catcher-processors by establishing a minimum retention schedule for the sector, beginning at 65% roundweight retention for 2008, and increasing by 5% increments to 85% for 2011 and subsequent years. Due to high compliance costs for the GRS program, Amendment 80 vessels and cooperatives were granted exemptions to the standard under emergency rule beginning in 2010, and the GRS program requirements were permanently rescinded under Amendment 93 to the FMP (77 FR 59852, October 1, 2012), effective March, 2013.

the rationalization of the CP pollock fishery under the American Fisheries Act. Of the original 24 CPs electing to enroll in the Amendment 80 catch share program, 22 remained operational as of implementation of the program in 2008, and 21 CPs participated in the program that year. Over the first 10 years of the program, three new vessels have entered to replace an original vessel, one each in 2009, 2016, and 2017, and of the 19 vessels participating in the program during 2017, 16 vessels remain of the original fleet.

Species allocated to the Amendment 80 fleet include: Aleutian Islands Pacific ocean perch, BSAI Atka mackerel, BSAI flathead sole, BSAI Pacific cod, BSAI rock sole, and BSAI yellowfin sole. In addition, the Amendment 80 cooperatives and vessels receive allocations of Pacific halibut and crab prohibited species catch (PSC) for use while fishing in the BSAI, and groundfish sideboard limits and halibut PSC for use in the Gulf of Alaska. Amendment 80 allocates the six target species and five prohibited species in the BSAI to the CP sector and allows qualified vessels to form cooperatives. These voluntary harvest cooperatives coordinate use of the target allocations, incidental catch allowances and prohibited species allocations among active member vessels. From 2008-2010, 16 vessels formed a single cooperative (identified as the Best Use Cooperative, renamed Alaska Seafood Cooperative in 2010), with the remainder operating in the limited-access fishery. Since 2011, all vessels are in one of two cooperatives, with the Alaska Groundfish Cooperative being formed with nine member vessels/LLP licenses.

To assess the performance of the fleet under the rationalization program and subsequent changes in fishery management, statistics reported below are intended to indicate trends in a variety of economic indicators and metrics. The reported statistics provide a general overview of fishery performance over time, and are not intended as a rigorous statistical analysis of specific hypotheses regarding economic efficiency or other performance metrics. These generally include changes in the physical characteristics of the participating vessel stock, including productive capacity of vessel physical plant (freezer and processing line capacity and maximum potential throughput) and fuel consumption rates, efficiency and diversification of processing output, investment in vessel capital improvements, operational costs incurred for fishing and processing in the Amendment 80 fisheries and elsewhere, and employment and compensation of vessel crews and processing employees. As noted above, these results complement the analysis presented in the catch share metrics section of the Groundfish Economic Status Report for the Amendment 80 program for the period 2007-2017. The reader is referred thereto for a comparative presentation of trends in the following: aggregate quota allocations, catch, and quota utilization rates; season length; QS ownership and vessel participation; and earnings concentration among participating vessels. The reader is also referred to the Council's Five-Year Review of the program for a more detailed and comprehensive analysis of economic effects of Amendment 80 (Northern Economics, 2014).

In the following tables, annual statistics are reported for Amendment 80 fleet or fishery aggregate total values and median vessel-level values. All monetary values in the report are presented as inflation-adjusted 2017 equivalent U.S. dollars, consistent with data presented in other sections of the Groundfish Economic Status Report. Due to the small number of reporting entities, some results are suppressed to protect the confidentiality of proprietary information, as indicated in tables by the symbol "*", and "-" indicates that no data are available for the tabular value. The total count of non-zero reported values are shown in the tables (under the heading "Obs" or "Vessels"); vessel-level median statistics (calculated over reported non-zero values) is reported to represent the average; arithmetic means for the reported indicators can be derived as needed by users of this report by dividing the aggregate total value shown by either the associated number of non-zero observations, or alternately by the total count of vessels (where different). It should be noted, however, that for many of the reported statistics, the underlying data is highly variable and/or irregularly distributed, such that the arithmetic mean may be a poor representation of the population average value.

9.1. Fleet Characteristics and Production Capacity

Table 9.1 shows fleet aggregate and median vessel values for physical size and capacity of the vessel stock within the active fleet as of 2008-2017. The number of Amendment 80-qualified vessels active in EEZ fisheries in the Bering Sea/Aleutian Islands (BSAI) and Gulf of Alaska (GOA) days increased by one to 19 vessels during 2016 and 2017, having declined to 18 vessels during the three previous years. The initial reduction from 22 active vessels the first year of the program (2008) to 20 in 2012 was due to loss of one vessel at sea (the Alaska Ranger) and the inactivity of the Tremont, which last fished in 2008. In total, five vessels permanently exited the Amendment 80 fleet between 2008 and 2012, all of which were built between 1970 and 1980. Regulations implementing Amendment 97 to the BSAI Groundfish FMP were published and became effective in October of 2012 (77 FR 59852), lifting prohibitions on replacement of Amendment 80 vessels and establishing regulatory requirements and processes for qualifying a replacement for an Amendment 80 vessel and transfer of associated fishing privileges. The first such vessels qualified for entry to the Amendment 80 program during 2016, the Seafreeze America and the Cape Flattery, both owned by United States Seafood and replacing the company's vessels Alliance and Ocean Alaska, which last operated in 2012. The Seafreeze American began active operations during 2016, increasing the active fleet to 19 vessels, however, the Alaska Juris, owned by Fishing Company of Alaska (FCA), sank while underway on the Bering Sea in July of 2016;[3] statistics showing increased aggregate and median physical capacity reported for 2016 are inclusive of both vessels and do not reflect the loss of the Alaska Juris. FCA ceased business operations during 2017 and the company's three remaining vessels and all quota share holdings were acquired by other Amendment 80 entities (vessels Alaska Victory and Alaska Warrior were acquired by Ocean Peace, Inc., and the Alaska Spirit was acquired by O'Hara, Inc.). With entry of F/V Araho (owned by O'Hara, Inc.) in 2017, maintaining the count of vessels at 19, aggregate fleet gross tonnage increased from 2016 to 18,152 tons (+4.6%), while fleet aggregate length overall (LOA) decreased slightly to 3,443 feet.

Table 9.2 displays aggregate and median vessel statistics for physical processing capacity of the active Amendment 80 fleet, including total aggregate and median number of processing lines, number of species and product-types produced, and estimated vessel maximum processing throughput capacity for a) whole-fish product and b) maximum over all product categories produced.[4] With 33 distinct species processed and 55 distinct species-product types produced across the fleet, production variety during 2017 increased to the highest levels of over the 10-year period. These indicators are somewhat indirect measures of physical production capacity as both reflect operational responses to fishery management (e.g., catch allocations), product markets, and other dynamics. More direct physical measures indicate increasing processing capacity in the fleet during the most recent years, both in aggregate and to a lesser degree, at the median vessel level. In the active fleet of 19 vessels during 2017, most had one (1) processing line, as indicated by the median value which has been

[3]NTSB, 2017. `https://www.ntsb.gov/investigations/AccidentReports/Reports/MAB1726.pdf`

[4]Production capacity in the EDR is reported by species and delivery codes as defined in eLandings and Commercial Operators Annual Report (COAR) specifications; a) corresponds to delivery code 01- Whole Fish and b) includes all delivery codes reported in the EDR, primarily head-and gut product types (06 - H&G with roe, 07 - H&G western cut, 08 - H&G eastern cut, and 10 - H&G tail removed) and small quantities of other product types reported (including 11 - Kirimi, and various ancillary product types).

constant since 2008; over the fleet in aggregate, however, total processing lines increased to 31 in 2017. Median processing line throughput capacity for whole-fish product increased to the highest level of the 10-year period, to 4.53 metric tons per hour (t/hr), but declined slightly in aggregate to 78.9 (t/hr); processing line throughput of all product types increased to a greater degree during 2017, to a median 4.8 t/hr and 103.9 t/hr in aggregate, indicating recent investment in greater production capacity in both new vessel entrants and improvements to original vessels in the Amendment 80 fleet. Similarly, freezer capacity in the fleet, commonly cited as the principal limiting factor in the overall processing production rate on Amendment 80 CP's and enabling longer trips between onshore deliveries, increased to the highest levels to-date during 2017 (Table 9.3). Cold storage capacity aggregated over all C/Ps in the active fleet increased by 9% in 2017 to a total of 8,932 t, and freezer throughput capacity increased in aggregate by 4% to 72.8 t/hr.

Table 9.1: Amendment 80 Fleet - Aggregate and Median Vessel Size Statistics

Year	Vessels	Gross Tonnage		Net Tonnage		Length Overall (ft)		Beam (ft)		Shaft Horsepower		Fuel Capacity (million gal)	
		Median	Total	Median	Total	Median	Total	Median	Total	Median	Total	Median	Total
2008	22	806	17,483	403	9,449	177	3,760	39	826	2,385	54,650	77,920	1.99
2009	21	560	15,482	380	8,723	169	3,546	38	784	2,250	48,300	76,840	1.82
2010	20	775	15,285	403	8,589	177	3,424	39	758	2,385	47,475	77,920	1.78
2011	20	775	15,285	403	8,568	177	3,434	39	748	2,385	47,400	77,920	1.77
2012	20	775	15,880	403	8,712	177	3,434	40	761	2,385	47,400	77,920	1.82
2013	18	1,008	15,495	506	8,451	185	3,218	40	706	2,560	45,075	89,077	1.77
2014	18	1,008	15,495	506	8,451	185	3,218	40	706	2,560	45,075	89,077	1.77
2015	18	1,026	15,897	506	8,403	185	3,218	40	706	2,560	45,075	89,077	1.77
2016	19	1,027	17,362	586	9,399	185	3,449	40	751	2,550	47,625	99,154	1.93
2017	19	1,027	18,152	586	9,543	185	3,443	40	758	2,550	48,025	99,154	1.95

Source: Amendment 80 Economic Data Reports.

Table 9.2: Amendment 80 Fleet - Aggregate and Median Vessel Processing Capacity Statistics

	Vessels	Processing Lines on Vessel		Species Processed		Total No. Products Processed (species+product)		Max Throughput (mt/hr), Whole-fish Product		Max Throughput (mt/hr), Any Product	
Year	Count	Median	Total	Median	Total	Median	Total	Median	Total	Median	Total
2008	22	1	32	12	23	18	46	3.33	62.06	3.63	90.72
2009	21	1	31	12	26	17	47	3.33	61.37	3.63	81.86
2010	20	1	30	12	25	18	46	3.32	64.55	3.85	81.21
2011	19	1	29	12	27	17	44	3.31	61.59	3.92	79.07
2012	19	1	29	12	23	16	49	3.22	50.27	4.43	90.82
2013	18	1	28	12	21	16	37	3.32	48.64	4.62	88.83
2014	18	1	28	12	22	16	41	3.88	56.69	4.30	87.31
2015	18	1	28	13	28	18	53	4.04	74.21	4.18	82.20
2016	19	1	30	13	26	19	48	4.16	79.19	4.20	87.63
2017	19	1	31	13	33	18	55	4.53	78.94	4.81	103.85

Notes:

Source: Amendment 80 Economic Data Reports.

Table 9.3: Amendment 80 Fleet - Aggregate and Median Vessel Freezer Capacity

Year	Vessels	Freezer Hold Capacity (t)		Maximum Freezing Capacity (t/hr)	
		Median	Total	Median	Total
2008	22	317.51	8,227.42	2.89	99.29
2009	21	317.51	7,693.25	2.68	58.83
2010	20	317.51	7,576.07	2.89	60.01
2011	20	308.76	7,076.30	3.64	64.21
2012	20	317.51	7,558.92	3.90	67.08
2013	18	336.57	7,345.19	3.92	64.28
2014	18	336.57	7,345.19	3.92	64.28
2015	18	336.57	7,345.07	3.92	64.06
2016	19	355.62	8,171.14	3.92	69.94
2017	19	359.99	8,932.12	4.04	72.81

Source: Amendment 80 Economic Data Reports.

Table 9.4: Amendment 80 Fleet - Median Vessel Fuel Consumption Rates by Vessel Activity

Year	Vessels	Fishing/ Processing (gal/hr)	Steaming Loaded (gal/hr)	Steaming Empty (gal/hr)
	Count	Median	Median	Median
2008	22	97	95	97
2009	21	90	89	87
2010	20	97	95	94
2011	20	97	95	93
2012	20	100	105	96
2013	18	103	121	100
2014	18	103	121	101
2015	18	103	117	101
2016	19	105	120	97
2017	19	101	110	95

Source: Amendment 80 Economic Data Reports.

Table 9.4 shows median values for reported estimates of average hourly fuel consumption rate, in gallons per hour (gph), of Amendment 80 vessels during fishing and processing, steaming loaded, and steaming empty operational modes, and Table 9.5 shows aggregate and vessel median annual fuel consumption (gallons) by operational mode and annual total. Median reported hourly fuel use rates vary by activity (highest during steaming loaded and lowest while steaming empty) and have generally increased over the 2008 - 2016 period, reflecting the increase in median and aggregate vessel size within the active fleet. Although changes in the composition of the fleet during 2016 and 2017 resulted in net increases in all metrics of aggregate fleet size while maintaining a total of 19 vessels for both years, median fuel consumption rates for 2017 declined across all operational modes for the first time since 2009; median fuel consumption rate dropped to 101 gph while fishing and processing (-4%), 110 gph while steaming loaded (-8%), and 95 gph steaming empty (-2%). Similarly, total annual fleet fuel consumption during 2017 declined from 2016 across all vessel activity. Total aggregate fleet fuel consumption over all vessel activities, including fuel used in fishing and processing and vessel transiting, declined by 7% to 13.5 million gallons during 2017; fuel used in fishing and processing (typically representing 70-80% of total fuel use) declined from

Table 9.5: Amendment 80 Fleet - Aggregate and Median Vessel Annual Fuel Use, by Vessel Activity

	Vessels	Fishing/Processing		Steaming Empty		Steaming Loaded		All Fuel Use	
Year	Count	Median (1000 Gal)	Total (million Gal)	Median (1000 Gal)	Total (million Gal)	Median (1000 Gal)	Total (million Gal)	Median (1000 Gal)	Total (million Gal)
2008	22	522	10.78	52	1.04	70	1.76	644	13.57
2009	21	449	9.27	61	1.04	81	1.77	591	12.09
2010	20	485	9.73	66	1.45	68	1.46	619	12.65
2011	20	457	10.16	85	1.74	63	1.44	606	13.34
2012	20	445	9.26	70	1.31	89	1.64	603	12.21
2013	18	520	9.70	67	1.20	79	1.50	667	12.40
2014	18	551	10.09	63	1.19	88	1.52	702	12.79
2015	18	543	10.03	74	1.19	79	1.64	695	12.86
2016	19	585	11.11	73	1.21	72	1.98	730	14.30
2017	19	511	10.58	61	1.20	56	1.52	629	13.31

Source: Amendment 80 Economic Data Reports.

2016 to 10.6 million gallons (-4.8%) and 511 thousand gallons (-12.6%) in total and median terms, respectively. More statistical analysis is required to evaluate net changes in fuel efficiency across the fleet over time, controlling for compositional and operational changes as well as improvements to existing vessel stock; nonetheless, the most recent investments in the fleet appear to correspond with substantial net improvements in fuel efficiency indicated in the metrics described above.

9.2. Fishing Effort - Vessel Days at Sea

Table 9.6 reports fleet aggregate and median statistics for vessel activity days reported in EDR data from 2008-2017, representing counts of days during which the vessel undertook fishing and processing operations in 1) Amendment 80 program fisheries in the Bering Sea/Aleutian Islands management area (including mothership operations in the BSAI processing Amendment 80 program catch), 2) all fisheries other than Amendment 80 program fisheries (inclusive of catch and processing of Open Access (OA), CDQ allocation, and/or landings on experimental or exempted fishing permits in any management area, as well as catch and processing of Rockfish Pilot Program (RPP) catch in the GOA and/or Amendment 80 sideboard allowances in the GOA), 3) days on which the vessel was in transit (not fishing or processing) or offloading in port, and 4) inactive in shipyard. Beginning in 2015, EDR reporting broke out vessel activity in the GOA from Amendment 80 and all other fisheries, respectively; to provide consistent metrics over time, Table 9.6 reports active vessels and vessel days in all non-A80 fisheries inclusive of GOA activity for the full 2008-2017 period, with metrics for the GOA beginning in 2015 (as included in the non-A80 metrics). Note that counts of days by activity, area, and/or fishery for a given vessel are not mutually exclusive and represent days during which the vessel reported activity by fishery management program in eLandings; a given calendar day may be counted both as a day fishing and as a day processing (counts of days processing are generally inclusive of days fishing), in one or more program fisheries, as well as a day transiting/offloading. As such, the results as reported in Table 9.6 give a relative account of the distribution of fleet activity among different activities and as a upper-bound approximation of the cumulative duration of vessel use in a given activity.[5]

Aggregate fleet total and median vessel activity days in the Amendment 80 program fisheries exhibited a general downward trend from 2008 until 2012, when fleet aggregate vessel-days processing declined to a low of 3,425 across 19 active vessels, with 173 days over 20 vessels during 2011 the lowest median vessel value to-date. Aggregate fleet-level fishing and processing days in the Amendment 80 program have increased each subsequent year, to 3,757 vessel-days processing across 19 vessels during 2017. From 2013 to 2017, median vessel-days processing has varied from 200 to 213, most recently increasing both days fishing and days processing from 202 in 2016 to 208 in 2017. Participation in fisheries other than those included in the Amendment 80 program is more variable from year to year, declining from 17 in 2011-2012 to 10 in 2017. In non-A80 fisheries during 2017, the highest aggregate vessel-days were reported to date, with fleet-total days fishing increasing by 65 days to 867, and processing days increasing by 62 days to 1,094. In median terms, non-A80 days days processing during 2017 reached the highest number to-date at 115, compared to 35 days on average from 2008 to 2016 and 78 days in 2016, while median days fishing declined from 2016 by 11 days to 47. The greater relative increase in processing days in 2016 and 2017 is primarily the result of some Amendment 80 vessels operating as motherships (processing catch delivered by catcher vessels) in the BSAI. The largest proportion of vessel counts and activity days shown for all non-A80 fisheries represent participation in GOA fisheries, as reported explicitly for 2015 to 2017. Of the 10 Amendment 80 C/Ps active outside of Amendment 80 fisheries during 2017, 9 fished and processed in the GOA, accounting for a small proportion of fleet total non-A80 days processing (31 of 115), but nearly half of days fishing (422 of 867 days), and two-thirds of median vessel days fishing (31 of 47). Across the active fleet of 19 vessels during 2017, 1,465 vessel-days included transiting and/or offloading and 68 days on a median basis. Days inactive (in-port or inactive at sea) during 2017 totaled 1,373 across the fleet and 69 days at median, implying active vessel days-at-sea of approximately 5,562 total, and 296 days for the median vessel.

[5]Vessel days at sea (including days offloading) can be calculated using days inactive values shown above in Table 9.6 as follows: median days at sea = 365-days inactive, and fleet total days at sea = (Vessel count x 365) - fleet total days inactive.

Table 9.6: Amendment 80 Fleet Activity - Days Fishing and Processing by Fishery, and Days in Transit/Offloading and Inactive in Port, Fleet Total and Median Vessel Values

		Stat	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Amendment 80 Fisheries		Active vessels	22	21	20	20	19	18	18	18	19	19
	Days Fishing	Fleet total	3,821	3,765	3,639	3,405	3,395	3,513	3,567	3,611	3,746	3,755
		Median vessel	185	181	182	175	178	200	209	210	202	208
	Days Processing	Fleet total	4,117	3,774	3,747	3,454	3,425	3,559	3,615	3,633	3,747	3,757
		Median vessel	196	181	189	173	185	200	213	210	202	208
All Non-A80 Fisheries		Active vessels	11	11	14	17	17	12	12	11	11	10
	Days Fishing	Fleet total	456	261	535	812	735	648	818	826	802	867
		Median vessel	25	20	30	32	30	28	27	41	58	47
	Days Processing	Fleet total	455	259	534	819	730	649	818	880	1,032	1,094
		Median vessel	26	20	30	32	30	28	27	41	78	115
GOA Fisheries		Active vessels	-	-	-	-	-	-	-	7	8	9
	Days Fishing	Fleet total	-	-	-	-	-	-	-	402	339	422
		Median vessel	-	-	-	-	-	-	-	41	32	31
	Days Processing	Fleet total	-	-	-	-	-	-	-	402	339	422
		Median vessel	-	-	-	-	-	-	-	41	32	31
Non-Fishing and Inactive		Vessels	22	21	20	20	20	18	18	18	19	19
	Days Travel/Offload	Fleet total	1,318	1,398	1,681	1,956	1,682	1,560	1,401	1,327	1,332	1,465
		Median vessel	58	72	77	80	69	80	65	69	69	68
	Days Inactive	Fleet total	1,980	2,355	1,928	1,857	2,089	1,466	1,301	1,298	1,319	1,373
		Median vessel	94	100	81	78	98	74	73	75	61	69

Notes: Vessel activity days as reported in Economic Data Reports are not mutually exclusive with respect to fishery or activity type, and summing number of days over activity and/or fishery categories may total to more than 365 for a given vessel. Vessel days at sea (including days offloading) can be calculated using days inactive values shown above as follows: median days at sea = 365-days inactive, and fleet total days at sea = (Vessel count x 365) - fleet toal days inactive.

Prior to 2015, fishing and processing activity days reported im the Economic Data Report were broken out by Amendment 80 fisheries and all other fisheries, with separate reporting of activity days in Gulf of Alaska fisheries beginning in 2015; vessel activity statistics shown above for 'All Non-A80 Fisheries' for 2008 through 2016 are inclusive of days when vessels were active fishing or processing in the GOA and all other non-Amendment 80 fisheries.

Source: Amendment 80 Economic Data Reports.

9.3. Catch, Production, and Value

Table 9.7 reports annual fleet aggregate and median vessel-level values for retained and discarded catch, volume of processed product in finished weight terms (in t), estimated wholesale value of finished processed volume (aggregate and per-t values in $US adjusted to 2017-equivalent value using the GDP deflator); statistics for these metrics are shown aggregated over all Alaska fisheries, and stratified by Amendment 80 target species (as a group), all other species caught in fisheries in the BSAI, and all species caught in fisheries in the Gulf of Alaska. Aggregating over all Alaska fisheries, the Amendment 80 fleet had a decline in total retained catch of 321 thousand t (down 4.5%) compared to 2016, with discard volume of 18.5 thousand t and discard rate (discard as percentage of total catch) of 5.76% both at the lowest levels of any year since the management program started in 2008. Total retained catch aggregated over the six targeted Amendment 80 species (Atka mackerel, flathead sole, rock sole, yellowfin sole, Pacific cod, and Pacific Ocean perch) declined in 2017 to 238 thousand t (15% less than in 2016), while discard within Amendment 80 program fisheries declined to 2.9 thousand t, 1.23% of total catch (declining by 26% and 23% from 2016, respectively). Total retained catch of all other species in the BSAI also declined in 2017, to 53 thousand t (down 12% from 2016), with total discard of 12.9 thousand t, at a rate if 24.3% of total catch, also declining from 2016 (down 13% and 1.5%, respectively). Total retained catch in GOA fisheries increased by nearly one-third to 29.4 thousand t in 2017, with discard volume and rate both substantially increased as well, up 68% to 2.7 thousand t and a discard rate of 9.2% (up 27%).

Production and value information displayed in Table 9.7 indicate that, from 2008 to 2017, the total volume of finished production of the Amendment 80 fleet, aggregated over all Alaska fisheries, has varied between 181 thousand t and 218 thousand t per year, with gross wholesale revenue value varying between $296 million and $465 million over the period. While aggregate finished volume of the fleet over all Alaska fisheries during 2017 was nearly equal to 2016 at 203 thousand t, aggregate gross wholesale value increased by 22% to $436 million. On a median vessel basis, production volume over all Alaska fisheries increased by 12% from 2016, to 2.3 thousand t, and by 36% in gross wholesale value, to $5.32 million. For Amendment 80 program fisheries, finished volume and value for the fleet in 2017 were 157 thousand t (down 1.3% from 2016) and $334 million (up 25%), representing 77% of both production volume and gross revenue value over all Alaska production for the fleet. On a median basis, production volume in Amendment 80 program fisheries declined 11% to 8.3 thousand t in 2017, while first wholesale value increased by 12% to $13.3 million.

GOA fisheries typically contribute a relatively small proportion of total production and value for the Amendment 80 fleet, averaging approximately 6% of finished volume and 8% of wholesale value for the fleet in aggregate in most years. During 2014, total aggregate production volume and value from GOA fisheries reached the highest levels reported to-date over the 10-year period, with finished volume increasing to 21.3 thousand t, accounting for nearly 10% of aggregate finished volume for the fleet, and $46.4 million accounting for 12.6% of fleet-aggregate wholesale value. Fleet-aggregate volume and value of GOA production declined during the next two years, but finished product 16.9 thousand t and $45 million in first wholesale value during 2017 represented year-on-year increases of 33% and 50%, respectively, and accounted for 8% and 10% of the fleet's 2017 Alaska production and value. Fleet production volume from non-Amendment 80 species in the BSAI (varying between 12% and 18% of both total volume and total value of fleet production over the 10-year period) declined by 8% to 29 thousand t for 2017 and first wholesale value declined by 5% to $57 million; on a median basis, production volumed similarly declined, to 1,530 tm while median wholesale value in 2017 increased slightly, to $2.11 million.

Price indices, i.e., weighted average value per t calculated over all finished production by species-area group in Table 9.7 indicate that market conditions improved for 2017, with average price values increasing from 2016 and approaching peak price levels of 2011-2012. Averaging over all Alaska production, value per t increased by 22% from 2016 to $2,146, with the largest price increases attributable to Amendment 80 species as a group, which increased by 27% to $2,130 per t on average. Production from GOA catch represented the highest average product values per t, at $2,662 (up 13% from 2016 price levels), while average first wholesale value per t from non-Amendment 80 species in the BSAI increased by 2.7% to $1,934. Further analysis of production, prices, and market conditions for individual species, Amendment 80 target species and others, are provided elsewhere in the Economic SAFE Report.

Table 9.7: Amendment 80 Fleet - Aggregate and Median Vessel Catch, Discard, and Finished Production Volume and Value

		Fleet Aggregate							Median Vessel				
	Year	Vessels	Retained Catch (1000t)	Discard (1000t)	Discard Rate	Finished Weight (1000t)	Wholesale Value ($million)	Weighted Average Price ($/t)	Retained Catch (1000t)	Discard (1000t)	Discard Rate	Finished Weight (1000t)	Wholesale Value ($million)
BSAI - Amendment 80 target species	2008	22	270.64	11.42	4.22 %	152.31	$ 279.80	$ 1,837	13.01	0.30	3.06 %	6.89	$ 12.11
	2009	21	239.66	12.80	5.34 %	140.54	$ 226.38	$ 1,611	12.22	0.51	4.95 %	7.52	$ 11.18
	2010	20	257.57	12.68	4.92 %	154.95	$ 275.45	$ 1,778	13.96	0.44	3.40 %	8.43	$ 13.63
	2011	20	262.29	6.51	2.48 %	163.61	$ 355.28	$ 2,172	14.34	0.17	1.91 %	8.56	$ 16.80
	2012	20	265.04	6.82	2.57 %	167.18	$ 355.42	$ 2,126	14.55	0.23	2.35 %	8.96	$ 16.94
	2013	18	260.43	6.79	2.61 %	159.85	$ 256.59	$ 1,605	15.03	0.31	2.27 %	8.32	$ 12.72
	2014	18	254.97	3.17	1.24 %	158.17	$ 262.59	$ 1,660	13.94	0.15	1.19 %	8.53	$ 11.58
	2015	18	248.00	3.08	1.24 %	153.65	$ 255.99	$ 1,666	12.84	0.18	1.19 %	7.57	$ 10.62
	2016	19	253.93	3.98	1.57 %	158.99	$ 266.90	$ 1,679	13.68	0.15	1.13 %	8.15	$ 11.89
	2017	19	238.78	2.93	1.23 %	156.92	$ 334.28	$ 2,130	12.25	0.13	0.87 %	7.29	$ 13.31
BSAI - All other species	2008	22	44.81	25.83	57.63 %	22.28	$ 39.83	$ 1,788	1.82	1.27	69.47 %	0.92	$ 1.57
	2009	21	55.43	20.94	37.78 %	29.67	$ 46.79	$ 1,577	2.30	1.00	49.87 %	1.23	$ 1.56
	2010	20	63.18	20.49	32.43 %	34.29	$ 50.85	$ 1,483	2.38	0.96	45.38 %	1.27	$ 1.72
	2011	20	62.11	17.45	28.10 %	34.77	$ 66.25	$ 1,905	3.16	0.80	26.97 %	1.71	$ 3.01
	2012	20	60.34	13.51	22.39 %	34.05	$ 70.65	$ 2,075	3.17	0.63	22.70 %	1.82	$ 3.21
	2013	18	70.85	20.27	28.61 %	37.90	$ 57.57	$ 1,519	3.97	1.17	29.80 %	2.18	$ 3.42
	2014	18	73.94	23.83	32.22 %	38.75	$ 59.52	$ 1,536	3.94	1.22	31.23 %	2.12	$ 3.19
	2015	18	59.78	14.88	24.90 %	32.96	$ 46.42	$ 1,408	3.66	0.79	25.53 %	1.96	$ 2.54
	2016	19	60.12	14.84	24.68 %	31.77	$ 59.84	$ 1,884	3.33	0.77	27.29 %	1.64	$ 2.09
	2017	19	53.02	12.89	24.32 %	29.35	$ 56.75	$ 1,934	3.09	0.60	23.21 %	1.53	$ 2.11
GOA - All species	2008	12	20.54	3.76	18.29 %	11.10	$ 24.46	$ 2,204	1.88	0.29	15.04 %	0.93	$ 2.00
	2009	17	20.19	6.09	30.15 %	10.95	$ 22.88	$ 2,089	0.99	0.17	24.20 %	0.42	$ 0.97
	2010	16	21.36	5.25	24.60 %	12.15	$ 29.98	$ 2,467	0.91	0.24	17.80 %	0.49	$ 1.26
	2011	16	24.34	4.42	18.17 %	13.85	$ 43.79	$ 3,162	0.75	0.19	15.52 %	0.39	$ 1.49
	2012	16	24.20	3.40	14.06 %	13.21	$ 36.75	$ 2,782	0.67	0.07	12.87 %	0.38	$ 1.21
	2013	13	20.46	3.61	17.64 %	11.71	$ 24.36	$ 2,080	0.98	0.15	10.27 %	0.54	$ 1.38
	2014	10	39.19	2.96	7.56 %	21.34	$ 46.38	$ 2,173	2.11	0.13	5.79 %	1.13	$ 3.31
	2015	9	27.05	2.53	9.36 %	15.29	$ 31.90	$ 2,086	2.14	0.23	5.65 %	1.88	$ 4.41
	2016	13	22.29	1.61	7.24 %	12.74	$ 30.09	$ 2,362	0.70	0.02	2.21 %	0.37	$ 0.71
	2017	10	29.43	2.70	9.17 %	16.90	$ 44.99	$ 2,662	2.58	0.06	2.83 %	1.38	$ 4.00

Continued on next page.

Table 9.7: Continued

		Fleet Aggregate							Median Vessel				
	Year	Vessels	Retained Catch (1000t)	Discard (1000t)	Discard Rate	Finished Weight (1000t)	Wholesale Value ($million)	Weighted Average Price ($/t)	Retained Catch (1000t)	Discard (1000t)	Discard Rate	Finished Weight (1000t)	Wholesale Value ($million)
All Alaska Fisheries	2008	22	335.99	41.00	12.20 %	185.69	$ 344.09	$ 1,853	2.62	0.64	15.04 %	1.35	$ 2.67
	2009	21	315.29	39.83	12.63 %	181.15	$ 296.06	$ 1,634	2.37	0.65	18.73 %	1.29	$ 2.16
	2010	20	342.11	38.43	11.23 %	201.39	$ 356.28	$ 1,769	2.87	0.58	12.64 %	1.44	$ 2.80
	2011	20	348.74	28.39	8.14 %	212.23	$ 465.32	$ 2,193	3.37	0.40	14.69 %	1.94	$ 4.54
	2012	20	349.58	23.74	6.79 %	214.44	$ 462.81	$ 2,158	3.39	0.37	12.21 %	1.98	$ 4.26
	2013	18	351.74	30.67	8.72 %	209.46	$ 338.51	$ 1,616	4.55	0.49	9.87 %	2.62	$ 4.00
	2014	18	368.11	29.96	8.14 %	218.25	$ 368.48	$ 1,688	5.83	0.31	5.79 %	2.98	$ 4.94
	2015	18	334.83	20.49	6.12 %	201.90	$ 334.31	$ 1,656	4.52	0.28	5.65 %	2.60	$ 4.59
	2016	19	336.34	20.44	6.08 %	203.50	$ 356.83	$ 1,753	3.81	0.35	3.45 %	2.02	$ 3.90
	2017	19	321.23	18.52	5.76 %	203.18	$ 436.03	$ 2,146	3.71	0.26	3.42 %	2.27	$ 5.32

Notes: All dollar values are inflation-adjusted to 2016-equivalent value. Fleet aggregate discard rate represents total discarded catch as a percentage of total retained catch. Amendment 80 target species are: Atka mackerel, yellowfin sole, flathead sole, rock sole, Pacific Ocean perch, and Pacific cod.

Source: Catch and discard statistics sourced from NMFS Alaska Region Catch Accounting System data, and production volume statistics are sourced from NMFS Alaska Region At-Sea Production Reporting system data, with production value estimated using average species/product per-unit prices sourced from ADF&G Commercial Operators Annual Report (COAR) data; source data and compilation are provided by the Alaska Fisheries Information Network (AKFIN).

9.4. Operating Income, Costs, and Capital Expenditures

The following section provides a brief summary of the economic performance of the Amendment 80 sector over the 10-year period since implementation of Amendment 80 in 2008, in terms of sector/fleet and median vessel-level statistics for annual gross revenues, annual operating expenses, net income calculations, and capital investment expenditures. The analysis is limited to reporting summarized results calculated from available revenue and cost data, and does not currently encompass a broader analytical assessment of trends in reported outcomes and causal factors driving economic and financial performance of the sector.

9.4.1 Revenues

Table 9.8 presents a summary of annual gross sales units and revenues for the Amendment 80 sector, including revenue and volume of fishery product sales, royalty revenue received for QS and other fishery allocations leased to active vessels, and revenue from fee services provided by the vessel.[6] Revenue from fishery permit asset sales are not shown; as of 2017, only one Amendment 80 entity has reported revenue from permanent sale of fishery permits, and only one vessel has reported revenue derived from vessel use other than fishing and processing in each of 2010, 2012, and 2013 (revenue values suppressed for confidentiality). Total reported volume of finished product sales for the sector during 2017 was 207 thousand t (a 9.5% increase from 2016), producing gross first wholesale revenue of $418 million (a 21.5% increase from 2016 as a result of increasing value per-t for 2017). At the median vessel-level, total sales revenue increased by 12% to $19.95 million, with sales volume reduced 7% to 9.5 thousand t.

Royalty revenues represent a small proportion of annual operating revenue for the sector due to the relatively inactive QS lease market compared to other catch shares programs.[7] The volume of QS lease activity during 2017 was markedly reduced compared to recent years, with a total of 11.6 thousand t of allocation transferred, compared to a previous high of 18.3 t in 2014, and an average of 14.9 t over the 2012-2016 period; at the median (within the 5 entities reporting QS royalties),

[6] Quantity and revenue values shown in Table 9.8 represent product sales completed during the calendar year as reported in Amendment 80 Economic Data Reports, including product sold from inventory held from the prior year, and excluding production completed but not sold during the year. In contrast, volume and value statistics shown in Table 9.7 report volume of physical production by active vessels in the Amendment 80 sector during the calendar year, with first wholesale value estimated based on ADF&G Commercial Operators Annual Reports (COAR) price data. Discrepancies between values reported in the respective tables (and comparable tables presented elsewhere in the SAFE report) are attributable to differences between production output, sales, and fluctuating inventories, as well as other sources of variation.

[7] Fleet consolidation was not a management objective in developing Amendment 80 given the limited number of CPs comprising the fleet historically, most of which continue to be active in the fishery to-date. As a result, leasing activity of QS and other transferable allocations within the fishery has been limited compared to other catch-shares management programs in Alaska fisheries (e.g., BSAI Crab Rationalization, Halibut IFQ) where consolidation was a prominent management outcome facilitated by introduction of transferable quota. In addition, most of the companies that hold A80 QS operate multiple vessels and effect QS transfers internally. The number of QS permit holders (lessors) reporting revenue from leasing QS for a given Amendment 80 target species has ranged from zero (0) to as many as 9, while the number of vessels reporting costs (lessees) for QS allocation from Amendment 80 QS permit holders ranges from 0 to 8; due to the small number of entities reporting lease activity, little useful information regarding quota lease markets for individual species can be reported. The most active lease market to-date has occurred in yellowfin sole QS beginning in 2011, however, non-confidential data can only be published for 2014, a total of 18 thousand t of yellowfin sole QS was transferred between QS holders and harvesting vessels, for a total of $1.3 million, or approximately $70 per t (nominal 2014 value).

lease volume declined to 1,560 t, compared to 5,100 t in 2016, with royalty revenue decreased by $88 thousand to $100 thousand.[8]

9.4.2 Operating expenses

Tables 9.9 and 9.10 summarize the annual expenses incurred by Amendment 80 CPs from 2008 to 2017 as operating costs for all fishing and processing activity, by expense item, and provide results of pro-rata indexing for each expense item in terms of 1) cost per day of vessel operation, 2) cost per thousand t of finished product output, 3) item cost as a proportion of total vessel expenses, and 4) as a proportion of total vessel gross revenue. Table 9.9 reports aggregated results for the fleet as a whole, and Table 9.10 provides results on a per-vessel basis, calculated as the median value over vessel-level observations. Operating expenses are grouped into the following categories: labor costs (including crew share, wages, and payroll taxes for deck crews, processing employees, and for officers and all other on-board personnel, and all benefits, travel, recruitment, and other labor-related expenses); vessel costs (repair and maintenance, fishing gear, equipment leases, and associated freight costs); materials (fuel, lubrication and fluids, food and provisions, production and packaging materials, and raw fish purchases); fees (fishery landing taxes, cooperative costs, observer fees, and QS and other permit lease costs); and overhead (general administrative costs, insurance, and product and other freight services). It should be noted that the categorized expenses constitute the majority of operating costs incurred, but are not inclusive of all expenses, notably excluding cost-recovery fees, and financial expenses (interest and principal payments). The cost per day and cost per thousand t pro-rata indices shown in Tables 9.9 and 9.10 provide relative indices of cost per unit of vessel effort and production output, respectively, and are most relevant for those input costs that vary with production level.

Aggregate operating and overhead expenses for the active fleet during 2017 totaled $305 million, substantially higher than the average of $274 million over 2008-2016 and 16% higher than total 2016 expenses. As a category of expenses, combined labor costs (including direct wages and bonuses, payroll taxes, benefits, and travel and recruitment expenses incurred for all members of the vessel's paid fishing and processing crew and other on-vessel labor) typically represent the largest component of expenses, consistently ranging between 38% to 40% of total annual operating costs at the fleet level prior to 2017. Fleet aggregate combined vessel labor costs increased substantially during 2017, increasing by $32 million from the previous year to $131 million (+33%), and growing to an unprecedented 43% of total fleet operating costs for the year. The largest increases from 2016 fleet-level labor costs were in direct wage costs for processing labor, increasing by $13.5 million to $56 million (18% of 2017 fleet-total operating costs), and for senior vessel staff (labeled "Other employees" in Tables 9.9 and 9.10; includes captains and other vessel officers, engineers, plant-managers and others), which grew by $12 million to $43.6 million (14% of 2017 fleet-total operating costs); fishing (deck) crew labor costs and other employment-related expenses also increased from 2016, but to a lesser degree. In addition, other pro-rata indices of operating costs shown in Tables 9.9 and 9.10 indicate that all components of labor costs during 2017 approached or exceeded the highest levels observed to-date on cost per-day and per-t-produced bases, as well as cost-to-gross revenue terms.

[8] Annual revenue and quantities are aggregated over all species QS allocation and PSC lease data reported, and composition of the aggregate varies from year-to-year; as such, the aggregate value of royalty revenue shown for different years may not track closely with aggregate lease volume. The decline of quota lease volume and revenue during 2017 is largely the result of sale transfers of QS assets associated with the exit of Fishing Company of Alaska from the Amendment 80 sector completed during the year.

Table 9.8: Amendment 80 Sector Annual Revenue from All Sources, including Volume and Value of Total Fishery Product Sales, Other Vessel Income, and Quota Royalties

		Revenue ($million)			Volume (1,000t)		
	Year	LLPs	Median	Total	LLPs	Median	Total
Total Fishery Product Sales	2008	22	$ 14.24	$ 319.22	22	7.47	176.85
	2009	21	$ 12.11	$ 270.95	21	8.45	168.31
	2010	20	$ 15.36	$ 334.63	20	9.76	183.48
	2011	20	$ 21.59	$ 441.46	20	10.17	196.97
	2012	20	$ 20.33	$ 423.70	20	9.39	198.31
	2013	18	$ 16.56	$ 327.69	18	10.38	195.42
	2014	18	$ 18.68	$ 360.83	18	10.65	202.93
	2015	18	$ 16.35	$ 321.42	18	10.58	188.63
	2016	19	$ 16.86	$ 344.00	19	9.96	188.98
	2017	19	$ 19.95	$ 417.86	19	9.50	206.84
Quota Lease Royalties	2008	6	$ 0.02	$ 0.46	6	0.17	2.38
	2009	3	$ *	$ *	3	*	*
	2010	6	$ 0.02	$ 0.11	6	0.10	0.66
	2011	10	$ 0.04	$ 0.97	10	0.32	8.70
	2012	10	$ 0.08	$ 1.36	10	0.65	11.18
	2013	7	$ 0.22	$ 1.27	7	2.00	11.40
	2014	8	$ 0.21	$ 1.44	8	2.85	18.28
	2015	4	$ *	$ *	4	*	*
	2016	5	$ 0.19	$ 0.76	5	5.07	20.32
	2017	5	$ 0.10	$ 0.45	5	1.56	11.59
Other Income from Vessel Operations	2008	-	$ -	$ -	-	-	-
	2009	-	$ -	$ -	-	-	-
	2010	1	$ *	$ *	-	-	-
	2011	-	$ -	$ -	-	-	-
	2012	1	$ *	$ *	-	-	-
	2013	1	$ *	$ *	-	-	-
	2014	-	$ -	$ -	-	-	-
	2015	-	$ -	$ -	-	-	-
	2016	-	$ -	$ -	-	-	-
	2017	-	$ -	$ -	-	-	-

Notes: All dollar values are inflation-adjusted to 2016-equivalent value. Fleet aggregate catch and production volumes are shown in 1000s of metric tons(t), and fleet aggregate and median revenue values are shown in $million. "*" indicates value is suppressed for confidentiality.
Revenue statistics include all Amendment 80 entities that reported revenue from the respective sources, including Amendment 80 LLP holders that did not actively fish or process on the associated vessel during the reporting year but received revenue from QS lease royalties, vessel services, and/or sales of inventory produced during a prior year. Revenue from sale of LLP licenses is not shown due to confidential data restrictions.

Source: Amendment 80 Economic Data Reports.

As itemized in Tables 9.9 and 9.10 and the underlying data, processing labor costs represent the single largest expense item in most years, ranging from 15% to 18% of total expenses, followed by fuel costs, ranging more variably from 10% to 20% of aggregate fleet-level expenses. After a period of declining fuel prices since 2013, fuel costs for the fleet during 2017 increased slightly from 2016, totaling $31.4 million, 10% as a proportion of total expenses, and increased by 4% to $1.54 million on a median vessel basis. Repair and maintenance expenses for 2017 increased by 13% to $31 million across the fleet, representing 10% of overall costs, and increased by 44% to $1.5 million on a median basis. Product freight and storage costs have varied widely over the 2008 to 2016 period, from $14 million to $32 million at the aggregate fleet level (11% to 20% of fleet total costs), comprising one of the largest single expense items at both the fleet- and median vessel-level in recent years[9], and increasing by 19% to $38 million at the fleet-level during 2017. General administrative costs also grew substantially in 2017, increasing by 35% to $27 million during 2017, while declining somewhat on most pro-rata bases. With successive annual growth in product freight/storage and general administrative costs beginning in 2014, concurrent with declining fuel costs, overhead expenses as a category have displaced material expenses as the second largest category of annual expenditures at both the fleet and median vessel levels, behind labor costs.

Ownership restructuring among vessels and firms within the Amendment 80 sector during 2017, as noted above, are likely to have generated substantial transitional costs, as reflected in annual expense statistics reported for the year at both the fleet- and vessel-level. As a result of ongoing adjustment to 2017 events within the Amendment 80 sector, notwithstanding any further changes in ownership structure and/or fleet composition, these elevated transitional costs may continue to taper off over the next few years. It should be noted, however, that some of the transitional variation in annual expenses shown in Tables 9.9 and 9.10 reflects redistribution of costs between expense categories as reported in EDR data, and likely result in part from changing business structures and/or accounting practices associated with shifting ownership.

[9]Note that EDR data on product freight and storage costs are somewhat irregular, with fewer than one-half of the active vessels in the fleet reporting a value for this expense item during years 2008 to 2014 (as indicated in Table 9.9), and reported values in successive years for a given vessel ranging from $0 to more than $1 million.

Table 9.9: Fleet Aggregate Operating Expenses, by Category and Year

		Year	Vessels	Total Fleet Cost ($million)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Labor	Labor Payment, Fishing Crew	2008	22	$ 16.98	$ 2.81	$ 0.10	6.22 %	5.31 %
		2009	21	$ 13.65	$ 2.57	$ 0.08	5.86 %	5.03 %
		2010	20	$ 14.84	$ 2.76	$ 0.08	5.71 %	4.43 %
		2011	20	$ 18.60	$ 3.42	$ 0.09	5.85 %	4.20 %
		2012	20	$ 17.78	$ 3.41	$ 0.09	5.60 %	4.19 %
		2013	18	$ 13.85	$ 2.71	$ 0.07	5.35 %	4.21 %
		2014	18	$ 14.99	$ 2.85	$ 0.07	5.49 %	4.14 %
		2015	18	$ 13.00	$ 2.47	$ 0.07	4.86 %	4.04 %
		2016	19	$ 14.12	$ 2.51	$ 0.07	5.40 %	4.10 %
		2017	19	$ 18.93	$ 3.40	$ 0.09	6.21 %	4.53 %
	Labor Payment, Other Employees	2008	21	$ 30.11	$ 5.28	$ 0.17	11.25 %	9.53 %
		2009	21	$ 26.74	$ 5.04	$ 0.16	11.48 %	9.86 %
		2010	20	$ 31.66	$ 5.89	$ 0.17	12.19 %	9.46 %
		2011	20	$ 39.82	$ 7.32	$ 0.20	12.53 %	9.00 %
		2012	20	$ 40.71	$ 7.81	$ 0.21	12.82 %	9.59 %
		2013	18	$ 30.60	$ 5.99	$ 0.16	11.81 %	9.30 %
		2014	18	$ 32.20	$ 6.11	$ 0.16	11.80 %	8.89 %
		2015	18	$ 31.21	$ 5.92	$ 0.17	11.67 %	9.70 %
		2016	19	$ 31.59	$ 5.62	$ 0.17	12.07 %	9.16 %
		2017	19	$ 43.57	$ 7.83	$ 0.21	14.30 %	10.42 %
	Labor Payment, Processing Employees	2008	22	$ 46.36	$ 7.66	$ 0.26	16.98 %	14.50 %
		2009	21	$ 40.34	$ 7.60	$ 0.24	17.32 %	14.88 %
		2010	20	$ 46.25	$ 8.61	$ 0.25	17.80 %	13.82 %
		2011	20	$ 56.64	$ 10.41	$ 0.29	17.83 %	12.80 %
		2012	20	$ 56.52	$ 10.85	$ 0.29	17.80 %	13.31 %
		2013	18	$ 42.32	$ 8.29	$ 0.22	16.34 %	12.86 %
		2014	18	$ 45.64	$ 8.66	$ 0.22	16.73 %	12.60 %
		2015	18	$ 40.98	$ 7.77	$ 0.22	15.32 %	12.74 %
		2016	19	$ 42.55	$ 7.58	$ 0.23	16.26 %	12.34 %
		2017	19	$ 56.09	$ 10.08	$ 0.27	18.40 %	13.41 %
	Other Employment Related Costs	2008	22	$ 9.25	$ 1.53	$ 0.05	3.39 %	2.89 %
		2009	21	$ 8.76	$ 1.65	$ 0.05	3.76 %	3.23 %
		2010	20	$ 9.76	$ 1.82	$ 0.05	3.76 %	2.92 %
		2011	20	$ 13.01	$ 2.39	$ 0.07	4.09 %	2.94 %
		2012	20	$ 10.25	$ 1.97	$ 0.05	3.23 %	2.41 %
		2013	18	$ 10.89	$ 2.13	$ 0.06	4.20 %	3.31 %
		2014	18	$ 10.72	$ 2.04	$ 0.05	3.93 %	2.96 %
		2015	18	$ 11.37	$ 2.16	$ 0.06	4.25 %	3.54 %
		2016	19	$ 10.53	$ 1.87	$ 0.06	4.02 %	3.05 %
		2017	19	$ 12.65	$ 2.27	$ 0.06	4.15 %	3.02 %

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Table 9.9: Continued

		Year	Vessels	Total Fleet Cost ($million)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Vessel	Fishing Gear	2008	19	$ 7.18	$ 1.38	$ 0.05	2.90 %	2.52 %
		2009	21	$ 9.97	$ 1.88	$ 0.06	4.28 %	3.68 %
		2010	20	$ 9.17	$ 1.71	$ 0.05	3.53 %	2.74 %
		2011	20	$ 10.06	$ 1.85	$ 0.05	3.17 %	2.27 %
		2012	19	$ 10.01	$ 1.93	$ 0.05	3.17 %	2.36 %
		2013	18	$ 8.98	$ 1.76	$ 0.05	3.47 %	2.73 %
		2014	18	$ 8.12	$ 1.54	$ 0.04	2.98 %	2.24 %
		2015	18	$ 9.45	$ 1.79	$ 0.05	3.53 %	2.94 %
		2016	14	$ 6.02	$ 1.42	$ 0.04	2.84 %	2.14 %
		2017	19	$ 8.73	$ 1.57	$ 0.04	2.86 %	2.09 %
	Freight	2008	22	$ 1.59	$ 0.26	$ 0.01	0.58 %	0.50 %
		2009	21	$ 2.16	$ 0.41	$ 0.01	0.93 %	0.80 %
		2010	20	$ 1.75	$ 0.33	$ 0.01	0.67 %	0.52 %
		2011	20	$ 1.94	$ 0.36	$ 0.01	0.61 %	0.44 %
		2012	20	$ 1.94	$ 0.37	$ 0.01	0.61 %	0.46 %
		2013	18	$ 1.92	$ 0.38	$ 0.01	0.74 %	0.58 %
		2014	18	$ 2.42	$ 0.46	$ 0.01	0.89 %	0.67 %
		2015	18	$ 2.30	$ 0.44	$ 0.01	0.86 %	0.71 %
		2016	19	$ 1.76	$ 0.31	$ 0.01	0.67 %	0.51 %
		2017	17	$ 2.24	$ 0.45	$ 0.01	0.81 %	0.59 %
	Lease Expenses	2008	1	$ *	$ *	$ *	* %	* %
		2009	5	$ 0.06	$ 0.04	$ 0.00	0.08 %	0.06 %
		2010	6	$ 0.15	$ 0.08	$ 0.00	0.19 %	0.13 %
		2011	7	$ 0.10	$ 0.05	$ 0.00	0.13 %	0.08 %
		2012	8	$ 0.12	$ 0.06	$ 0.00	0.13 %	0.08 %
		2013	6	$ 0.08	$ 0.04	$ 0.00	0.11 %	0.07 %
		2014	5	$ 0.11	$ 0.07	$ 0.00	0.14 %	0.10 %
		2015	5	$ 0.03	$ 0.02	$ 0.00	0.05 %	0.04 %
		2016	7	$ 0.08	$ 0.04	$ 0.00	0.11 %	0.08 %
		2017	9	$ 0.09	$ 0.03	$ 0.00	0.07 %	0.05 %
	Repair and Maintenance	2008	22	$ 29.06	$ 4.80	$ 0.16	10.65 %	9.09 %
		2009	21	$ 32.33	$ 6.09	$ 0.19	13.88 %	11.93 %
		2010	20	$ 43.23	$ 8.05	$ 0.24	16.64 %	12.92 %
		2011	19	$ 37.86	$ 7.23	$ 0.20	12.53 %	8.99 %
		2012	20	$ 45.32	$ 8.70	$ 0.23	14.27 %	10.67 %
		2013	18	$ 37.52	$ 7.35	$ 0.19	14.49 %	11.40 %
		2014	18	$ 28.70	$ 5.45	$ 0.14	10.52 %	7.92 %
		2015	18	$ 32.53	$ 6.17	$ 0.17	12.16 %	10.11 %
		2016	19	$ 27.44	$ 4.89	$ 0.15	10.49 %	7.96 %
		2017	19	$ 30.98	$ 5.57	$ 0.15	10.16 %	7.41 %

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Table 9.9: Continued

		Year	Vessels	Total Fleet Cost ($million)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Materials	Food and Provisions	2008	19	$ 7.16	$ 1.37	$ 0.05	2.89 %	2.52 %
		2009	18	$ 5.76	$ 1.29	$ 0.04	2.78 %	2.38 %
		2010	17	$ 5.25	$ 1.16	$ 0.03	2.30 %	1.79 %
		2011	17	$ 6.05	$ 1.33	$ 0.04	2.13 %	1.57 %
		2012	17	$ 6.00	$ 1.39	$ 0.04	2.13 %	1.63 %
		2013	15	$ 6.04	$ 1.43	$ 0.04	2.69 %	2.15 %
		2014	15	$ 6.36	$ 1.47	$ 0.04	2.77 %	2.03 %
		2015	15	$ 6.48	$ 1.50	$ 0.04	2.82 %	2.30 %
		2016	16	$ 6.87	$ 1.45	$ 0.04	3.05 %	2.23 %
		2017	14	$ 4.62	$ 1.12	$ 0.03	2.03 %	1.45 %
	Fuel	2008	22	$ 52.09	$ 8.61	$ 0.29	19.08 %	16.29 %
		2009	21	$ 34.76	$ 6.55	$ 0.21	14.92 %	12.82 %
		2010	20	$ 39.51	$ 7.35	$ 0.22	15.21 %	11.80 %
		2011	20	$ 48.92	$ 8.99	$ 0.25	15.39 %	11.06 %
		2012	20	$ 50.28	$ 9.65	$ 0.25	15.83 %	11.84 %
		2013	18	$ 51.41	$ 10.07	$ 0.26	19.85 %	15.63 %
		2014	18	$ 50.92	$ 9.66	$ 0.25	18.66 %	14.05 %
		2015	18	$ 38.83	$ 7.37	$ 0.21	14.52 %	12.07 %
		2016	19	$ 31.01	$ 5.52	$ 0.16	11.85 %	8.99 %
		2017	19	$ 31.39	$ 5.64	$ 0.15	10.30 %	7.50 %
	Lubrication and Fluids	2008	22	$ 3.14	$ 0.52	$ 0.02	1.15 %	0.98 %
		2009	21	$ 2.40	$ 0.45	$ 0.01	1.03 %	0.89 %
		2010	20	$ 5.98	$ 1.11	$ 0.03	2.30 %	1.78 %
		2011	20	$ 8.68	$ 1.59	$ 0.04	2.73 %	1.96 %
		2012	19	$ 2.53	$ 0.49	$ 0.01	0.80 %	0.60 %
		2013	18	$ 2.82	$ 0.55	$ 0.01	1.09 %	0.86 %
		2014	18	$ 2.48	$ 0.47	$ 0.01	0.91 %	0.69 %
		2015	18	$ 2.70	$ 0.51	$ 0.01	1.01 %	0.84 %
		2016	19	$ 2.34	$ 0.42	$ 0.01	0.90 %	0.68 %
		2017	19	$ 2.60	$ 0.47	$ 0.01	0.85 %	0.62 %
	Product and Packaging Materials	2008	22	$ 4.88	$ 0.81	$ 0.03	1.79 %	1.53 %
		2009	21	$ 3.72	$ 0.70	$ 0.02	1.60 %	1.37 %
		2010	20	$ 4.35	$ 0.81	$ 0.02	1.67 %	1.30 %
		2011	20	$ 4.99	$ 0.92	$ 0.03	1.57 %	1.13 %
		2012	20	$ 5.43	$ 1.04	$ 0.03	1.71 %	1.28 %
		2013	18	$ 5.04	$ 0.99	$ 0.03	1.95 %	1.53 %
		2014	18	$ 5.60	$ 1.06	$ 0.03	2.05 %	1.54 %
		2015	18	$ 4.20	$ 0.80	$ 0.02	1.57 %	1.31 %
		2016	19	$ 4.53	$ 0.81	$ 0.02	1.73 %	1.31 %
		2017	19	$ 6.28	$ 1.13	$ 0.03	2.06 %	1.50 %

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Table 9.9: Continued

		Year	Vessels	Total Fleet Cost ($million)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Materials	Raw Fish Purchases	2008	2	$ *	$ *	$ *	* %	* %
		2010	1	$ *	$ *	$ *	* %	* %
		2011	1	$ *	$ *	$ *	* %	* %
		2012	1	$ *	$ *	$ *	* %	* %
		2013	1	$ *	$ *	$ *	* %	* %
		2015	4	$ *	$ *	$ *	* %	* %
		2016	5	$ 3.54	$ 2.26	$ 0.05	3.50 %	2.62 %
		2017	5	$ 2.93	$ 2.05	$ 0.05	2.85 %	2.10 %
Fees	Cooperative Costs	2008	16	$ 0.56	$ 0.12	$ 0.00	0.26 %	0.23 %
		2009	15	$ 1.23	$ 0.30	$ 0.01	0.69 %	0.61 %
		2010	14	$ 1.15	$ 0.28	$ 0.01	0.57 %	0.44 %
		2011	16	$ 1.41	$ 0.31	$ 0.01	0.56 %	0.41 %
		2012	16	$ 1.26	$ 0.30	$ 0.01	0.53 %	0.38 %
		2013	14	$ 1.14	$ 0.28	$ 0.01	0.55 %	0.44 %
		2014	14	$ 1.00	$ 0.24	$ 0.01	0.48 %	0.35 %
		2015	14	$ 1.52	$ 0.36	$ 0.01	0.74 %	0.62 %
		2016	15	$ 1.39	$ 0.31	$ 0.01	0.69 %	0.55 %
		2017	18	$ 1.26	$ 0.24	$ 0.01	0.44 %	0.33 %
	Fish Tax	2008	22	$ 3.23	$ 0.53	$ 0.02	1.18 %	1.01 %
		2009	21	$ 3.43	$ 0.65	$ 0.02	1.47 %	1.26 %
		2010	20	$ 2.17	$ 0.40	$ 0.01	0.84 %	0.65 %
		2011	20	$ 2.29	$ 0.42	$ 0.01	0.72 %	0.52 %
		2012	20	$ 3.36	$ 0.64	$ 0.02	1.06 %	0.79 %
		2013	18	$ 3.39	$ 0.66	$ 0.02	1.31 %	1.03 %
		2014	18	$ 2.89	$ 0.55	$ 0.01	1.06 %	0.80 %
		2015	18	$ 3.17	$ 0.60	$ 0.02	1.18 %	0.98 %
		2016	19	$ 4.08	$ 0.73	$ 0.02	1.56 %	1.18 %
		2017	19	$ 3.94	$ 0.71	$ 0.02	1.29 %	0.94 %
	Observer	2008	22	$ 4.94	$ 0.82	$ 0.03	1.81 %	1.54 %
		2009	21	$ 4.09	$ 0.77	$ 0.02	1.76 %	1.51 %
		2010	20	$ 4.15	$ 0.77	$ 0.02	1.60 %	1.24 %
		2011	20	$ 4.01	$ 0.74	$ 0.02	1.26 %	0.91 %
		2012	19	$ 3.92	$ 0.75	$ 0.02	1.24 %	0.92 %
		2013	18	$ 3.93	$ 0.77	$ 0.02	1.52 %	1.19 %
		2014	18	$ 4.02	$ 0.76	$ 0.02	1.47 %	1.11 %
		2015	18	$ 4.37	$ 0.83	$ 0.02	1.63 %	1.36 %
		2016	19	$ 4.36	$ 0.78	$ 0.02	1.67 %	1.26 %
		2017	19	$ 4.28	$ 0.77	$ 0.02	1.40 %	1.02 %

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Table 9.9: Continued

		Year	Vessels	Total Fleet Cost ($million)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Fees	Quota Royalties	2008	2	$ *	$ *	$ *	* %	* %
		2009	4	$ *	$ *	$ *	* %	* %
		2010	2	$ *	$ *	$ *	* %	* %
		2011	8	$ 1.37	$ 0.59	$ 0.01	0.82 %	0.61 %
		2012	4	$ *	$ *	$ *	* %	* %
		2013	3	$ *	$ *	$ *	* %	* %
		2014	8	$ 1.07	$ 0.43	$ 0.01	0.74 %	0.56 %
		2015	7	$ 0.79	$ 0.38	$ 0.01	0.73 %	0.61 %
		2016	9	$ 0.39	$ 0.14	$ 0.00	0.26 %	0.21 %
		2017	5	$ 0.31	$ 0.22	$ 0.00	0.32 %	0.28 %
Overhead	Freight and Storage	2008	9	$ 17.61	$ 7.19	$ 0.26	14.02 %	13.49 %
		2009	10	$ 13.82	$ 5.27	$ 0.17	11.28 %	10.86 %
		2010	8	$ 15.91	$ 7.10	$ 0.18	11.80 %	10.14 %
		2011	4	$ *	$ *	$ *	* %	* %
		2012	4	$ *	$ *	$ *	* %	* %
		2013	4	$ *	$ *	$ *	* %	* %
		2014	7	$ 21.14	$ 9.71	$ 0.24	17.05 %	14.13 %
		2015	10	$ 31.78	$ 10.75	$ 0.29	20.05 %	18.20 %
		2016	10	$ 31.88	$ 10.43	$ 0.28	20.46 %	17.19 %
		2017	13	$ 37.86	$ 10.07	$ 0.25	16.55 %	12.75 %
	General Administrative Cost	2008	22	$ 22.37	$ 3.70	$ 0.13	8.20 %	7.00 %
		2009	21	$ 17.37	$ 3.27	$ 0.10	7.46 %	6.41 %
		2010	16	$ 12.68	$ 3.01	$ 0.08	5.78 %	4.71 %
		2011	16	$ 29.53	$ 6.80	$ 0.18	10.92 %	8.09 %
		2012	20	$ 29.60	$ 5.68	$ 0.15	9.32 %	6.97 %
		2013	18	$ 13.99	$ 2.74	$ 0.07	5.40 %	4.25 %
		2014	16	$ 21.30	$ 4.56	$ 0.11	8.30 %	6.27 %
		2015	11	$ 18.01	$ 5.74	$ 0.15	9.95 %	8.72 %
		2016	11	$ 19.80	$ 6.08	$ 0.16	10.93 %	8.61 %
		2017	15	$ 26.73	$ 6.17	$ 0.16	10.42 %	8.07 %
	Insurance	2008	22	$ 12.45	$ 2.06	$ 0.07	4.56 %	3.90 %
		2009	21	$ 12.29	$ 2.32	$ 0.07	5.28 %	4.54 %
		2010	20	$ 11.71	$ 2.18	$ 0.06	4.51 %	3.50 %
		2011	20	$ 14.86	$ 2.73	$ 0.08	4.68 %	3.36 %
		2012	20	$ 16.76	$ 3.22	$ 0.08	5.28 %	3.95 %
		2013	18	$ 9.86	$ 1.93	$ 0.05	3.81 %	3.00 %
		2014	17	$ 13.19	$ 2.64	$ 0.07	5.10 %	3.84 %
		2015	18	$ 12.87	$ 2.44	$ 0.07	4.81 %	4.00 %
		2016	19	$ 17.40	$ 3.10	$ 0.09	6.65 %	5.05 %
		2017	19	$ 9.31	$ 1.67	$ 0.05	3.06 %	2.23 %

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Table 9.9: Continued

	Year	Vessels	Total Fleet Cost ($million)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
All Annual Expenses	2008	22	$ 272.93	$ 45.11	$ 1.54	100.00 %	85.38 %
	2009	21	$ 232.98	$ 43.88	$ 1.38	100.00 %	85.96 %
	2010	20	$ 259.83	$ 48.37	$ 1.42	100.00 %	77.62 %
	2011	20	$ 317.76	$ 58.38	$ 1.61	100.00 %	71.82 %
	2012	20	$ 317.60	$ 60.95	$ 1.60	100.00 %	74.79 %
	2013	18	$ 258.99	$ 50.74	$ 1.33	100.00 %	78.73 %
	2014	18	$ 272.87	$ 51.79	$ 1.34	100.00 %	75.32 %
	2015	18	$ 267.45	$ 50.73	$ 1.42	100.00 %	83.15 %
	2016	19	$ 261.69	$ 46.60	$ 1.38	100.00 %	75.91 %
	2017	19	$ 304.78	$ 54.80	$ 1.47	100.00 %	72.86 %

Notes: All dollar values are inflation-adjusted to 2016-equivalent value; aggregate fleet cost per expense item are shown in $million; cost per vessel day and cost per thousand t are prorated by fleet total number of days and t produced, representing average pro-rata values for the fleet, and are shown in $1000 per pro-rata unit. "*" indicates value is suppressed for confidentiality.

Gross revenue values are inclusive of all reported fishery product sales, tendering and other for-hire vessel services, quota royalties and other permit/license leasing and sales realized during the year. Fleet-level pro-rata values by expense item are calculated using fleet aggregated cost values and pro-rata factors, respectively, and represent the weighted average (mean) for vessels within the fleet; cost per vessel-day is pro-rated over the number of days that each vessel was active (365 - days inactive), aggregated over all vessels; cost per thousand metric ton is pro-rated over aggregate fleet production output.

Source: Amendment 80 Economic Data Reports.

Table 9.10: Vessel Operating Expenses, Median, by Category and Year

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Labor	Labor Payment, Fishing Crew	2008	22	$ 760	$ 3.13	$ 0.10	6.20 %	5.07 %
		2009	21	$ 685	$ 3.01	$ 0.08	5.33 %	4.78 %
		2010	20	$ 693	$ 2.90	$ 0.08	5.53 %	4.10 %
		2011	20	$ 956	$ 3.29	$ 0.08	5.34 %	3.52 %
		2012	20	$ 831	$ 3.06	$ 0.08	5.62 %	3.64 %
		2013	18	$ 696	$ 2.54	$ 0.07	5.15 %	4.18 %
		2014	18	$ 824	$ 2.69	$ 0.07	5.05 %	4.00 %
		2015	18	$ 736	$ 2.52	$ 0.07	4.82 %	4.57 %
		2016	19	$ 720	$ 2.62	$ 0.08	5.37 %	4.21 %
		2017	19	$ 887	$ 3.37	$ 0.09	5.51 %	4.48 %
	Labor Payment, Other Employees	2008	21	$ 1,259	$ 4.46	$ 0.17	10.57 %	10.06 %
		2009	21	$ 1,135	$ 4.86	$ 0.17	12.28 %	11.64 %
		2010	20	$ 1,563	$ 5.72	$ 0.19	13.36 %	11.68 %
		2011	20	$ 2,093	$ 7.00	$ 0.21	14.04 %	10.64 %
		2012	20	$ 2,209	$ 7.58	$ 0.21	13.68 %	10.72 %
		2013	18	$ 1,734	$ 5.97	$ 0.17	11.84 %	10.28 %
		2014	18	$ 1,731	$ 5.88	$ 0.16	12.49 %	9.70 %
		2015	18	$ 1,553	$ 5.00	$ 0.17	11.77 %	10.50 %
		2016	19	$ 1,497	$ 5.28	$ 0.19	13.27 %	11.16 %
		2017	19	$ 1,942	$ 6.79	$ 0.23	13.92 %	10.71 %
	Labor Payment, Processing Employees	2008	22	$ 2,109	$ 8.72	$ 0.27	16.84 %	14.73 %
		2009	21	$ 1,938	$ 8.35	$ 0.23	16.16 %	15.08 %
		2010	20	$ 2,073	$ 8.74	$ 0.26	17.42 %	13.77 %
		2011	20	$ 2,818	$ 9.69	$ 0.30	18.09 %	13.06 %
		2012	20	$ 2,786	$ 9.75	$ 0.30	18.50 %	14.23 %
		2013	18	$ 2,078	$ 7.49	$ 0.22	15.46 %	13.12 %
		2014	18	$ 2,356	$ 7.78	$ 0.23	16.42 %	12.59 %
		2015	18	$ 2,075	$ 7.08	$ 0.21	14.74 %	12.86 %
		2016	19	$ 2,091	$ 7.56	$ 0.22	16.89 %	12.77 %
		2017	19	$ 2,751	$ 10.47	$ 0.30	18.80 %	14.74 %
	Other Employment Related Costs	2008	22	$ 290	$ 1.04	$ 0.05	3.46 %	2.64 %
		2009	21	$ 377	$ 1.29	$ 0.05	3.89 %	3.11 %
		2010	20	$ 448	$ 1.78	$ 0.05	3.72 %	2.89 %
		2011	20	$ 570	$ 1.83	$ 0.05	3.67 %	2.40 %
		2012	20	$ 542	$ 1.93	$ 0.05	3.24 %	2.22 %
		2013	18	$ 631	$ 2.16	$ 0.05	4.14 %	3.15 %
		2014	18	$ 580	$ 2.14	$ 0.05	4.07 %	2.94 %
		2015	18	$ 620	$ 2.17	$ 0.06	4.40 %	3.59 %
		2016	19	$ 577	$ 2.03	$ 0.05	4.43 %	3.15 %
		2017	19	$ 660	$ 2.25	$ 0.07	4.45 %	3.38 %

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Table 9.10: Continued

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Vessel	Fishing Gear	2008	19	$ 300	$ 1.11	$ 0.05	3.11 %	2.82 %
		2009	21	$ 431	$ 1.70	$ 0.06	3.89 %	3.30 %
		2010	20	$ 452	$ 1.70	$ 0.06	3.80 %	2.76 %
		2011	20	$ 382	$ 1.32	$ 0.04	2.42 %	1.64 %
		2012	19	$ 413	$ 1.55	$ 0.03	2.00 %	1.41 %
		2013	18	$ 499	$ 1.66	$ 0.04	3.51 %	2.61 %
		2014	18	$ 412	$ 1.35	$ 0.03	2.31 %	2.02 %
		2015	18	$ 415	$ 1.36	$ 0.04	2.95 %	2.86 %
		2016	14	$ 361	$ 1.22	$ 0.03	2.13 %	1.83 %
		2017	19	$ 409	$ 1.38	$ 0.03	2.03 %	1.48 %
	Freight	2008	22	$ 51	$ 0.19	$ 0.01	0.50 %	0.44 %
		2009	21	$ 59	$ 0.29	$ 0.01	0.67 %	0.69 %
		2010	20	$ 78	$ 0.31	$ 0.01	0.64 %	0.52 %
		2011	20	$ 68	$ 0.25	$ 0.01	0.64 %	0.44 %
		2012	20	$ 70	$ 0.27	$ 0.01	0.57 %	0.45 %
		2013	18	$ 90	$ 0.38	$ 0.01	0.69 %	0.54 %
		2014	18	$ 113	$ 0.37	$ 0.01	0.78 %	0.61 %
		2015	18	$ 114	$ 0.43	$ 0.01	0.82 %	0.56 %
		2016	19	$ 61	$ 0.24	$ 0.01	0.80 %	0.56 %
		2017	17	$ 112	$ 0.35	$ 0.01	0.65 %	0.40 %
	Lease Expenses	2008	1	$ *	$ *	$ *	* %	* %
		2009	5	$ 5	$ 0.02	$ 0.00	0.05 %	0.05 %
		2010	6	$ 6	$ 0.02	$ 0.00	0.05 %	0.04 %
		2011	7	$ 7	$ 0.03	$ 0.00	0.13 %	0.09 %
		2012	8	$ 11	$ 0.05	$ 0.00	0.13 %	0.09 %
		2013	6	$ 8	$ 0.03	$ 0.00	0.08 %	0.05 %
		2014	5	$ 18	$ 0.06	$ 0.00	0.13 %	0.11 %
		2015	5	$ 3	$ 0.01	$ 0.00	0.03 %	0.02 %
		2016	7	$ 6	$ 0.03	$ 0.00	0.08 %	0.07 %
		2017	9	$ 9	$ 0.03	$ 0.00	0.08 %	0.04 %
	Repair and Maintenance	2008	22	$ 1,029	$ 4.43	$ 0.17	10.46 %	9.54 %
		2009	21	$ 1,299	$ 4.51	$ 0.19	13.41 %	11.11 %
		2010	20	$ 1,881	$ 6.73	$ 0.18	14.50 %	10.37 %
		2011	19	$ 1,597	$ 5.98	$ 0.18	11.53 %	9.03 %
		2012	20	$ 1,857	$ 6.76	$ 0.24	16.63 %	10.91 %
		2013	18	$ 1,990	$ 7.32	$ 0.20	15.02 %	11.46 %
		2014	18	$ 1,573	$ 5.51	$ 0.15	10.91 %	8.17 %
		2015	18	$ 1,642	$ 5.49	$ 0.14	9.45 %	8.09 %
		2016	19	$ 1,040	$ 3.19	$ 0.13	8.64 %	6.66 %
		2017	19	$ 1,494	$ 4.97	$ 0.11	8.16 %	6.03 %

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Table 9.10: Continued

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Materials	Food and Provisions	2008	19	$ 301	$ 1.22	$ 0.06	2.69 %	2.63 %
		2009	18	$ 301	$ 1.16	$ 0.04	2.80 %	2.66 %
		2010	17	$ 311	$ 1.16	$ 0.03	2.59 %	2.00 %
		2011	17	$ 375	$ 1.28	$ 0.03	2.32 %	1.60 %
		2012	17	$ 363	$ 1.28	$ 0.03	1.99 %	1.63 %
		2013	15	$ 359	$ 1.29	$ 0.03	2.40 %	2.01 %
		2014	15	$ 303	$ 1.02	$ 0.03	2.51 %	1.79 %
		2015	15	$ 349	$ 1.21	$ 0.04	2.77 %	2.34 %
		2016	16	$ 342	$ 1.16	$ 0.04	3.03 %	2.10 %
		2017	14	$ 330	$ 1.13	$ 0.03	1.98 %	1.53 %
	Fuel	2008	22	$ 2,430	$ 8.87	$ 0.32	20.57 %	18.29 %
		2009	21	$ 1,667	$ 6.41	$ 0.22	15.90 %	14.23 %
		2010	20	$ 2,059	$ 7.61	$ 0.22	16.82 %	13.09 %
		2011	20	$ 2,332	$ 8.27	$ 0.23	17.45 %	11.47 %
		2012	20	$ 2,602	$ 8.76	$ 0.25	15.97 %	11.81 %
		2013	18	$ 2,898	$ 9.81	$ 0.27	19.36 %	17.10 %
		2014	18	$ 2,726	$ 9.60	$ 0.24	19.05 %	14.09 %
		2015	18	$ 1,913	$ 7.18	$ 0.19	13.78 %	12.14 %
		2016	19	$ 1,484	$ 4.70	$ 0.15	11.48 %	9.16 %
		2017	19	$ 1,540	$ 5.77	$ 0.15	10.07 %	7.63 %
	Lubrication and Fluids	2008	22	$ 96	$ 0.33	$ 0.02	0.91 %	0.84 %
		2009	21	$ 117	$ 0.42	$ 0.01	1.05 %	0.80 %
		2010	20	$ 106	$ 0.40	$ 0.01	0.90 %	0.69 %
		2011	20	$ 122	$ 0.46	$ 0.01	0.89 %	0.60 %
		2012	19	$ 122	$ 0.50	$ 0.01	0.67 %	0.60 %
		2013	18	$ 142	$ 0.50	$ 0.01	0.96 %	0.85 %
		2014	18	$ 113	$ 0.40	$ 0.01	0.85 %	0.58 %
		2015	18	$ 123	$ 0.46	$ 0.01	1.05 %	0.83 %
		2016	19	$ 116	$ 0.36	$ 0.01	0.87 %	0.67 %
		2017	19	$ 137	$ 0.47	$ 0.01	0.88 %	0.55 %
	Product and Packaging Materials	2008	22	$ 229	$ 0.87	$ 0.03	1.74 %	1.53 %
		2009	21	$ 166	$ 0.63	$ 0.02	1.43 %	1.32 %
		2010	20	$ 190	$ 0.79	$ 0.02	1.54 %	1.16 %
		2011	20	$ 274	$ 0.90	$ 0.02	1.51 %	1.12 %
		2012	20	$ 264	$ 0.89	$ 0.02	1.64 %	1.23 %
		2013	18	$ 233	$ 0.94	$ 0.02	1.68 %	1.36 %
		2014	18	$ 295	$ 0.93	$ 0.02	1.80 %	1.56 %
		2015	18	$ 205	$ 0.69	$ 0.02	1.50 %	1.30 %
		2016	19	$ 220	$ 0.75	$ 0.02	1.74 %	1.31 %
		2017	19	$ 230	$ 0.72	$ 0.02	1.46 %	1.12 %

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Table 9.10: Continued

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
Materials	Raw Fish Purchases	2008	2	$ *	$ *	$ *	* %	* %
		2010	1	$ *	$ *	$ *	* %	* %
		2011	1	$ *	$ *	$ *	* %	* %
		2012	1	$ *	$ *	$ *	* %	* %
		2013	1	$ *	$ *	$ *	* %	* %
		2015	4	$ *	$ *	$ *	* %	* %
		2016	5	$ 439	$ 1.45	$ 0.03	2.02 %	1.74 %
		2017	5	$ 626	$ 2.12	$ 0.05	2.71 %	1.92 %
Fees	Cooperative Costs	2008	16	$ 30	$ 0.11	$ 0.00	0.34 %	0.25 %
		2009	15	$ 78	$ 0.27	$ 0.01	0.79 %	0.64 %
		2010	14	$ 81	$ 0.33	$ 0.01	0.66 %	0.51 %
		2011	16	$ 87	$ 0.29	$ 0.01	0.58 %	0.40 %
		2012	16	$ 87	$ 0.35	$ 0.01	0.58 %	0.44 %
		2013	14	$ 96	$ 0.30	$ 0.01	0.59 %	0.46 %
		2014	14	$ 70	$ 0.24	$ 0.01	0.59 %	0.43 %
		2015	14	$ 72	$ 0.23	$ 0.01	0.59 %	0.46 %
		2016	15	$ 76	$ 0.26	$ 0.01	0.71 %	0.53 %
		2017	18	$ 71	$ 0.26	$ 0.01	0.43 %	0.28 %
	Fish Tax	2008	22	$ 151	$ 0.58	$ 0.02	1.15 %	1.05 %
		2009	21	$ 157	$ 0.69	$ 0.02	1.42 %	1.28 %
		2010	20	$ 91	$ 0.32	$ 0.01	0.79 %	0.66 %
		2011	20	$ 109	$ 0.35	$ 0.01	0.79 %	0.55 %
		2012	20	$ 149	$ 0.63	$ 0.02	1.10 %	0.83 %
		2013	18	$ 168	$ 0.59	$ 0.02	1.36 %	1.04 %
		2014	18	$ 159	$ 0.55	$ 0.01	1.10 %	0.86 %
		2015	18	$ 159	$ 0.51	$ 0.02	1.20 %	1.02 %
		2016	19	$ 224	$ 0.79	$ 0.02	1.84 %	1.20 %
		2017	19	$ 160	$ 0.56	$ 0.02	1.31 %	1.04 %
	Observer	2008	22	$ 210	$ 0.79	$ 0.03	1.57 %	1.40 %
		2009	21	$ 195	$ 0.78	$ 0.02	1.90 %	1.60 %
		2010	20	$ 213	$ 0.78	$ 0.02	1.75 %	1.31 %
		2011	20	$ 213	$ 0.72	$ 0.02	1.33 %	0.90 %
		2012	19	$ 205	$ 0.75	$ 0.02	1.19 %	0.94 %
		2013	18	$ 218	$ 0.75	$ 0.02	1.46 %	1.23 %
		2014	18	$ 221	$ 0.77	$ 0.02	1.53 %	1.23 %
		2015	18	$ 233	$ 0.79	$ 0.02	1.57 %	1.40 %
		2016	19	$ 229	$ 0.76	$ 0.02	1.58 %	1.27 %
		2017	19	$ 227	$ 0.73	$ 0.02	1.51 %	1.05 %

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Table 9.10: Continued

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
		2008	2	$ *	$ *	$ *	* %	* %
		2009	4	$ *	$ *	$ *	* %	* %
		2010	2	$ *	$ *	$ *	* %	* %
		2011	8	$ 78	$ 0.25	$ 0.01	0.39 %	0.29 %
Fees	Quota Royalties	2012	4	$ *	$ *	$ *	* %	* %
		2013	3	$ *	$ *	$ *	* %	* %
		2014	8	$ 173	$ 0.56	$ 0.01	0.75 %	0.51 %
		2015	7	$ 12	$ 0.04	$ 0.00	0.10 %	0.09 %
		2016	9	$ 45	$ 0.14	$ 0.00	0.18 %	0.14 %
		2017	5	$ 36	$ 0.12	$ 0.00	0.27 %	0.23 %
		2008	9	$ 2,254	$ 8.02	$ 0.27	14.38 %	14.24 %
		2009	10	$ 280	$ 1.05	$ 0.07	4.34 %	4.66 %
		2010	8	$ 1,592	$ 5.02	$ 0.14	8.40 %	7.19 %
		2011	4	$ *	$ *	$ *	* %	* %
	Freight and Storage	2012	4	$ *	$ *	$ *	* %	* %
		2013	4	$ *	$ *	$ *	* %	* %
		2014	7	$ 3,083	$ 9.54	$ 0.29	18.28 %	16.53 %
		2015	10	$ 3,100	$ 10.53	$ 0.29	20.49 %	18.35 %
		2016	10	$ 2,916	$ 9.92	$ 0.29	20.60 %	17.02 %
		2017	13	$ 2,878	$ 9.28	$ 0.27	16.13 %	12.54 %
		2008	22	$ 503	$ 2.00	$ 0.09	5.20 %	4.75 %
		2009	21	$ 790	$ 2.75	$ 0.12	8.78 %	7.72 %
		2010	16	$ 806	$ 3.37	$ 0.08	6.27 %	4.42 %
		2011	16	$ 1,264	$ 4.10	$ 0.09	5.90 %	4.46 %
Overhead	General Administrative Cost	2012	20	$ 777	$ 3.14	$ 0.07	4.69 %	3.91 %
		2013	18	$ 579	$ 2.40	$ 0.06	4.68 %	4.15 %
		2014	16	$ 1,324	$ 4.34	$ 0.11	8.27 %	7.18 %
		2015	11	$ 1,410	$ 6.03	$ 0.13	9.62 %	8.08 %
		2016	11	$ 1,833	$ 6.62	$ 0.17	11.65 %	8.42 %
		2017	15	$ 1,776	$ 5.95	$ 0.17	10.34 %	8.10 %
		2008	22	$ 519	$ 1.83	$ 0.07	3.95 %	3.87 %
		2009	21	$ 509	$ 1.73	$ 0.07	5.41 %	4.65 %
		2010	20	$ 547	$ 2.01	$ 0.06	4.55 %	3.34 %
		2011	20	$ 547	$ 1.78	$ 0.05	3.59 %	2.50 %
	Insurance	2012	20	$ 622	$ 2.35	$ 0.06	4.12 %	3.05 %
		2013	18	$ 583	$ 1.87	$ 0.05	3.87 %	3.00 %
		2014	17	$ 732	$ 2.55	$ 0.07	5.67 %	3.62 %
		2015	18	$ 480	$ 1.58	$ 0.05	3.82 %	3.43 %
		2016	19	$ 447	$ 1.53	$ 0.06	4.17 %	3.31 %
		2017	19	$ 432	$ 1.39	$ 0.05	2.98 %	2.55 %

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Table 9.10: Continued

	Year	Vessels	Cost Per Vessel, Median ($1,000)	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($1000)	Percent Of Total Expenses	Percent Of Gross Revenue
All Annual Expenses	2008	22	$ 11,832	$ 49.98	$ 1.67	100.00 %	87.28 %
	2009	21	$ 10,242	$ 41.30	$ 1.40	100.00 %	82.96 %
	2010	20	$ 11,657	$ 48.19	$ 1.38	100.00 %	76.09 %
	2011	20	$ 15,780	$ 61.23	$ 1.58	100.00 %	70.98 %
	2012	20	$ 17,828	$ 66.94	$ 1.58	100.00 %	79.82 %
	2013	18	$ 13,359	$ 52.38	$ 1.34	100.00 %	76.92 %
	2014	18	$ 14,871	$ 52.76	$ 1.34	100.00 %	75.93 %
	2015	18	$ 14,684	$ 51.77	$ 1.36	100.00 %	86.87 %
	2016	19	$ 12,948	$ 42.67	$ 1.41	100.00 %	77.01 %
	2017	19	$ 15,460	$ 57.55	$ 1.59	100.00 %	80.36 %

Notes: All dollar values are inflation-adjusted to 2016-equivalent value; median cost per expense item, cost per vessel day, and cost per thousand t are shown in $1000. “*” indicates value is suppressed for confidentiality.
Gross revenue values are inclusive of all reported fishery product sales, tendering and other for-hire vessel services, quota royalties and other permit/license leasing and sales realized during the year. Median cost values and pro-rata indices are calculated over non-zero observations in individual vessel data for each expense item. Note that the set of vessels reporting non-zero values typically differs across expense items during a given year, and median values reported for respective expense items in a given year are calculated over distict sets of vessels. As such, the statisitics reported in the above table should not be interpreted as directly comparable across respective expense items and/or years in terms of characterizing a consistent representative ”median vessel”.

Source: Amendment 80 Economic Data Reports.

9.4.3 Operating returns

Table 9.11 provides an overview of economic and financial performance of the Amendment 80 sector at the fleet and median vessel level over the 10-year period in terms of a high-level income statement analysis, summarizing and synthesizing the operating revenue and operating cost information presented in the previous two subsections. *Gross revenue* values in the table report aggregate fleet- and median vessel-level gross operating revenues, itemized by revenue category in Table 9.8. Operating and overhead cost values shown in Table 9.11 summarize itemized expenses detailed in Tables 9.9 and 9.10, aggregating over total labor costs, non-labor operating costs (inclusive of all vessel, materials, and fee expense items), and overhead costs, respectively. *Gross income* is calculated as gross revenue, less total operating costs (i.e., expenses incurred most directly in the operation of the vessel and the process of production, including on-board labor, vessel and equipment, materials, and ad-valorem fees and taxes). *Operating income* is calculated as gross income less overhead expenses; as reported based on available data, this approximates the sector aggregate and median vessel-level annual return to vessel owners from the primary production activities of vessels and associated assets in the Amendment 80 fleet. These results provide a measure of profitability of vessel operations on an annual cash-flow basis, with residual percentage values (income as percentage of gross revenue) shown as well.[10] However, the results shown do not provide a complete accounting of all relevant variable operating costs, exclude non-payroll income and other taxes, depreciation and debt payments (principle and interest) on capital assets, and other financial and cash-flow accounting items relevant to some or all vessels. As such, the operating income results presented in Table 9.11 do not measure aggregate or average net profit within the sector, and should be regarded as representing an upper bound on pre-tax annual returns to capital over time.

From a fleet aggregate gross revenue of $418 million during 2017, $187 million remained as estimated gross income after deducting aggregate operating costs, increasing 23% from $152 million gross income in 2016. While 2017 saw the third highest gross revenue in the 10-year period, gross income reached it's highest value to-date, both in direct cash value, as well as in residual percentage terms at 44.8% of gross revenue (compared to an average of 36.6% gross residual from 2008 to 2016). Despite substantially increased operating and overhead expenses reported for 2017 of $231 million and $74 million, aggregate fleet operating income in 2017 was the second highest value to-date in both cash value and residual percentage terms, at $113.5 million and 27.1% of gross revenue, respectively. Cumulatively since 2008, these results represent a total $3.569 billion in gross revenue for the sector, returning 22% over the period for a total of $802 million in operating income to owners of Amendment 80 vessels and QS permits.

At the median vessel-level, year-on-year trends in gross income, operating income, and residual return rate are similar to those at the aggregate fleet level. Median gross revenue increased by 18% from 2016 to $19.95 million during 2017, approaching the highest gross revenue to-date during 2011 and 2012. Median gross income has varied from $3.1 million to $8.7 million after deducting operating costs, with gross return rate varying from 24% in 2009 to 44% of gross revenue in 2016. With labor costs increased 35% from 2016 to $3.4 million, on-par with 2011-2012 peak values, but median non-labor operating costs in 2017 lower than average at $5 million median, gross income

[10] Monetary cost, revenue and income values presented in this section are adjusted for inflation, as described above, to provide comparability of value over time; note, however, that the specific adjustment method may result in a different relative ranking of high/low values over time than an alternative method, e.g., using a Producer Price Index. Residual percentages provide normalized measures of financial performance that are directly comparable over time without requiring inflation adjustment.

increased 31% in 2017 to $8.6 million. After deducting overhead expenses, which increased by 20% to $4.1 million, median operating income for 2017 increased by 9% to $3.5 million, 20% of gross revenue.

Table 9.11: Amendment 80 Fleet Operating Costs and Income, Fleet Total and Vessel Median

		Fleet Total			Vessel Median	
	Year	Vessels	$ Million	Percent Of Fleet Gross Revenue	$1,000	Percent Of Vessel Gross Revenue
Gross Revenue	2008	22	$ 319.68	100.00 %	$ 14,245	100.00 %
	2009	21	$ 271.05	100.00 %	$ 12,106	100.00 %
	2010	20	$ 334.75	100.00 %	$ 15,363	100.00 %
	2011	20	$ 442.43	100.00 %	$ 21,591	100.00 %
	2012	20	$ 424.67	100.00 %	$ 20,354	100.00 %
	2013	18	$ 328.96	100.00 %	$ 16,673	100.00 %
	2014	18	$ 362.27	100.00 %	$ 18,716	100.00 %
	2015	18	$ 321.64	100.00 %	$ 16,348	100.00 %
	2016	19	$ 344.76	100.00 %	$ 16,862	100.00 %
	2017	19	$ 418.31	100.00 %	$ 19,952	100.00 %
Labor - Total Costs	2008	22	$ 102.69	32.12 %	$ 4,363	32.20 %
	2009	21	$ 89.49	33.01 %	$ 3,957	36.62 %
	2010	20	$ 102.51	30.62 %	$ 4,642	34.56 %
	2011	20	$ 128.07	28.95 %	$ 6,388	33.31 %
	2012	20	$ 125.26	29.50 %	$ 6,288	33.08 %
	2013	18	$ 97.65	29.68 %	$ 4,877	30.72 %
	2014	18	$ 103.55	28.58 %	$ 5,169	29.87 %
	2015	18	$ 96.57	30.02 %	$ 4,870	33.02 %
	2016	19	$ 98.78	28.65 %	$ 4,732	34.61 %
	2017	19	$ 131.24	31.37 %	$ 6,385	35.67 %
Operating (Non-labor) - Total Costs	2008	22	$ 117.80	36.85 %	$ 5,160	35.86 %
	2009	21	$ 100.01	36.90 %	$ 4,797	38.44 %
	2010	20	$ 117.02	34.96 %	$ 5,407	34.15 %
	2011	20	$ 129.42	29.25 %	$ 6,442	28.94 %
	2012	20	$ 132.38	31.17 %	$ 6,514	29.66 %
	2013	18	$ 123.98	37.69 %	$ 6,507	38.26 %
	2014	18	$ 113.69	31.38 %	$ 5,664	30.75 %
	2015	18	$ 108.22	33.65 %	$ 5,275	31.72 %
	2016	19	$ 93.82	27.21 %	$ 3,807	27.40 %
	2017	19	$ 99.63	23.82 %	$ 5,001	22.69 %
Gross Income	2008	22	$ 99.18	31.03 %	$ 4,329	31.48 %
	2009	21	$ 81.55	30.09 %	$ 3,082	24.48 %
	2010	20	$ 115.21	34.42 %	$ 5,166	31.99 %
	2011	20	$ 184.94	41.80 %	$ 8,698	36.79 %
	2012	20	$ 167.03	39.33 %	$ 8,547	38.92 %
	2013	18	$ 107.33	32.63 %	$ 5,017	31.34 %
	2014	18	$ 145.03	40.03 %	$ 7,086	37.67 %
	2015	18	$ 116.85	36.33 %	$ 5,199	34.17 %
	2016	19	$ 152.15	44.13 %	$ 6,560	43.57 %
	2017	19	$ 187.43	44.81 %	$ 8,566	41.64 %

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Table 9.11: Continued

	Year	Fleet Total: Vessels	Fleet Total: $ Million	Fleet Total: Percent Of Fleet Gross Revenue	Vessel Median: $1,000	Vessel Median: Percent Of Vessel Gross Revenue
Overhead - Total Costs	2008	22	$ 52.43	16.40 %	$ 2,013	14.00 %
	2009	21	$ 43.49	16.05 %	$ 1,147	15.22 %
	2010	20	$ 40.29	12.04 %	$ 1,020	8.70 %
	2011	20	$ 60.27	13.62 %	$ 1,244	5.91 %
	2012	20	$ 59.95	14.12 %	$ 1,521	7.80 %
	2013	18	$ 37.36	11.36 %	$ 1,294	8.52 %
	2014	18	$ 55.63	15.36 %	$ 2,306	11.35 %
	2015	18	$ 62.66	19.48 %	$ 3,059	21.34 %
	2016	19	$ 69.09	20.04 %	$ 3,433	20.36 %
	2017	19	$ 73.90	17.67 %	$ 4,128	20.22 %
Operating Income	2008	22	$ 46.75	14.62 %	$ 1,449	12.72 %
	2009	21	$ 38.06	14.04 %	$ 1,556	17.04 %
	2010	20	$ 74.92	22.38 %	$ 3,825	23.91 %
	2011	20	$ 124.67	28.18 %	$ 5,910	29.02 %
	2012	20	$ 107.07	25.21 %	$ 4,008	20.18 %
	2013	18	$ 69.97	21.27 %	$ 3,177	23.08 %
	2014	18	$ 89.40	24.68 %	$ 3,616	24.07 %
	2015	18	$ 54.18	16.85 %	$ 2,047	13.13 %
	2016	19	$ 83.07	24.09 %	$ 3,179	22.99 %
	2017	19	$ 113.53	27.14 %	$ 3,473	19.64 %

Notes: All dollar values are inflation-adjusted to 2016-equivalent value; "*" indicates value is suppressed for confidentiality.
Median and fleet aggregate operating expenses and income values shown above are approximations based on available data; annual expense reporting in Amendment 80 Economic Data Reports is relatively comprehensive, but does not include depreciation and debt payments (princicle or interest) on capital assets, and other financial and cash-flow accounting items relevant to some or all vessels. Gross revenue values are inclusive of all reported fishery product sales, tendering and other for-hire vessel services, quota royalties and other permit/license leasing and sales realized during the year. Gross Income is calculated as Gross Revenue less expenses for labor, vessel and equipment, materials, and fees; Operating Income is calculated as Gross Income less Overhead Expenses.
Note that royalties paid and received for Amendment 80 QS and PSC allocations represent transfer payments between fishery participants and have net-zero value at the fleet-level in Gross Income, but may be of non-zero net value at the median vessel-level
Fleet-level residual percentages are calculated using fleet aggregate values and represent the weighted average (mean) for vessels within the fleet. Median values for income residuals and percentages are calculated over non-zero observations in individual vessel data for each item; users should use caution in interpreting median statistics as characterizing a consistent representative "median vessel" across accounting categories and/or years
Source: Amendment 80 Economic Data Reports.

9.4.4 Capital investment

Table 9.12 reports aggregate sector-level and median vessel-level annual expenditures for new investment and improvements in fishing gear (e.g., net electronics and hydraulic equipment), processing plant and equipment, vessel and other on-board equipment (e.g., hull improvements, propulsion), and other capital expenditures associated with operations of the vessel.[11] Data reported exclude any expenditures for onshore equipment or facilities, and reflect initial purchase cost (including sales tax) for fully capitalized assets and improvements purchased during the year. Expensed payments for principal and debt servicing on financed assets previously purchased are not included. Also, the EDR only captures capital investment costs for vessels once they have entered the sector and become subject to EDR reporting requirements, such that investment in new vessels occurring over a period of years prior to entering the sector is not captured in EDR data. Capital costs reported by individual vessel owners typically reflect moderate expenditures incurred regularly in routine (e.g. every three to five years) maintenance overhauls, as well as a small number of "outlier" observations reflecting large expenditures associated with major vessel refitting or ownership restructuring. EDR data collection does not explicitly distinguish between routine versus "major" capital expenditures, such that the distributions of reported values within a given capital asset category tend to be highly asymmetric. All reported values are included in summary statistics of capital expenditures reported in Table 9.12, with no censoring or statistical treatment of outliers. As a result, the reported statistics reflect high variability over multiple dimensions, including differences in scale and direction of year-on-year variation between metrics (fleet aggregate or vessel-median) and/or asset categories.[12]

Combined capital expenditures in total for the fleet have varied between \$9.1 million and \$19.2 million prior to 2017, but more than tripled from 2016 to \$38 million in 2017, and nearly twice the highest previous value reported in 2012. Fleet aggregate capital expenditures on fishing equipment increased modestly during 2017, to \$3.1 million, while investment in processing plant and equipment declined by \$680 thousand (19%) to \$2.9 million. Major investments in vessel improvements and new equipment (other than fishing and processing equipment) totaled \$22.6 million during 2017, nearly twice the previous high of \$12 million reported in 2012, with additional capital investment related to vessel operations increasing by a similar degree, to \$9.7 million. On a median vessel basis, combined capital expenditure costs have varied between \$309 thousand and \$467 thousand prior to 2017, and declined to \$265 thousand in 2017 (in contrast to the large increase in fleet aggregate combined expenditures reported for 2017. Capital expenditures in vessel and other onboard equipment (including purchases and improvements in vessel capital exclusive of fishing and processing equipment) are the most frequently reported category of investment costs and comprise the largest proportion of combined capital expenditures). Major vessel refitting projects in 2009, 2013, and 2014 are indicated by spikes in aggregate expenditures for those years. Ten vessels reported such investment in 2017, totaling \$3.3 million, with a median of \$106 thousand.

9.5. Employment

Table 9.13 displays aggregate and median statistics for employment in the fleet, in terms of total number of individuals employed during all or part of the year, and the number of positions on-board

[11] While EDR reporting includes capital expenditures for purchase of LLP licenses, no data has been reported to date; as LLP transfers are infrequent, data on such expenditures would likely be confidential.

[12] Note that median statistics for individual expenditure categories are calculated over vessels reporting non-zero values in the respective category, and for combined (total annual) capital expenditures, are calculated over all vessels reporting non-zero values for one or more capital expenditure category in a given year; i.e., the distribution of combined cost observations is more asymmetric (right-skewed) than for individual capital categories. In contrast to fleet-level statistics, which represent the active fleet in a given year as a whole, median statistics reported for individual expenditure categories in a given year represent distinct sets of reporting vessels rather than a consistent, representative "median vessel". See table footnotes for Table 9.12 for additional detail.

Table 9.12: Amendment 80 Fleet Capital Expenditures by Category and Year, Fleet Total and Median Vessel Values

	Year	Vessels	Total Fleet Expenditure ($million)	Percent Of Fleet Total Capital Expenditures	Expenditure Per Vessel, Median ($1,000)	Percent Of Vessel Total Capital Expenditures, Median
Fishing gear	2008	12	$ 1.78	20 %	$ 106.83	40 %
	2009	8	$ 0.67	7 %	$ 58.31	37 %
	2010	8	$ *	* %	$ 41.51	36 %
	2011	9	$ 1.38	15 %	$ 110.38	13 %
	2012	10	$ 3.10	16 %	$ 292.93	41 %
	2013	9	$ 1.60	9 %	$ 79.54	18 %
	2014	9	$ 0.97	7 %	$ 73.25	32 %
	2015	11	$ 2.21	18 %	$ 221.31	24 %
	2016	13	$ 3.01	24 %	$ 151.86	35 %
	2017	13	$ 3.05	8 %	$ 68.50	38 %
Processing gear	2008	11	$ 2.02	22 %	$ 135.34	31 %
	2009	9	$ 1.09	12 %	$ 101.06	22 %
	2010	13	$ 3.21	28 %	$ 169.69	28 %
	2011	10	$ 2.62	28 %	$ 164.96	32 %
	2012	14	$ 3.27	17 %	$ 86.62	21 %
	2013	9	$ 5.26	28 %	$ 148.47	42 %
	2014	8	$ 2.28	15 %	$ 118.53	15 %
	2015	10	$ 1.78	14 %	$ 138.68	18 %
	2016	8	$ 3.57	28 %	$ 102.12	32 %
	2017	11	$ 2.89	8 %	$ 24.40	8 %
Vessel and other onboard equipment	2008	11	$ 2.03	22 %	$ 57.94	33 %
	2009	13	$ 7.02	74 %	$ 447.87	75 %
	2010	15	$ 5.91	52 %	$ 120.28	57 %
	2011	11	$ 3.30	36 %	$ 136.59	32 %
	2012	18	$ 11.96	62 %	$ 70.37	55 %
	2013	11	$ 11.04	59 %	$ 578.51	69 %
	2014	13	$ 6.94	47 %	$ 411.17	73 %
	2015	12	$ 4.14	33 %	$ 93.64	38 %
	2016	10	$ 3.35	27 %	$ 108.19	27 %
	2017	11	$ 22.59	59 %	$ 205.30	61 %

Continued on next page.

vessels at a given time, by labor category. Total fishing crew positions for the fleet in aggregate was 103 during 2017, and the total number of individuals participating as crew was 202, both declining to the lowest level reported over the 10-year period. Median crew positions per vessel has remained constant at 6, while distinct crew members declined to 11 in 2017. In contrast, processing employment in aggregate across the fleet increased in terms of number of processing positions, up from 477 in 2016 to 504, and number of distinct persons employed increasing from 1,357 to 1,533. Median number of distinct persons employed in processing also increased, from 65 to 76, while the number of processing positions per vessel, at 24 in 2017, remained within the historic range of 23-25. Employment of other types of positions across the fleet, which include officers, engineers, and

Table 9.12: Continued

	Year	Vessels	Total Fleet Expenditure ($million)	Percent Of Fleet Total Capital Expenditures	Expenditure Per Vessel, Median ($1,000)	Percent Of Vessel Total Capital Expenditures, Median
Other capital expenditures	2008	9	$ 3.25	36 %	$ 97.21	17 %
	2009	5	$ 0.67	7 %	$ 46.93	7 %
	2010	4	$ *	* %	$ *	* %
	2011	8	$ 2.00	21 %	$ 151.83	63 %
	2012	7	$ 0.90	5 %	$ 104.69	5 %
	2013	8	$ 0.90	5 %	$ 117.30	44 %
	2014	10	$ 4.58	31 %	$ 178.47	47 %
	2015	10	$ 4.37	35 %	$ 155.37	51 %
	2016	6	$ 2.70	21 %	$ 209.51	81 %
	2017	8	$ 9.73	25 %	$ 408.05	95 %
Total Annual Capital Expenditures	2008	17	$ 9.08	100 %	$ 409.80	100 %
	2009	16	$ 9.45	100 %	$ 364.27	100 %
	2010	18	$ 11.38	100 %	$ 387.33	100 %
	2011	15	$ 9.30	100 %	$ 331.57	100 %
	2012	19	$ 19.23	100 %	$ 308.79	100 %
	2013	16	$ 18.79	100 %	$ 467.11	100 %
	2014	18	$ 14.76	100 %	$ 426.42	100 %
	2015	16	$ 12.51	100 %	$ 463.79	100 %
	2016	18	$ 12.63	100 %	$ 313.85	100 %
	2017	19	$ 38.26	100 %	$ 265.40	100 %

Notes: All dollar values are inflation-adjusted to 2016-equivalent value. Fleet average dollar values are shown in $1,000 and total aggregate values are shown in $millions. "*" indicates value is suppressed for confidentiality.
'Percentage of Fleet-Total Capital Expenditures' index values represent the weighted average (mean) for vessels within the fleet. Median statisitics reported in the above table should not be interpreted as directly comparable across respective expenditure categories and/or years in terms of characterizing a consistent representative "median vessel". Median values are calculated over non-zero observations in individual vessel data for each capital expense category, noting that the set of vessels reporting non-zero values typically differs across expenditure categories during a given year, and therefore a) median values reported for respective categories are representative of distict sets of vessels, and b) median percent of total capital expenditure is not additive across categories in a given year.

Source: Amendment 80 Economic Data Reports.

others involved in onboard management and record-keeping, increased to 160 during 2017, while the number of distinct persons employed in such position also increased, from 417 to 446.

Table 9.13: Amendment 80 Fleet Employment, Fishing, Processing, and Other Positions On-Board, Fleet Total and Median Vessel Values

		Year	Vessels	Median	Total
Fishing	Number of Employees During the Year	2008	22	11	340
		2009	21	12	273
		2010	20	13	294
		2011	20	9	234
		2012	19	10	240
		2013	18	8	214
		2014	18	11	239
		2015	18	11	231
		2016	19	13	262
		2017	19	11	202
	Positions on Board	2008	22	6	134
		2009	21	6	120
		2010	20	6	114
		2011	20	6	111
		2012	19	6	106
		2013	18	6	105
		2014	18	6	106
		2015	18	6	107
		2016	19	6	108
		2017	19	6	103
Processing	Number of Employees During the Year	2008	22	56	1,465
		2009	21	56	1,341
		2010	20	67	1,567
		2011	20	61	1,234
		2012	19	52	1,286
		2013	18	59	1,183
		2014	18	75	1,300
		2015	18	62	1,160
		2016	19	65	1,357
		2017	19	76	1,533
	Positions on Board	2008	22	22	529
		2009	21	23	516
		2010	20	23	476
		2011	20	23	473
		2012	19	23	444
		2013	18	23	437
		2014	18	24	449
		2015	18	24	449
		2016	19	25	477
		2017	19	24	504

Continued on next page.

Table 9.13: Continued

		Year	Vessels	Median	Total
Other	Number of Employees During the Year	2008	22	18	418
		2009	21	16	371
		2010	20	19	549
		2011	20	18	356
		2012	19	20	424
		2013	18	19	383
		2014	18	18	347
		2015	18	18	338
		2016	19	18	417
		2017	19	20	446
	Positions on Board	2008	22	7	156
		2009	21	6	136
		2010	20	7	145
		2011	20	7	150
		2012	19	7	164
		2013	18	7	160
		2014	18	7	140
		2015	18	7	141
		2016	19	7	157
		2017	19	7	160

Notes: Average positions on-board reflects the number of individuals employed on-board at one time (i.e., the complement of crew employed to operate the vessel), by employment category; number of employees during the year counts each unique person employed over the course of the year. The higher numbers reported for the latter reflects turnover in employment when compared to the average number of positions on-board.

Source: Amendment 80 Economic Data Reports.

9.6. Citations

Northern Economics, Inc., 2014. Five-Year Review of the Effects of Amendment 80. Prepared for the North Pacific Fishery Management Council. September, 2014.

National Transportation Safety Board (NTSB), 2017. Marine Accident Brief: Flooding and Sinking of Fishing Vessel Alaska Juris. National Transportation Safety Board, Washington DC, MAB-17/26, July 24, 2017. 14pp. https://www.ntsb.gov/investigations/AccidentReports/Reports/MAB1726.pdf

10. COMMUNITY PARTICIPATION IN NORTH PACIFIC GROUNDFISH FISHERIES

Fishing involvement in Alaska communities contributes to local and State economies, cultural cohesion, and the social organization of Alaska. Commercial, recreational, and subsistence fisheries contribute to economic livelihoods and support meaningful ways of life for Alaskans. There are hundreds of communities in Alaska involved, to some extent, in commercial, recreational, and/or subsistence fishing. This section, *Community Participation in North Pacific Groundfish Fisheries*, provides a socio-economic background of Alaska communities substantially engaged with Groundfish fisheries in Alaska. Due to the differences in the overall fisheries framework, CDQ communities were not included in this chapter.

During 2018 we made a number of changes to this section in response to comments provided by the SSC in February 2018. The most notable changes were an update to the existing database of communities to include communities outside Alaska in our analysis, and to focus only on FMP groundfish to be more consistent with the rest of the Groundfish Economic SAFE and NPFMC management concerns. For the purpose of this section, focus was placed on those communities substantially engaged in Groundfish fisheries from 2008-2017. Quantitative selection criteria were used in order to select communities with the most involvement in commercial groundfish fisheries. The section will be updated annually and expanded to include more detailed information on the socio-economic status and trends of Alaska fishing communities.

This chapter is divided into three sections to provide a multi-scaled synopsis of groundfish fisheries engagement and the socio-economic well-being of the communities involved. The first section describes the Community Fisheries Participation Indices for Alaska Communities and identifies the top communities participating in Groundfish fisheries and along with associated trends. This section also details the method used to identify which communities are substantially engaged. Section II presents the community sketches for the communities identified as substantially engaged in Alaskan groundfish fisheries. Finally, Section III provides background information as well as a general overview of Groundfish fisheries within Alaska in order to locate this analysis in historical and regulatory context.

10.1. Community Fisheries Participation Indices for Alaska Communities

The National Marine Fisheries Service (NMFS) has developed a framework to create quantitative indices to help understand community well-being and engagement in Federally managed fisheries[1]. The Alaska Fisheries Science Center's Economic and Social Sciences Research Program has adapted this framework to develop a set of performance metrics to track fisheries engagement over time using pre-existing data for all Alaska communities participating in Federally managed commercial fisheries. These performance metrics provide information to examine the degree to which Alaska

[1] Jepson, M., & Colburn, L. L. (2013). *Development of social indicators of fishing community vulnerability and resilience in the US southeast and northeast regions.* US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

communities participate in different aspects of commercial, recreational, and subsistence fisheries.[2,3] The analysis presented here examines community participation in the commercial sector of Alaska fisheries by Alaska communities. The purpose of this analysis is to explore the degree to which communities participate in Alaska fisheries and how their sustained participation has changed over time. This analysis can be used to provide information to support NMFS and NPFMC decision-making processes based in part on NS8.

10.1.1 The Importance of Human Communities

The 1996 revision of MSA recognized the importance of human communities and their relationship to fisheries. National Standard 8 states that management and conservation measures shall "take into account the importance of fishery resources to fishing communities in order to: (1) Provide for the sustained participation of such communities; and (2) To the extent practicable, minimize adverse economic impacts on such communities."[4] As defined in the MSFCMA, the term "fishing community" is a "community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community.[5] While the MSA requires consideration of "fishing communities;" what constitutes a fishing community is complex and has been long debated. The National Marine Fisheries Service's (NMFS) interprets a fishing community as "a social or economic group whose members reside in a specific location..."[6] While this definition was used in the Groundfish economic SAFE, it should be recognized that the concept of community may shift within differing contexts and perspectives. While location may be relatively easy to determine, defining fishing community solely on geography risks excluding social complexity including social networks valuable to the flow of people, information, goods, and services. [7, 8] Some managers have turned to "multiple constructions of communities" to better understand fishing communities;[9] while others expand the concept of "community" to include those areas, resources, and social networks on which people depend, and participation in the broader industry (for example fish processing).

The shift toward ecosystem-based management within fisheries suggest a move in fisheries management , "to emphasize community-level processes, practices, interactions and interdependencies as *starting points* for understanding the relationship between the rich and complex social practice of fishing and marine ecosystems."[10] In order to capture the linkages among people engaged in groundfish fisheries as well as the social and economic impacts on communities of place, emphasis

[2]Kasperski, S., & Himes-Cornell, A. (2014). Indicators of fishing engagement and reliance of Alaskan fishing communities. *Alaska Fisheries Science Center Quarterly Report feature (January-February-March 2014).*

[3]Himes-Cornell, A., & Kasperski, S. (2016). Using socioeconomic and fisheries involvement indices to understand Alaska fishing community well-being. *Coastal Management*, *44*(1), 36-70.

[4]MSFCMA, §* 600.345 National Standard 8—Communities.

[5]16 U.S.C. 1802 §* 3 (16).

[6]*50 CFR 600.345 - National Standard 8 – Communities.*

[7]St. Martin, K. S., & Hall-Arber, M. (2008). The missing layer: Geo-technologies, communities, and implications for marine spatial planning. *Marine Policy*, 32(5), 779-786.

[8]Clay, P. M., & Olson, J. (2008). Defining" fishing communities": vulnerability and the Magnuson-Stevens fishery conservation and management act. *Human Ecology Review*, 143-160

[9]Olson, J. (2005). Development in Theory: Re-Placing the Space of Community: A Story of Cultural Politics, Policies, and Fisheries Management. *Anthropological Quarterly*, 78(1), 247-268.

[10]Martin, K. S., McCay, B. J., Murray, G. D., Johnson, T. R., & Oles, B. (2007). Communities, knowledge and fisheries of the future. *International Journal of Global Environmental Issues,* 7(2-3), 221-239.

has been placed on level of participation within the industry as well as geographic location. The next section describes the methods used to identify the communities of analysis.

For the Economic SAFE, Alaska communities were examined in relation to geographic place, as well as historical and current fishing involvement in Alaska's groundfish fisheries. This analysis considers four performance metrics of community fisheries participation to understand the different ways that communities are invovled in Alaska fisheries: commercial processing engagement, commercial harvesting engagement, the processing regional quotient with measures the percentage of all Alaska landings occurring in each community, and the harvesting regional quotient that measures the percentage of all Alaska landings attributable to vessels owned by residents of each community. These indicators provide a quantitative measure of community participation in Alaska fisheries and how their participation has changed from 2008 through 2017.

10.1.2 Methods

During 2018 we made a number of changes to this section in response to comments provided by the SSC in February 2018. The most notable changes were an update to the existing database of communities to include communities outside Alaska and to focus only on FMP groundfish to be more consistent with the rest of the Groundfish Economic SAFE and NPFMC management concerns.

The Alaska Fisheries Information Network (AKFIN) and AFSC are working on developing a revised Community Profile database to improve the quality, quantity, and consistency of information provided to analysts working on economic and social science issues relevant to the North Pacific Fishery Management Council (NPFMC). The largest change to the data that will impact this section is expanding the set of communities beyond only Alaska communities, and now includes information on all U.S. communities, which are now grouped into 8 non-AK community groupings: the Seattle metropolitan statistical area (MSA), Bellingham, WA, Other Washington, Newport, OR, Other Oregon, All California, All Other States, and the At-Sea Processor grouping. The database was also updated to source data from the same sources as the rest of the Economic Groundfish SAFE to make this chapter as consistent with the rest of the SAFE report as possible. As a result, the dataset includes data on commercial fishing activities from 2008-2017 for all communities in the U.S. and we will be expanding it to include data on recreational and subsistence activities by community in the near future.

The analysis presented here remains restricted to only commercial participation and includes all communities with commercial participation in federally managed North Pacific fisheries, either by having landings in the community or having vessel owners residing in the community. In response to comments from the SSC, this section now only focuses on community harvesting and processing engagement in the FMP groundfish fisheries in Alaska. For the most part, communities emerged were discrete entities; however Kodiak Island Borough was analyzed as well as the City of Kodiak. For the most part, communities were discrete entities; however Kodiak Island was analyzed on the individual community level (e.g. Kodiak City and Ouzinkie) as well as on the Kodiak Island Borough (KIB) level to ensure accurate reporting of smaller communities affected by groundfish fisheries management policy.

10.1.3 Commercial Fisheries Engagement Indices

Communities were included in the study population if any shore side FMP groundfish landings were made in the community or if the owner of a vessel that fished in the fisheries resided in the community for any year from 2008 through 2017.[11] Therefore, the engagement indices exclude the at-sea processing, inshore floating processor, and any landings where the landing port is unknown or missing. The analysis separates variables into two categories of fisheries involvement: commercial processing and commercial harvesting. Processing engagement is represented by the amount of landings and associated revenues from landings in the community, the number of vessels delivering any FMP groundfish in the community, and the number of processors in the community processing any FMP groundfish. Harvesting engagement is represented by the FMP groundfish landings and revenues associated with vessels owned by community residents, the number of vessels with FMP groundfish landings owned by residents in the community, and the number of distinct resident vessel owners whose vessels made FMP groundfish landings in any community. By separating commercial processing from commercial harvesting, the engagement indices highlight the importance of fisheries in communities that may not have a large amount of landings or processing in their community, but have a large number of fishermen and/or vessel owners that participate in commercial fisheries that are based in the community.

To examine the relative harvesting and processing engagement of each community, a separate principal components factor analysis (PCFA) was conducted each year for each category to determine a community's engagement relative to all other Alaska communities. There are 10 years in the study and two PCFAs are conducted each year (processing engagement and harvesting engagement) for a total of 20 different PCFAs.

PCFA is a variable reduction strategy that separates a large number of correlated variables into a set of fewer, linearly independent components. These components are used to create quantitative indices of engagement for each community by using the regression method of summing the standardized coefficient scores multiplied by the included variable values. A unique processing index and harvesting index value for each community in each year is created using the first un-rotated extracted factor from the PCFA, each of which resulted in single factor solutions with second factor eigenvalues below 1.00 for all 20 PCFAs. Each index is normalized to have a mean of zero and a standard deviation of one for each year. These indices are relative scores in that they represent each community's engagement in commercial fisheries within a single year relative to all other communities in that year. Indices are then combined across all years to create a time series of relative engagement in these two aspects of commercial fisheries over time.

Communities that scored above one (above one standard deviation from the mean of zero) for any year are classified as highly engaged for that particular year. These communities are used in additional analyses to explore the changes in their participation for communities that were highly engaged for all 10 years from 2008-2017 for processing engagement or harvesting engagement. It is important to note that since these are relative indices, a large change in the total number of active vessels over time will only cause a change in an index if one community loses a larger share of their vessels (or other commercial fisheries activities) than another community. If the change in number of active vessels (or other commercial fishing activities) are directly proportional to the existing number of vessels across communities, there will not be a change in the indices over time.

[11] The owner's community is determined from the CFEC vessel registration each year.

10.1.4 Regional Quotient

The regional quotient is a measure of the importance of the community relative to all Alaska fisheries in terms of pounds landed or revenue generated from Alaska FMP groundfish fisheries. It is calculated as the landings or revenue attributable to a community divided by the total landings or revenue from all communities and community groupings. In contrast to the engagement indices above, the regional quotient does include at-sea processors (catcher processors and motherships) and inshore floating processors so that the regional quotient reflects each community's share of the total North Pacific FMP groundfish fisheries. The regional quotient is reported for both pounds and revenue from landings in a community (similar to processing engagement). New for this year, we are also calculating the regional quotient based on vessel owner residency (similar to harvesting engagement) since we now have non-Alaska community groupings included in our data. However, it should be noted that these values represent only North Pacific fisheries activities, as some residents (particularly those in other U.S. States) may participate in fisheries outside Alaska. The regional quotient uses the same criteria for inclusion as the processing and harvesting engagement indices and is presented for all communities that were highly engaged for all years from 2008-2017.

10.1.5 Results

This section will report performance metrics of community participation in Alaska fisheries from 2008-2017. Data were collected for 99 communities or community groupings throughout the U.S. that had either some commercial FMP groundfish fisheries landings or residents who owned vessels that were used in commercial FMP groundfish fishing during this period. There were 54 communities that had some FMP groundfish landings occurring in their community and were included in the commercial processing engagement analysis. In contrast, 92 of the 99 communities had a resident who owned a vessel that participated in commercial FMP groundfish fishing and therefore were included in the commercial harvesting engagement analysis.

10.1.6 FMP Groundfish Commercial Processing Engagement

The results of the commercial processing engagement PCFA analyses are shown in Table 10.1 which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient (Armor, 1974) for all of the variables included in each PCFA. The results suggest somewhat strong relationships among variables and that a single index based on the first extracted factor explains over 70% of the variation in each of the variables in each year.

In addition to the goodness of fit statistics of the analyses provided in Table 10.1, each PCFA provides an index score for each of the 54 communities included in the analyses. These index scores are presented in Table 10.2 for the 6 communities that were highly engaged (index score above one, which is one standard deviation above the mean of zero) for at least one year from 2008-2017, and these cells are shaded in Table 10.2. The index is an indicator of the degree of participation in a community relative to the participation of other communities. It is a measure of the presence of commercial fishing in the federal fisheries in Alaska through fishing activity including pounds landed, revenue, processors and the number of delivering vessels in the FMP groundfish fisheries.

Of the six communities found in Table 10.2, the five communities that were highly engaged in commercial processing all 10 years from 2008-2017 are shown in Figure 10.1 and includes Akutan,

Table 10.1: FMP groundfish commercial processing engagement PCFA results.

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Ex-vessel value	Pounds landed in community	# of vessels delivering	# of processors	% variance explained	Armor's Theta
2008	2.99	0.83	0.18	0.00	0.923	0.871	0.823	0.836	75%	0.89
2009	2.93	0.85	0.22	0.00	0.926	0.867	0.788	0.835	73%	0.88
2010	3.08	0.74	0.18	0.01	0.938	0.867	0.844	0.856	77%	0.90
2011	3.03	0.78	0.18	0.01	0.936	0.859	0.842	0.841	76%	0.89
2012	2.92	0.85	0.23	0.00	0.931	0.858	0.826	0.798	73%	0.88
2013	3.02	0.82	0.15	0.00	0.926	0.868	0.810	0.869	76%	0.89
2014	3.09	0.69	0.22	0.00	0.940	0.900	0.791	0.877	77%	0.90
2015	2.97	0.80	0.23	0.00	0.922	0.886	0.838	0.794	74%	0.88
2016	2.89	0.89	0.21	0.00	0.913	0.870	0.822	0.792	72%	0.87
2017	2.83	0.92	0.24	0.01	0.929	0.862	0.854	0.702	71%	0.86

Table 10.2: Communities highly engaged in commercial processing FMP groundfish for one or more years from 2008-2017*.

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Akutan	2.11	2.22	2.34	2.21	2.19	2.21	2.15	2.25	2.30	2.85
Homer	1.39	1.56	1.45	1.34	1.37	1.34	1.31	1.41	1.47	1.49
Kodiak	3.43	3.41	4.00	3.81	3.82	3.62	3.65	3.79	3.57	3.41
Seward	0.67	0.91	0.73	0.82	0.99	0.99	0.93	1.04	1.01	1.19
Sitka	1.35	1.16	1.28	1.32	1.20	1.24	1.11	1.21	1.34	1.65
Unalaska/ Dutch Harbor	4.93	4.85	4.32	4.63	4.63	4.79	4.91	4.63	4.67	4.27

Notes: *Shaded cells are index scores above one (which is one standard deviation above the mean of zero) for at least one year from 2008-2017.

Homer, Kodiak, Sitka, and Unalaska/Dutch Harbor. Unalaska/Dutch Harbor has the highest engagement scores over time, followed closely by Kodiak.

Several of the communities with increasing processing engagement scores experienced fairly substantial increases of 29%, 8%, and 35% for Akutan, Homer, and Sitka, respectively, compared with their mean value for the previous 5 years (2012-2016) (Figure 10.2). Unalaska/Dutch Harbor and Kodiak both experienced a moderate decline of 10% and 7% decrease in processing engagement score for 2017 compared with the previous five year average (Figure 10.3).

10.1.7 Processing Regional Quotient

Another measure of a community's participation in commercial FMP groundfish fisheries is its processing regional quotient, defined as the share of commercial landings/revenues within a community out of the total North Pacific FMP groundfish landings/revenues. It is an indicator of the percentage

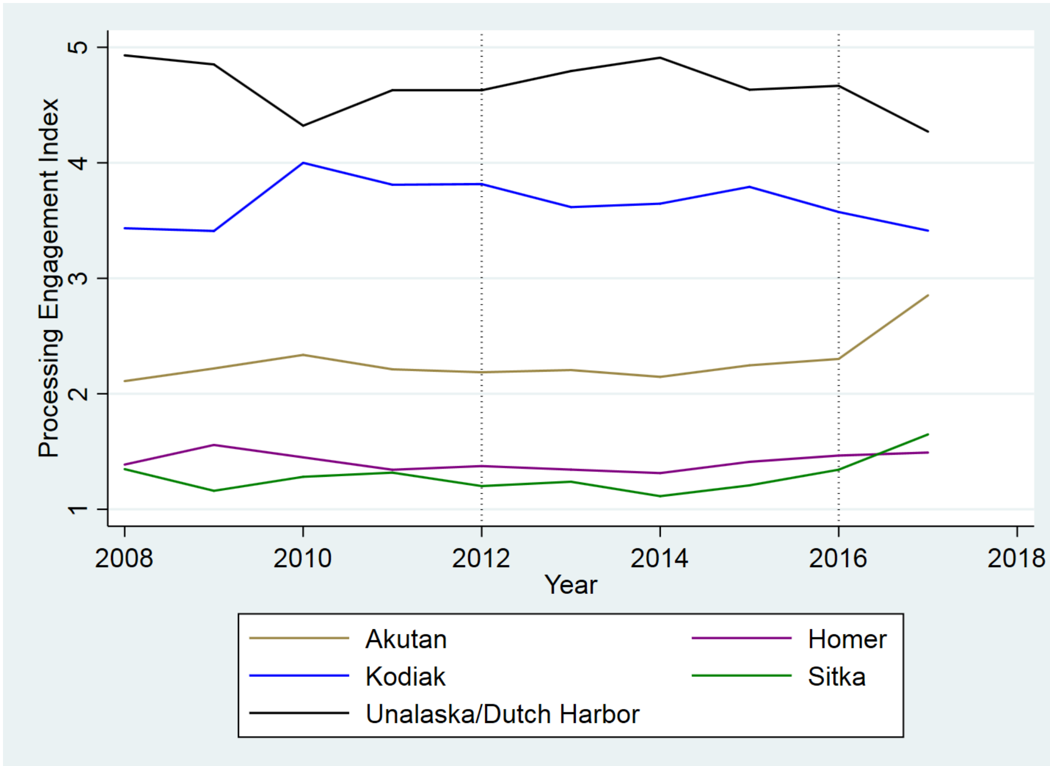


Figure 10.1: Index scores of communities highly engaged in commercial FMP groundfish processing for all years from 2008-2017. Dotted lines indicate the previous 5 year period (2012-2016).

contribution in pounds or revenue landed in that community relative the total (shore-based and at-sea) landings or revenue from all communities throughout the U.S. Figures 10.4 and 10.5 show the processing regional quotient both in pounds and revenue from 2008-2017.

The most prominent communities for processing FMP groundfish in terms of landing weight have been the At-Sea Processing grouping that accounts for approximately 60% of the weight of FMP groundfish retained in the North Pacific. In terms of shoreside processing, Unalaska/Dutch Harbor accounts for approximately 18% of the regional pounds landed from 2008-2017 as a result of the high volume pollock and other groundfish fisheries in the Eastern Bering Sea. The next highest volume community was Kodiak whose processing regional quotient averaged 7% from 2008-2017. Akutan was the only other community with an appreciable amount of FMP groundfish landings, and combined with all non-highly engaged communities accounts for approximately 14% of FMP groundfish landings over this period.

The processing revenue regional quotient is quite similar to the processing pounds regional quotient. However, in slight contrast the At-Sea Processor grouping only accounted for 53% of total FMP groundfish ex-vessel revenues, while Unalaska/Dutch Harbor and Kodiak presented 16 and 8%, respectively. Homer accounted for 1% on average of FMP groundfish ex-vessel revenue, while Sitka accounted for 2% and Akutan and all other communities represented 19%.

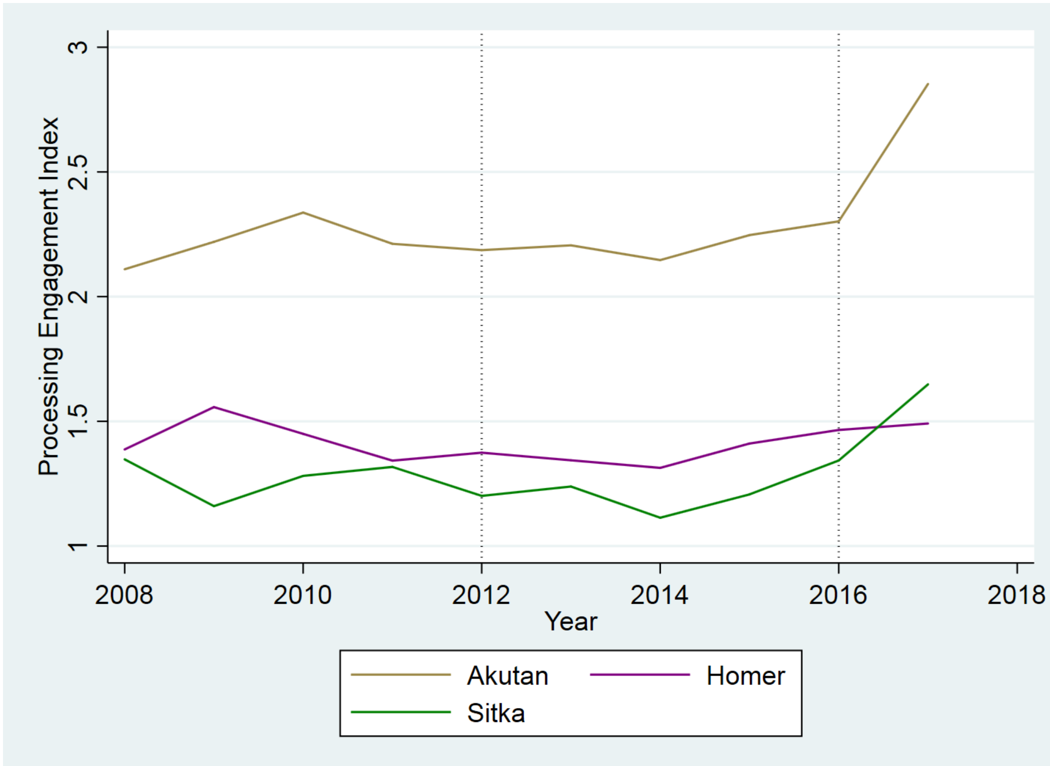


Figure 10.2: Index scores of communities highly engaged in commercial FMP groundfish processing for all years with increasing engagement in 2017 relative to previous 5 year average (2012-2016).

10.1.8 FMP Groundfish Commercial Harvesting Engagement

The results of the commercial harvesting engagement PCFA analyses are shown in Table 10.2 which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient (Armor, 1974) for all of the variables included in each PCFA. The results suggest a strong relationship among variables and that a single index based on the first extracted factor explains approximately 80% of the variation in each of the variables in each year.

Index scores derived from the PCFA results are presented in Table 10.3 for the six communities that were highly engaged (index score above one, which is one standard deviation above the mean of zero) for any year from 2008-2017, and these cells are shaded in Table 10.4. The harvesting engagement index is an indicator of the degree of participation in a community relative to the participation of all other communities in Alaska. It is a measure of the presence of commercial fishing through residents who own commercial fishing vessels including pounds landed, revenue, the number of vessels, and the total number of owners in a community.

Of the 6 communities listed in Table 10.3, five communities were highly engaged in commercial harvesting for all years from 2008-2017 (Figure 10.6). They are Homer, Kodiak, Petersburg, Sitka, and the Seattle Metropolitan Statistical Area (MSA – which includes King, Snohomish and Pierce Counties in Washington).

The Seattle MSA has by far the highest harvesting engagement scores over time, with fairly consistent index scores from 2008-2017 and remained flat in 2017 relative to the average of 2012-2016. Homer, Petersburg, and Sitka experienced moderate increases in harvesting engagement scores, which

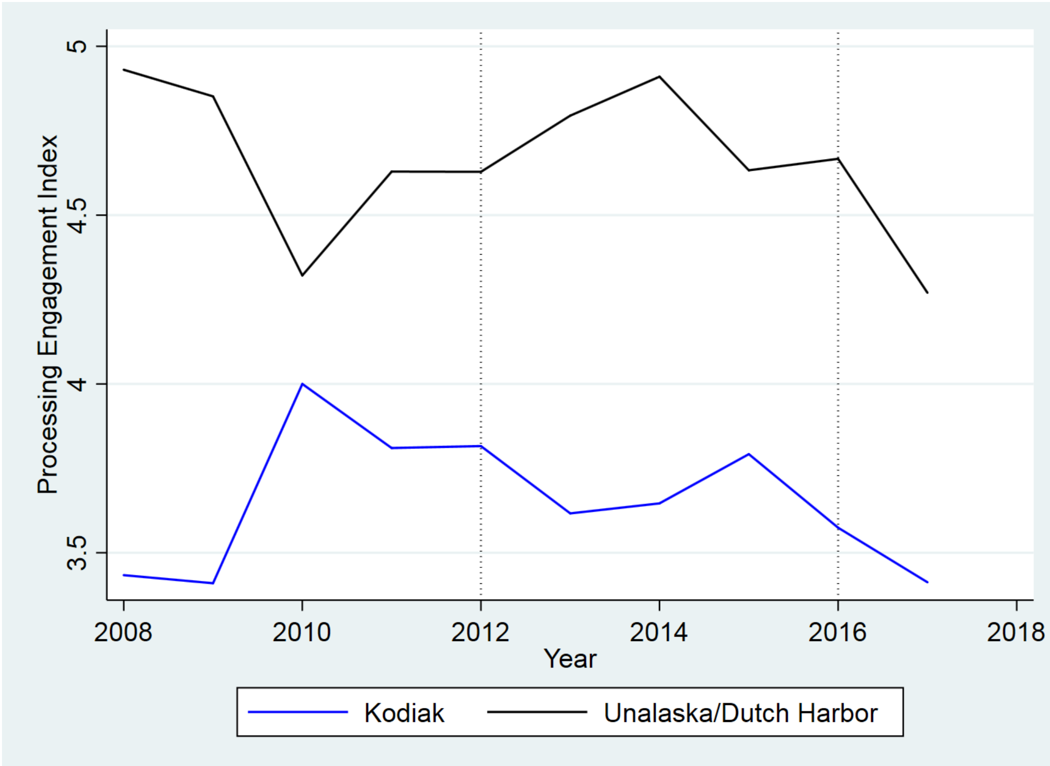


Figure 10.3: Index scores of communities highly engaged in commercial FMP groundfish processing for all years with decreasing engagement in 2017 relative to previous 5 year average (2012-2016).

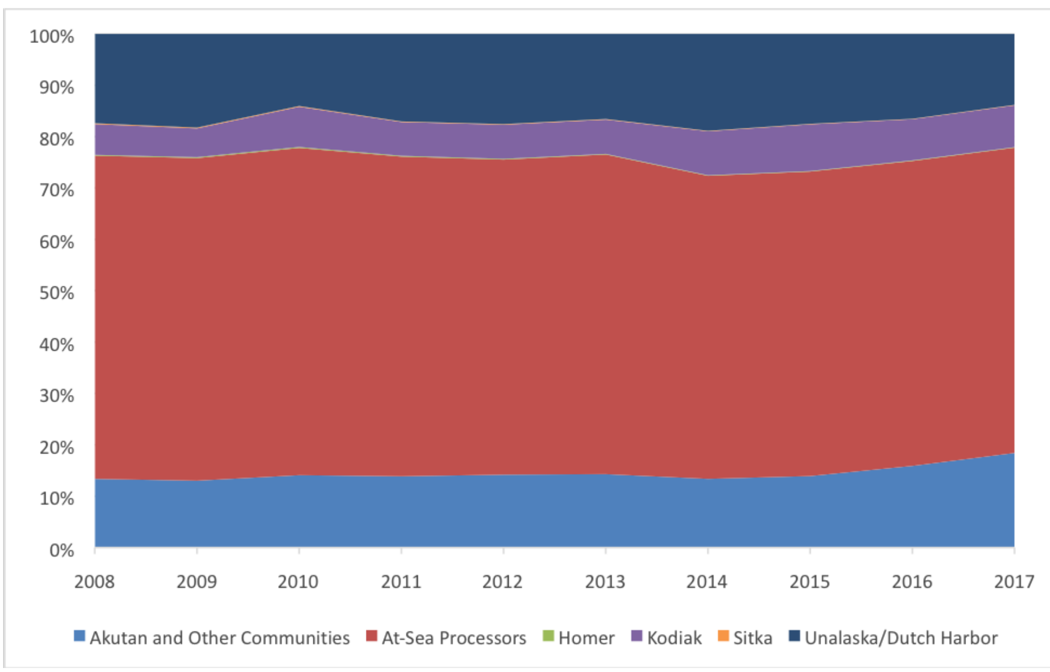


Figure 10.4: Processing regional quotient of pounds for communities highly engaged in commercial FMP groundfish processing for all years from 2008-2017.

went up by 8%, 6%, and 14%, respectively, in 2017 compared with the average from 2012-2016 (Figure 10.7). Only Kodiak experienced a decrease in harvesting engagement in 2017 relative to the

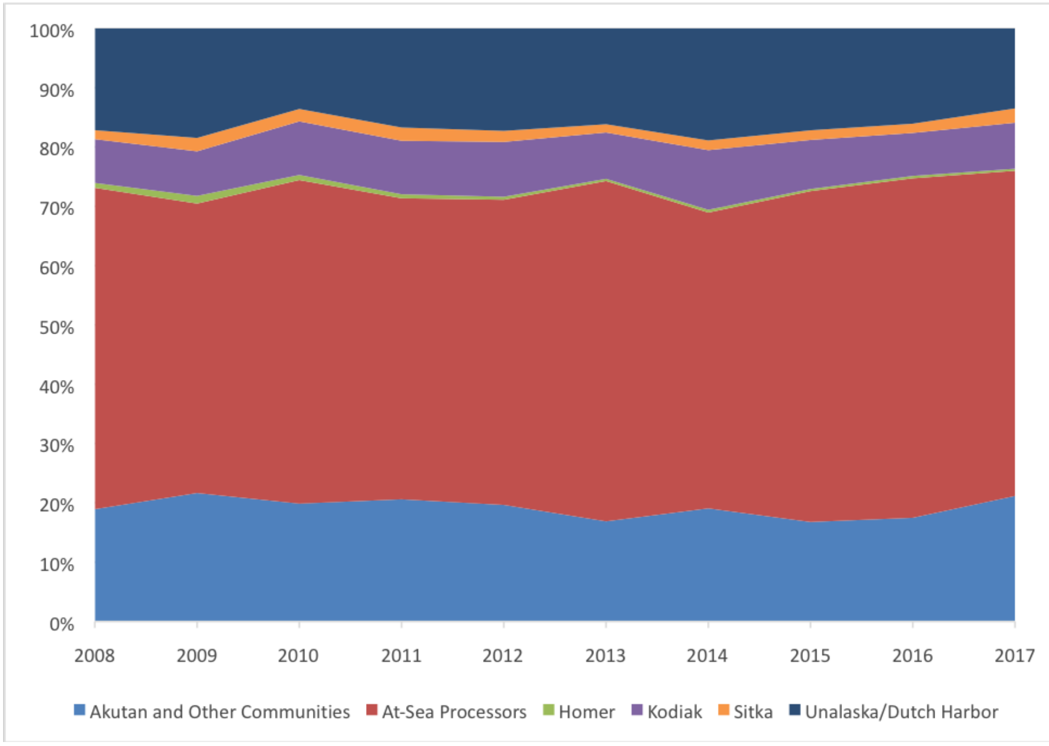


Figure 10.5: Processing regional quotient of revenue for communities highly engaged in commercial FMP groundfish processing for all years from 2008-2017.

Table 10.3: FMP groundfish commercial harvesting engagement PCFA Results.

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Ex-vessel value	Pounds landed in community	# of vessels delivering	# of processors	% variance explained	Armor's Theta
2008	3.27	0.73	0.00	0.00	0.912	0.897	0.919	0.889	82%	0.93
2009	3.2	0.8	0.00	0.00	0.905	0.884	0.913	0.873	80%	0.92
2010	3.16	0.83	0.00	0.00	0.901	0.879	0.907	0.870	79%	0.91
2011	3.13	0.87	0.00	0.00	0.897	0.872	0.902	0.866	78%	0.91
2012	3.12	0.88	0.00	0.00	0.893	0.875	0.903	0.861	78%	0.91
2013	3.22	0.78	0.00	0.00	0.905	0.891	0.919	0.872	80%	0.92
2014	3.18	0.82	0.00	0.00	0.901	0.884	0.912	0.869	80%	0.91
2015	3.16	0.84	0.00	0.00	0.895	0.884	0.909	0.865	79%	0.91
2016	3.11	0.89	0.00	0.00	0.890	0.879	0.909	0.851	78%	0.91
2017	3.18	0.82	0.00	0.00	0.903	0.884	0.920	0.858	80%	0.91

previous five year period, among those highly engaged all years, by 23% (Figure 10.8) as a result of a decline of approximately 50 FMP groundfish vessels and vessel owners in 2017 (or approximately 1/3rd) despite an increase in FMP groundfish pounds and revenues compared with 2016.

Table 10.4: Communities highly engaged in commercial harvesting FMP groundfish for one or more years from 2008-2017.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Homer	1.10	1.23	1.34	1.29	1.38	1.41	1.33	1.45	1.49	1.53
Kodiak	2.50	2.60	2.69	3.16	2.98	2.33	2.52	2.78	2.65	2.03
Petersburg	1.39	1.30	1.47	1.23	1.28	1.36	1.43	1.39	1.36	1.45
Sitka	2.23	2.63	2.66	2.54	2.59	2.61	2.74	2.56	2.79	3.02
Seattle MSA	8.29	8.17	8.07	8.00	8.03	8.24	8.13	8.09	8.08	8.15
Other Washington	1.24	1.18	1.13	1.03	0.98	0.99	0.99	0.91	0.90	0.86

Notes: *Shaded cells are index scores above one (which is one standard deviation above the mean of zero) for at least one year from 2008-2017.

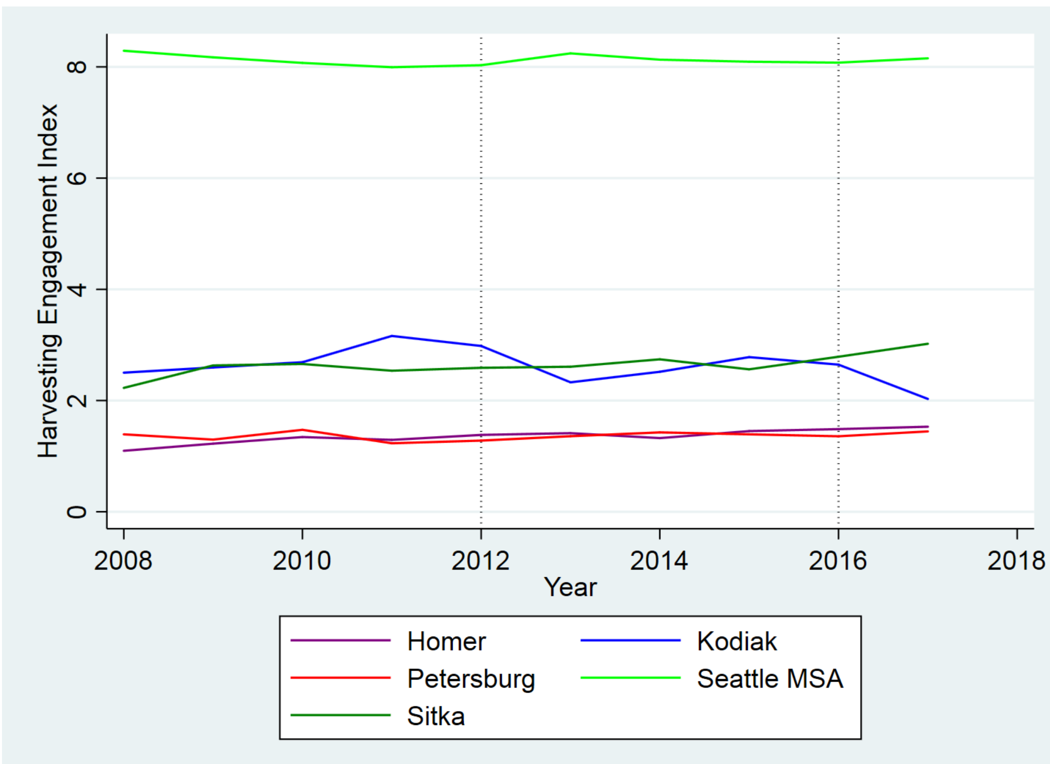


Figure 10.6: Index scores of communities highly engaged in commercial FMP groundfish harvest for all years from 2008-2017. Dotted lines indicate the previous 5 year period (2012-2016).

10.1.9 Harvesting Regional Quotient

This is a new metric reported this year as we have a full accounting of the communities with which vessel owners reside within the U.S. which summarizes where the owners of vessels participating in North Pacific FMP groundfish fisheries reside and therefore some share of fishing revenues will be entering the local economy. The harvesting regional quotient is defined as the share of North Pacific FMP groundfish commercial landings/revenues attributable to vessel owners residing in each community compared with the total North Pacific FMP groundfish landings/revenues. It is an indicator of the percentage contribution in pounds or revenue from resident vessel owners in a community relative the total (shore-based and at-sea) landings or revenue from all communities

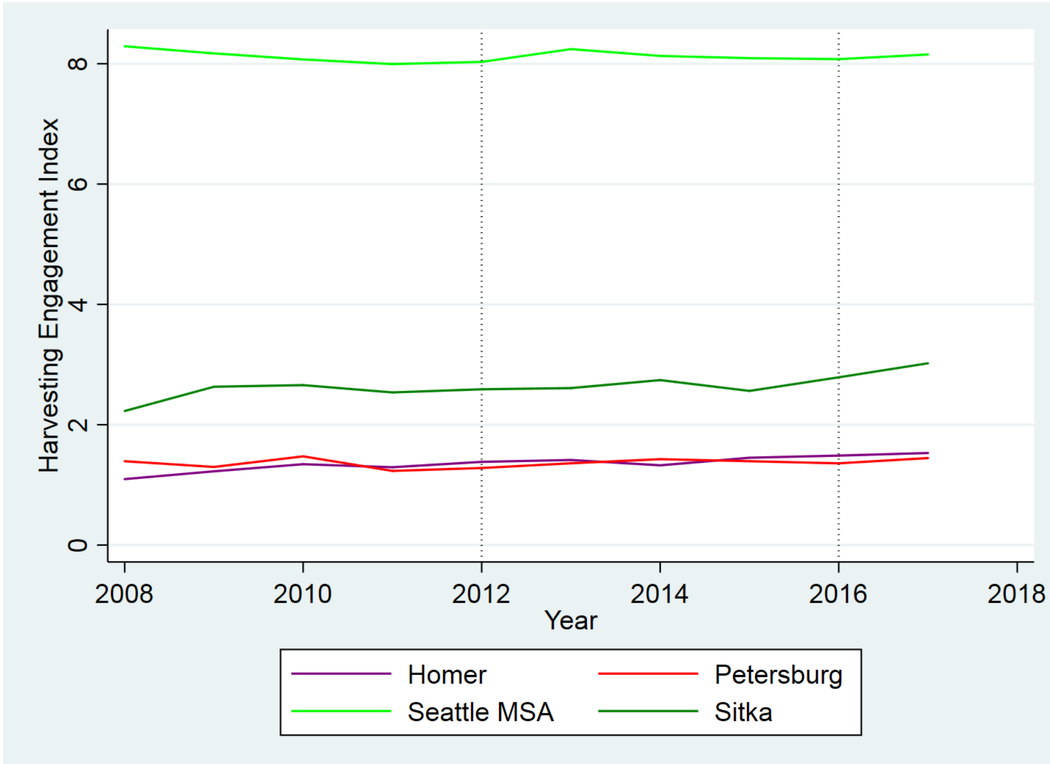


Figure 10.7: Index scores of communities highly engaged in commercial FMP groundfish harvesting for all years with increasing engagement in 2017 relative to previous 5 year average from 2012-2016.

throughout the U.S. Figures 10.9 and 10.10 show the harvesting regional quotient both in pounds and revenue from 2008-2017.

The most prominent communities for harvesting FMP groundfish in terms of landing weight and ex-vessel revenues has been the Seattle MSA grouping that accounts for 78% of the weight of FMP groundfish retained in the North Pacific on average over this period. In terms of Alaska communities, Kodiak accounts for the next largest share of pounds attributable to its resident vessel owners at approximately 5% of the regional pounds landed from 2008-2017, followed by Petersburg at 1% and Sitka and Homer each at less than 1%.

The harvesting revenue regional quotient is quite similar to the harvesting pounds regional quotient. However, in slight contrast the Seattle MSA grouping only accounted for 70% of total FMP groundfish ex-vessel revenues, while Kodiak represented 6%. Petersburg vessel owners accounted for 2% on average of FMP groundfish ex-vessel revenue, while Sitka and Homer each represented 1%.

10.1.10 Participation Summary

Based on the community engagement index scores for both commercial processing and commercial harvesting engagement, communities were categorized into low (index scores below the mean of 0), medium (index scores between 0 and .5), medium-high (index scores between .50001 and 1), and high engagement (index scores above 1) for each year. The number of years a community is in each category for the processing and harvesting engagement indices is presented in Table 10.5. There are 24 communities or community groupings in Table 10.5 that had medium, medium-high,

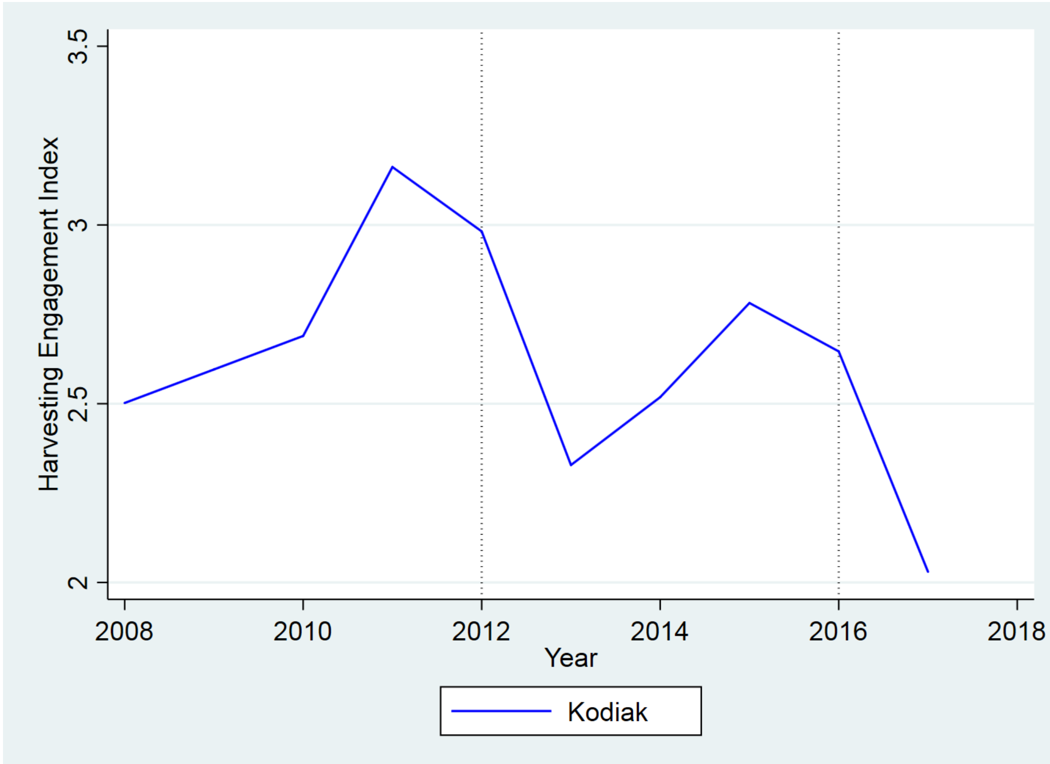


Figure 10.8: Index scores of communities highly engaged in commercial FMP groundfish harvesting for all years with decreasing engagement in 2017 relative to previous 5 year average from 2012-2016.

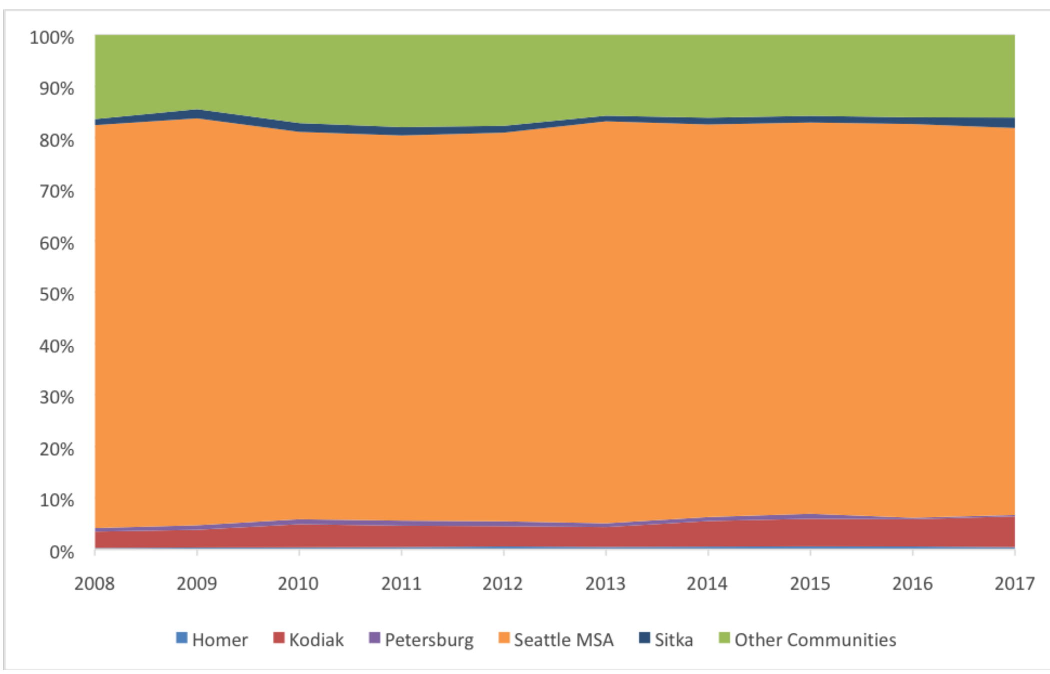


Figure 10.9: Harvesting regional quotient of pounds for communities highly engaged in commercial FMP groundfish harvesting for all years from 2008-2017.

or high engagement in either harvesting or processing engagement and 9 communities were highly engaged in one aspect of commercial fisheries in any year from 2008-2017. There were 6 communities

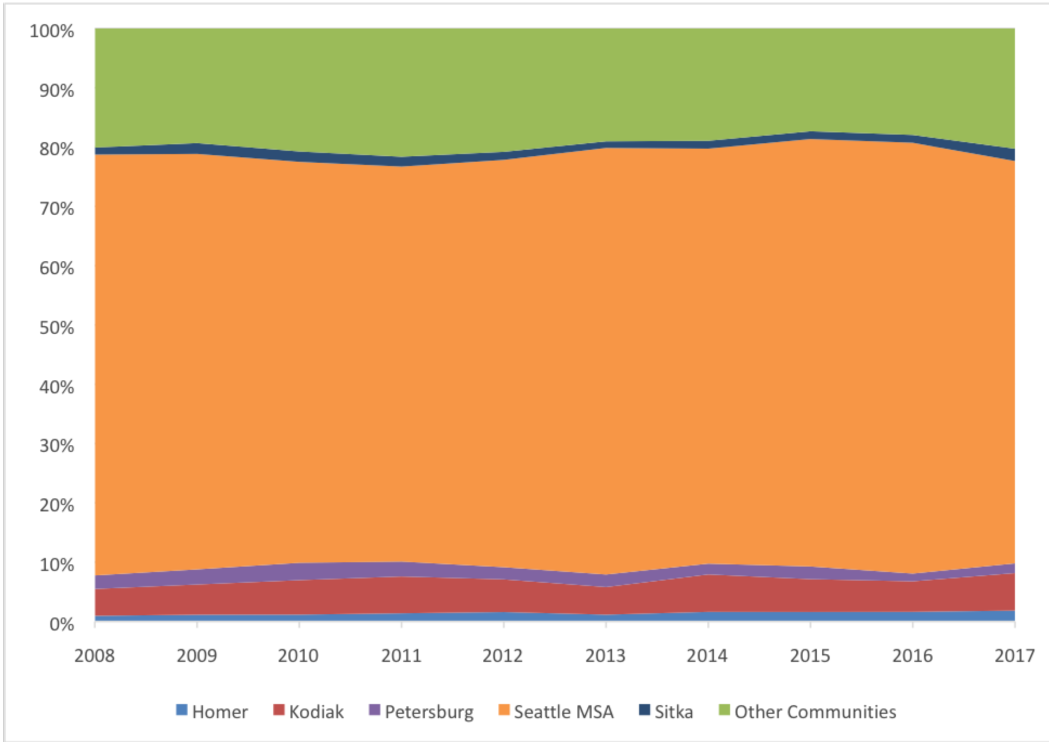


Figure 10.10: Harvesting regional quotient of revenue for communities highly engaged in commercial FMP groundfish harvesting for all years from 2008-2017.

that were highly engaged in processing engagement and 6 that were highly engaged in harvesting engagement for at least one year from 2008-2017.

10.2. Community Sketches

Seven communities were identified as having sustained and substantial engagement in the North Pacific FMP groundfish fisheries (the harvesting or processing sector, or both) for all years from 2008-2017. The seven communities are Akutan, Homer, Kodiak Island, Petersburg, Sitka, Unalaska, and the Seattle MSA. These communities differ geographically, historically, culturally, economically, and in demographic composition. The following section provides individual *Community Sketches* in order to provide additional context for each community identified as substantially engaged. These community sketches offer detailed views for six of the seven communities (Seattle MSA was not included) to increase socio-economic understanding and inform management processes regarding fishing communities relying on groundfish fisheries.

The purpose of the sketches is to: 1) present a brief but detailed snapshot of the communities with sustained and substantial engagement in groundfish fisheries; and 2) to shed light on linkages among social, economic, and policy processes to better inform management decisions. By identifying contemporary socio-economic trends, these sketches can inform assessments of groundfish fisheries and community well-being. The sketches will be updated yearly and additional communities of interest will be developed and presented according to council feedback and needs.

Table 10.5: Number of years by processing and harvesting engagement level for FMP groundfish commercial fisheries. Alaska communities not listed had low processing and harvesting engagement in all years.

	Harvesting Engagement				Processing Engagement			
Community	Low	Medium	Medium-High	High	Low	Medium	Medium-High	High
Akutan	10	0	0	0	0	0	0	10
All Other States	0	10	0	0	0	0	0	0
Anchorage	0	10	0	0	10	0	0	0
Cordova	7	3	0	0	0	9		0
Craig	0	10	0	0	4	6	0	0
Haines	9	1	0	0	10	0	0	0
Homer	0	0	0	10	0	0	0	10
Hoonah	10	0	0	0	9		0	0
Juneau	0	0	10	0	0	10	0	0
Ketchikan	0	10	0	0	2	8	0	0
King Cove	10	0	0	0	0	9	1	0
Kodiak	0	0	0	10	0	0	0	10
Newport	1	9	0	0	0	0	0	0
Other Oregon	0	10	0	0	0	0	0	0
Other Washington	0	0			10	0	0	0
Petersburg	0	0	0	10	0	6		0
Sand Point		9	0	0	0	3		0
Seattle MSA	0	0	0	10	10	0	0	0
Seward		0	0	0	0	0		3
Sitka	0	0	0		0	0	0	
Unalaska/Dutch Harbor	10	0	0	0	0	0	0	
Wasilla	4	6	0	0	0	0	0	0
Wrangell	7	3	0	0	10	0	0	0
Yakutat	10	0	0	0			0	0

Given the overarching aim of the Community Sketches—to best communicate a meaningful overview of groundfish fishing communities—it was necessary to modify the constraints of the information slightly for certain communities. First, a detailed community sketch was not created for the Seattle MSA due to the vastly different context in which Seattle MSA fisheries operate. A separate analysis of Seattle MSA will be conducted in the future in order to capture meaningful socio-economic trends relating to engagement with groundfish fisheries. Secondly, the engagement indices identified Kodiak City as one of the substantially engaged communities; however the choice was made to include the greater Kodiak Island in the community sketch in order to give attention to the close economic, social, and governance linkages among Kodiak Island communities. Finally, confidentiality concerns required that Akutan's fishing engagement data be aggregated with neighboring communities in order to avoid disclosure of confidential information. For that reason, the Akutan community sketch provides information specific to the community of Akutan, but presents aggregated fishing data from Akutan, King Cove, and Sand Point communities.

Community Sketch — AKUTAN

Demographics (self-identified, 2010 census)

Population	Gender pop. (%)	Pop. Over 18 (%)	Median household income ($)	White	Am. Indian/AK. Native	Black or African Am.
1027	23.1% female 76.9% male	98.3%	$24, 644	23.3%	5.5%	17.9%
Below poverty level (%)	**Housing units**	**Pop. Over 65 (%)**	**High school graduate or higher (%)**	**Asian**	**Native Hawaiian**	**Hispanic or Latino**
15.1%	44	3.3%	76.6%	43.3%	1.5%	20.8%

Processing Engagement: HIGH

Harvesting Engagement: LOW

Sea level rise: Probability of shoreline loss between 2 and 1 m/yr is 10-33%

Coastal hazards: Erosion threat to community's water supply. Tsunamis, **EARTHQUAKES**, storm surges, **COASTAL EROSION**, coastal flooding, riverine erosion, and **VOLCANOES**.

**Bold indicates high hazard potential*

Native Associations & Corporations:

- Akutan Corporation
- Aleut Corporation
- Aleutian Pribilof Islands Association

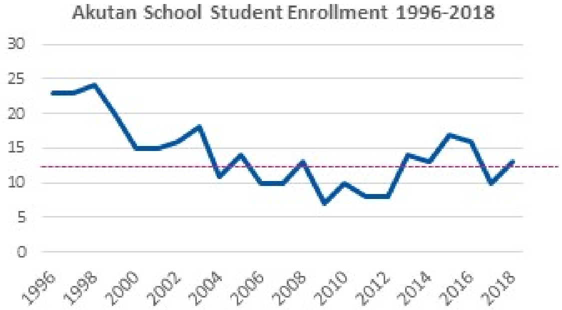
Area Description

Akutan is located on Akutan Island, one of the Krenitzin Islands of the Fox Island group in the eastern Aleutians. Located 35 miles east of Unalaska and 766 miles southwest of Anchorage, the area occupies 14m^2 of land and 4.9m^2 of water. The Aleuts of the region were the first to be involved in North Pacific fisheries. Historically, salmon, cod, herring, and other fish were targeted throughout the Aleutian chain. During World War II, Akutan residents were evacuated and many original residents did not return. Akutan was incorporated as a Second-class city in 1979 and is under the jurisdiction of the Aleutians East Borough. According to the 2010 census, the average household size is 2.25 (a decrease from 2000), and there were a total of 44 housing units. Of the households surveyed in 2010, 30% were owner-occupied, (74% in 2000), 61% were renter occupied (16% in 2000), 9% were vacant (11% in 2000), and zero houses were seasonally occupied. Group quarters with the processing plant houses 937 people, up from 638 in 2000. There are approximately 100 year round residents; however between 2008-2017 the number of residents eligible for the PFD increased by 139.74%.

Infrastructure & Transportation

Akutan's airport opened in 2012 and is located seven miles east on Akun Island, servicing the community by helicopter. The state ferry serves Akutan biweekly from May to September. Akutan has a 100-foot public dock and a 58-vessel mooring basin. Trident Seafoods owns several commercial docks.[2] Water derives from a stream and dam constructed in 1927. A community septic tank treats sewage before discharge. Electricity depends on hydropower with diesel backup. Household heating relies on fuel oil and kerosene.[3] The Akutan School provides K-12 education. School enrollment has decreased to 13 students in 2018, hovering just above the state closure threshold for several years.[4]

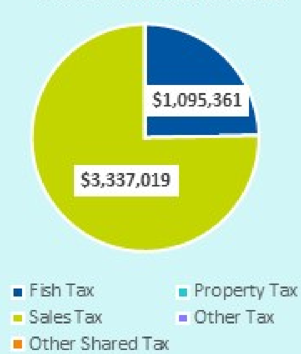
Akutan School Student Enrollment 1996-2018



Current Economy

Akutan's economy is primarily based on commercial fishing and subsistence harvest. Subsistence is vitally important to the community as a source of food and cultural identity. The main employer is the processing facility.

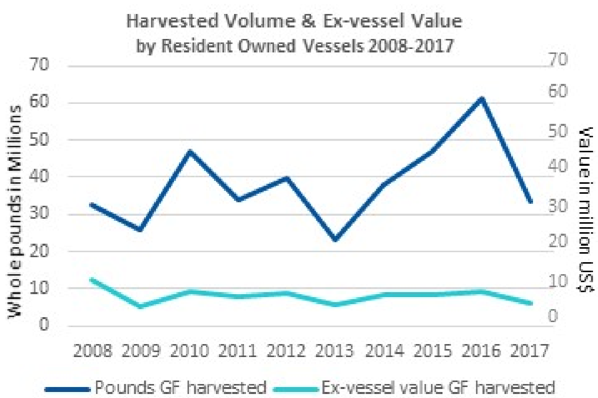
Akutan 2017 Tax Revenue



The Trident Seafoods' Akutan plant is the largest facility in North America, processing over three million pounds of product per day and capable of housing up to 825 employees.[3] In 2016, the median household income was estimated to be $40,067 and per capital income $28,335, up from $34,375 and $20,099 in 2010 respectively. [2] The unemployment rate was an estimated 3.6% in 2016, up from 2.7% in 2010. In 2017, fish related tax brought in $1.1 million (25%) of the total municipal tax revenue, funding needed services for the community.[5]

Fishing History and Regulatory Background

Historically, Aleuts harvested salmon, cod, herring, and other species around Akutan. Subsistence harvest continues to be important. Commercial fisheries began in the late 1800s, and today Akutan is one of the busiest fishing ports in the world.[3] Crab fisheries began in 1930 and accelerated in size and scope in the 1950s, when king crab fisheries developed in the Bering Sea. King crab harvests peaked in the 1970s and early 1980s, today, crab harvests remain at comparatively low levels. Akutan's proximity to the Bering Sea brought the processing industry in the late 1940s, first through floating processors, followed by a shore-based processing plant in the 1980s by Trident Seafoods.[2] The Akutan community comprises two distinct subgroups: long term residents who live in the village year-round and processing plant employees who live in group quarters. This dichotomy is evident in the village's successful campaign to participate in the Community Development Quota program (represented by the Aleutian Pribilof Islands Community Development Association).[8] Akutan is located in Federal Reporting Area 519, International Pacific Halibut Commission (IPHC) Regulatory Area 4B, and the Aleutian Islands Sablefish Regulatory Area.



Harvesting Engagement — *LOW*

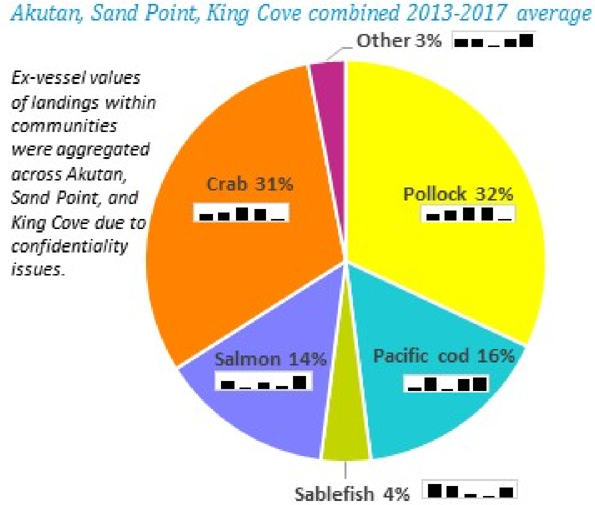
Due to the small number of participants, some data are considered confidential. For this reason, data were aggregated to include adjacent communities within the Aleutians East Borough (AEB). Between 2008-2017, the number of pounds groundfish harvested increased by just under 1 million pounds (an increase of 3%); however the ex-vessel value declined substantially during the same time period, falling from $12 million to $6 million (over 50%). Very few vessels are owned by Akutan residents. The small portion of vessels owned by Akutan residents has steadily decreased from six in 2008 to only one in 2017. There have been no groundfish fishing vessels owned by Akutan residents since 2014.

Processing Engagement — *HIGH*

Akutan has the largest seafood production facility in North America.[2] During peak seasons in the winter and summer, the plant can accommodate 825 employees and the processing sector is the largest employer in the community.[9] The top species landed are pollock, Pacific cod, crab, halibut, and sablefish. Due to the small number of participants, some data are considered confidential. The combined processing sectors of Akutan, Sand Point, and King Cove landed a total volume of 686 million pounds of groundfish in 2017, a 53% increase from 2008. The associated ex-vessel value of total landings decreased by $104 million, (down 16%) since 2008. Pollock value dropped most, declining 18%. In 2017, groundfish made up 15% of total landed volume and 48% ex-vessel value within the region's processing sector, which is a slight decrease from 41% in 2008.[7]

Share of revenue landed by species

Akutan, Sand Point, King Cove combined 2013-2017 average



Bar charts represent 2013-2017 ex-vessel values (2017$) by species landed in community. The scale of the y-axis is specific to the species.

Citations:

[1] American Fact Finder, Retr'd 10/1/2018 https://factfinder.census.gov

[2] Himes-Cornell, et al. (2013). *Community profiles for North Pacific fisheries* - Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 1

[3] Fey, M. et. al (2016) *Fishing Communities of Alaska Engaged in Federally Managed Fisheries.* NPFMC.

[4] School enrollment statistics compiled from AK. Dept. of Education & Early Development Retrieved 08/30/2018 at http://www.eed.state.ak.us/stats/

[5] Tax data from AK. Dept. of Revenue, Annual Reports 2008-2017. Retr.' 10/15/2018 from http://tax.alaska.gov/programs/sourcebook/index.aspx; Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retr.'10/20/2018 https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/AlaskaTaxableDatabase.aspx

[6] Alaska Community Survey, Alaska Fisheries Science Center 2013

[7] Alaska Fisheries Information Network (AKFIN).(2018).Commercial Comp. AK [dataset]

[8] The Aleutian Pribilof Islands Association website. Retrieved 12/01/2018 at https://www.apiai.org/tribes/akutan/

[9] Trident Seafoods website. Retrieved on 09/01/2018 @ http://www.tridentseafoods.com/Our-Story/Our-Plants

Alaska Fisheries Science Center
Economic and Social Sciences Research Program

Stock Assessment and Fishery Evaluation Report

Community Sketch — HOMER

Demographics (self-identified)*

Population	Gender pop. (%)	Pop. Over 18 (%)	Median household income ($)	White	Am. Indian/AK. Native	Black or African Am.
5,003	50.5% female 49.5% male	78.1%	$57,471	89.3%	4.1%	0.4%
Below poverty level (%)	**Housing units**	**Pop. Over 65 (%)**	**High school graduate or higher (%)**	**Asian**	**Native Hawaiian**	**Hispanic or Latino**
9.8%	2,692	14.5%	95.1%	1.0%	0.1%	2.1%

Harvesting Engagement: HIGH

Processing Engagement: HIGH

Sea level rise: Probability of shoreline loss between 2 and 1 m/yr is 10-33%

Coastal hazards:
- tsunamis, **EARTHQUAKES**, **COASTAL EROSION**, flooding, erosion, **VOLCANOES**, wildfires, snow and avalanches, severe weather

**Bold indicates high hazard potential*

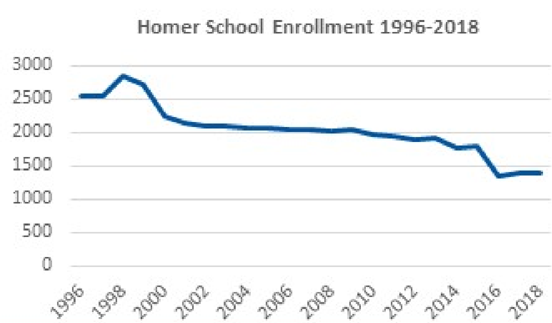
Native Associations & Corporations:
- Aleut Ninilchik Natives Association

Area Description

Homer is located on the north shore of Kachemak Bay on the southwestern edge of the Kenai Peninsula. The Homer Spit, a 4.5-mile long bar of gravel, extends from the Homer shoreline. It is 227 road miles south of Anchorage, at the southern-most point of the Sterling Highway. The area encompasses 10.6 square miles of land and 14.9 square miles of water. The City of Homer was incorporated in March 1964. As in many Alaskan communities, subsistence harvest is an important part of the local way of life. According to the 2010 census, the average household size is 2.21 (decreased from 2.4 in 2000), and there were a total of 2,692 housing units. An estimated 140 residents lived in group housing in 2016 (up from 71 in 2010). An additional 4,000 seasonal workers reside in Homer each year between April and October, mostly driven by employment in fishing sectors, with an annual population peak in July. Between 2008 and 2017 the number of residents eligible for the PFD increased by 5.28% suggesting an increase in residential stability. Homer was not included under the Alaska Native Claims Settlement Act (ANCSA).

Infrastructure & Transportation

In addition to being on the road system, Homer is also accessible via an airport, which has an asphalt runway and a float plane basin, and a seaplane base at Beluga Lake. The community is served by scheduled and chartered aircraft services. The community is serviced by the state ferry three times a week in winter and three to four times per week in the summer, with service to Kodiak and Seldovia. The community's deep-water dock can accommodate 30-foot drafts and 340-foot vessels. There is a cruise ship dock, a boat harbor with moorage for 920 vessels, and a 4-lane boat launch ramp.[4] There are several medical facilities. There are nine schools in the Homer area servicing 1400 K-12 students. Overall enrollment has decreased nearly 45% since 1996.[5]

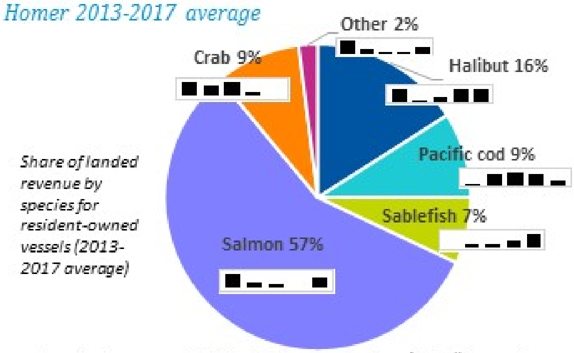


Current Economy

Important economic drivers in Homer include commercial fishing ecotourism, and sport hunting and fishing.[1] In 2017, the Kenai Peninsula Borough generated $775,640 in fishery related taxes, presumably some of which was spent in Homer. An estimated 50 residents are employees of shore-side processing plants.[3] In 2016, per capita income in Homer was estimated to be $31,899, and the median household income was estimated to be $52,057. This represents a significant increase reported in 2000 ($21,823 and $42,823, respectively).[1] During the same year, unemployment was estimated at 7.4%.[ibid] A full range of fisheries-related services are available in Homer, including fish processing plants, cold storage facilities, fishing gear manufacture, sales, repair, and storage, boat repair, haul-out facilities and tidal grids for boats.

Share of harvest revenue landed by species

Homer 2013-2017 average

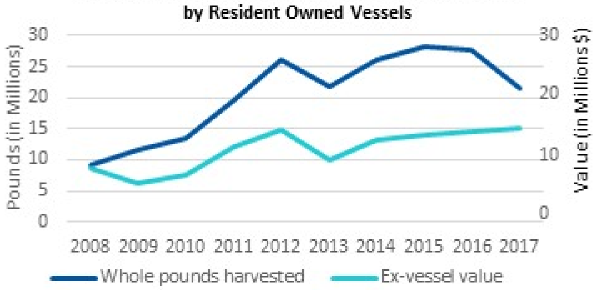


Bar charts represent 2013 to 2017 ex-vessel values (2017$) by species landed in the community. The scale of the y-axis is specific to the species.

Harvesting Engagement — *HIGH*

Homer fishers are diversified in commercial fisheries, including salmon, halibut, crab, groundfish, herring, and "other shellfish". Salmon remains the most abundant and valuable species; however a wide range of fishing vessels use Homer as a base of fishing operations.[3] On average from 2008-2017, the majority of harvest revenue came comes first from salmon (57%), then halibut (16%), then Pacific cod (9%). Fishing vessels owned by Homer residents increased from 306 vessels (2008) to 381 vessels (2017), an increase of 25%. Simultaneously, ownership of groundfish vessels among Homer residents increased by 10% from 90 (2008) to 99 (2017), peaking in 2012 at 109 vessels. The volume of groundfish harvested increased a notable 137%, from 9.09 (2008) to 21.6 million (2017) pounds. Meanwhile, the ex-vessel value increased from $8.7 to $15.1 million (31%).

Groundfish Harvested Volume & Ex-vessel Value by Resident Owned Vessels



Citations:

[1] Himes-Cornell, et al. (2013). *Community profiles for North Pacific fisheries - Alaska.* U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 1

[2] American Fact Finder, Retr'd 10/1/2018 https://factfinder.census.gov

[3] Alaska Community Survey, Alaska Fisheries Science Center 2013

[4] Fey, M. et. al (2016) *Fishing Communities of Alaska Engaged in Federally Managed Fisheries.* NPFMC.

[5] School enrollment statistics compiled from AK. Dept. of Education & Early Development Retrieved 08/30/2018 at http://www.eed.state.ak.us/stats/

[6] Alaska Fisheries Information Network (AKFIN).(2018).Commercial Comp. AK [dataset].

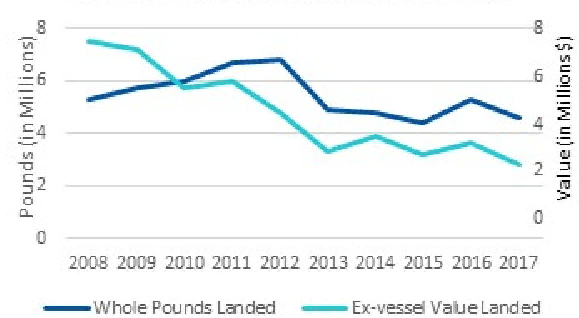
[7] Tax data from AK. Dept. of Revenue, Annual Reports 2008-2017. Retr.' 10/15/2018 from http://tax.alaska.gov/programs/sourcebook/index.aspx; Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retr.'10/20/2018 https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/AlaskaTaxableDatabase.aspx

Fishing History and Regulatory Background

Homer is located in the traditional territory of the Kenaitze people, a branch of Athabascan Native Americans. Historically, the Kenaitze had summer fish camps along the rivers and shores of Cook Inlet. Commercial fisheries began to develop in the Cook Inlet area in the mid 1800s. Salmon and herring were two of the earliest commercial fisheries in Alaska. Commercial exploitation of halibut and groundfish first extended into the Gulf of Alaska (GOA) in the 1920s. The first year-round processing facility in Homer in 1954 specializing in frozen king crab and shrimp. Until the early 1960s, Seldovia served as a regional center for seafood processing and fishing activity; however, after the Good Friday earthquake of 1964 destroyed Seldovia's waterfront, Homer began to take over this role. Homer is located in the Lower Cook Inlet state fishery management area, Federal Statistical and Reporting Area 630, Pacific Halibut Fishery Regulatory Area 3A, and the Central GOA federal Sablefish Regulatory Area.[1] Homer is in House District 31, Senate District P.

Processing Engagement — *HIGH*

Groundfish Processed Volume & Ex-vessel Value



Homer is one of the leading processing communities in Alaska. In 2017, Homer's processing sector processed 4.6 million pounds of groundfish, which is a 14% increase from 2008. The associated ex-vessel value of total landings has decreased substantially since 2008, from $7.5 to $2.8 million, (down 63% since 2008). Between the years 2008-2017. All groundfish species showed declines in volume and associated value; however Pollock had the largest drop in value, falling 80% since 2008. In 2017, groundfish comprised 35% of total volume processed in Homer, down slightly from 2016 (39%), but showing an overall increase from 28% in 2008. Within Homer's processing sector, groundfish have ranged between 8-15% of total ex-vessel value since 2008. The highest percentage was in 2008 (15%) dipping to 8% in 2010. As of 2017, groundfish constitute 11% of associated value.[6]

NOAA FISHERIES

Alaska Fisheries Science Center
Economic and Social Sciences Research Program

Stock Assessment and Fishery Evaluation Report

Community Sketch

KODIAK ISLAND

Demographics (self-identified, 2010 census) – *All Communities*

Kodiak Island

	Akhiok	Chiniak CDP	Karluk	Kodiak City	Larsen Bay	Old Harbor	Ouzinkie	Port Lions
Population	71	47	37	6,130	87	218	161	194
AK. Native	50.7%	8.5%	94.6%	13.8%	75.9%	89.0%	87.0%	61.3%
Housing Units	32	27	25	2,173	76	119	109	143
Med. Income	$27,500	N/A	$18,000	$69,868	$36,250	$29,063	$39,375	$32,917
Poverty	20.8%	N/A	27.5%	10.9%	35.7%	22.8%	14.6%	23.4%
Med. age	36	N/A	19	36	47	29	35	49
High School Ed. or higher	100%	N/A	70.6%	85.3%	81.8%	77.1%	70.6%	86.7%

Harvest Engagement: HIGH

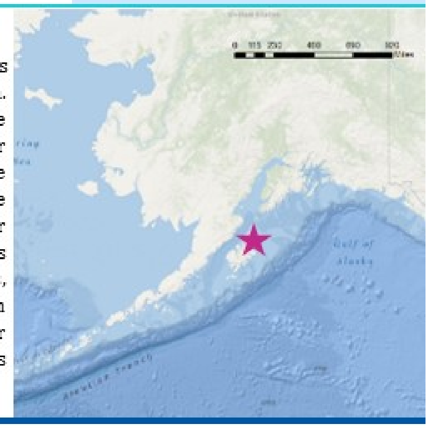
Processing Engagement: HIGH

Coastal hazards: TSUNAMIS, EARTHQUAKES, storm surges, EROSION, Flooding, VOLCANOES.
**Bold indicates high hazard potential*

Native Associations & Corporations
- Natives of Kodiak, Inc.
- Koniag, Incorporated
- Kodiak Area Native Association

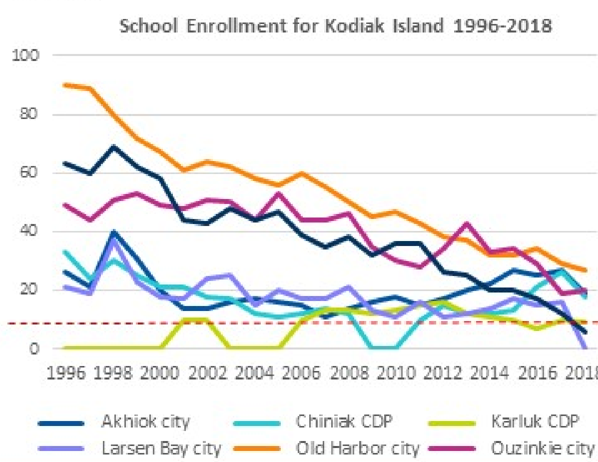
Area Description

The largest island in the Gulf of Alaska, Kodiak Island (KI) is approximately 25 miles across the Shelikof Straight from the Katmai Coast and 90 miles southwest of the Kenai Peninsula. All of Kodiak Island communities are highly dependent on some form of fisheries. The majority of commercial vessels and seafood processing plants are in Kodiak City; however other communities rely heavily on commercial, recreational, and subsistence fishing. There are two main harbors in Kodiak City: St. Paul Harbor and St. Herman Harbor which is the larger of the two. According to the US census, the population estimate is 13,448 with over half living in Kodiak City. The other seven island communities reported populations between 37 and 218. Native Alaskans represent the majority of residents of KI communities, except Kodiak City which has a more diverse population as the island's urban center. In 2016, the average household size for KI was estimated to be 3.06 (this increased to 3.52 for Kodiak City), up slightly from 2.94 (2010). Between 2008 and 2017, the number of residents eligible for the PFD decreased by -3.35% indicating a reduction in stable residency.[1]

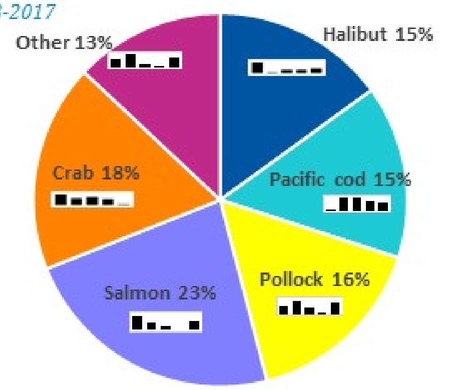


Infrastructure & Transportation

Kodiak Island is accessible by air and sea, however accessibly varies drastically among communities. Kodiak City has two small airports, which are served with several daily flights. Air taxi services provide flights to five remote villages; however weather conditions often restrict travel. City-owned seaplane bases at Trident Basin and Lilly Lake accommodate floatplane traffic. The state ferry operates three to four times a week between Kodiak and Homer, and in the summer months, includes other ports as far west as Unalaska. The Port of Kodiak has two boat harbors with 600 boat slips. Three deep-draft piers accommodate ferries, cruise ships, container ships, military vessels, and a variety of large commercial fishing vessels. Boat launch ramps, a shipyard, and 150 ton vessel lift are available. Island communities have limited access to medical services and residents must travel to Kodiak City or Anchorage for treatment. Maintaining adequate school enrollment is a grave concern for Kodiak communities which have struggled to keep schools open with declining enrollment. K-12 school enrollment has decreased by 13% since 1996. Other schools saw enrollment declines from 7% (Akhiok) to 63% (Old Harbor). Larsen Bay School closed in 2018, and Karluk school is pending closure. Kodiak City was not included in the analysis due to difference in size of schools.



Kodiak Island Share of Revenue Harvested by Species
2013-2017



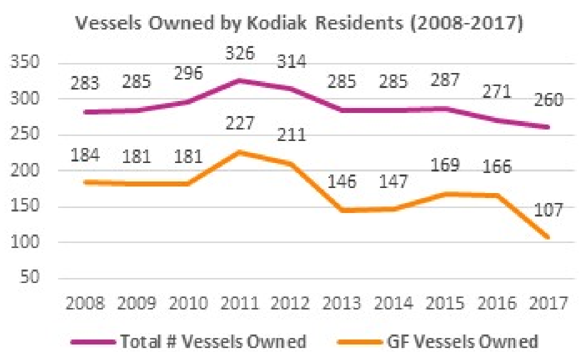
Bar charts represent 2013 to 2017 ex-vessel values (2017$) by species landed in the community. The scale of the y-axis is specific to the species.

Fishing History and Regulatory Background

The Alutiiq peoples have harvested fish, marine invertebrates, and marine mammals for thousands of years on Kodiak Island. Reliance on subsistence resources is vital.[2] Commercial fisheries began in the early 1800s, and today Kodiak City is Alaska's second largest commercial fishing port in volume of seafood landed. Top species are salmon (23%), crab (18%), Pollock (16%), halibut and Pacific cod (both 15%).[7] Kodiak is located in Federal Statistical and Reporting Area 630, Pacific Halibut Fishery Regulatory Area 3A, and Central Gulf of Alaska Sablefish Regulatory Area.

Harvesting Engagement — HIGH

The volume of groundfish harvest has increased by 151% since 2008, from 119 million (2008) to 298 million pounds (2017). The associated ex-vessel value of landings increased $10.5 million (up 25%). Between 2008-2017, resident ownership of GF vessels decreased by 77 vessels (42%).



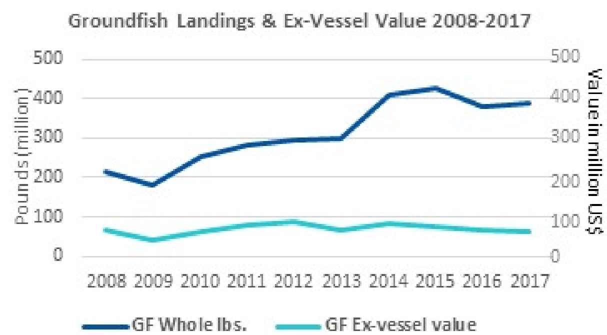
Small communities were severely impacted by the decline. Ouzinkie's GF vessels decreased from 12 to 6, and Port Lions decreased from 9 to 5 vessels since 2008. Kodiak City lost 65 vessels (38%).[2] The drop in the volume of Pacific cod harvested (volume was down by 14% in 2016 and 12% in 2017) likely contributed to the drastic reduction in vessels owned by Kodiak island residents, particularly in the jig fleet.

Current Economy

Commercial fishing, seafood processing, and commercial fishing support services are the major industries contributing to the local economy.[2] The U.S. Coast Guard station and hospital are also significant employers. Other industries include retail services and government. Tourism is growing, and recreational fishing, hiking, and kayaking are increasing in popularity. Kodiak's economy is reliant on fishing, logging, ecotourism, and sport hunting/fishing.[5] In 2017, Kodiak collected $2.34 million in fisheries-related taxes, compared to $5.27 in 2010 and $3.63 million in 2000. The bulk of tax revenue (85%) comes from property taxes, reported as $15.7 million in 2017. However, it should be noted that data related to port/dock usage fees are not available for 2017 or 2010. Since those fees accounted for a significant portion of fisheries-related revenue in previous years, it is likely that revenue figures are underrepresented.

Processing Engagement — HIGH

Kodiak Island has several multi species processors in Kodiak City and one plant in Larsen Bay, as well as a primarily salmon facility in Alitak. Top species processed in Kodiak Island are salmon at 31% of total ex-vessel value, followed by pollock at 20%. In 2017, Kodiak facilities processed 387 million pounds of groundfish worth $63.8 million (99% of which is processed in Kodiak City). Groundfish volume has increased steadily since 2008 (by 79.9% overall) while the value landed in Kodiak Island has decreased by 5.7% in the same time period. The Larsen Bay facility has not landed groundfish since 2011. [7]



Citations:

[1] American Fact Finder, Retr'd 10/1/2018 https://factfinder.census.gov

[2] Himes-Cornell, et al. (2013). *Community profiles for North Pacific fisheries - Alaska.* U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 1

[3] Fey, M. et. al (2016) *Fishing Communities of Alaska Engaged in Federally Managed Fisheries.* NPFMC.

[4] School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retrieved 08/30/2018 at http://www.eed.state.ak.us/stats/

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[7] Alaska Fisheries Information Network (AKFIN).(2018).Commercial Comp. AK [dataset]

NOAA FISHERIES

Alaska Fisheries Science Center
Economic and Social Sciences Research Program

Stock Assessment and Fishery Evaluation Report

Community Sketch Petersburg

Demographics (self-identified) [1]

Petersburg						
Population	Gender pop. (%)	Pop. Over 18 (%)	Median household income ($)	White	Am. Indian/AK. Native	Black or African Am.
3,815	46.4% female 53.6% male	76.6%	$63,940	71.1%	16.1%	0.4%
Below poverty level (%)	Housing units	Pop. Over 65 (%)	High school graduate or higher (%)	Asian	Native Hawaiian	Hispanic or Latino
9.3%	1,764	11.5%	92.4%	2.6%	0.2%	3.4%

Harvesting Engagement: HIGH

Processing Engagement: MED-HIGH

Sea level rise: Probability of shoreline loss between 2 and 1 m/yr is 10-33%.

Coastal hazards: **TSUNAMIS**, **EARTHQUAKES**, flooding, erosion, volcanoes, severe weather

**Bold indicates high hazard potential*

Native Associations & Corporations:

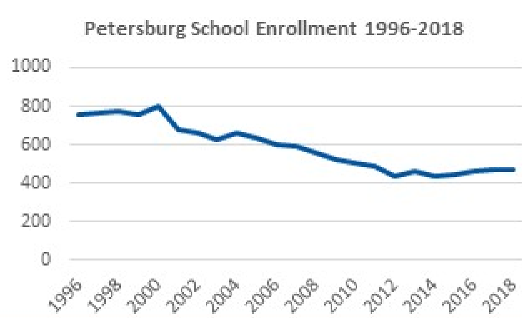
- Petersburg Indian Association

Area Description

Historically utilized by Tlingits as a fish camp, Petersburg is located on the northwest end of Mitkof Island. In the 1800s Norwegian immigrants settled in the area and in 2013, the City and Borough of Petersburg was formed. [1] The community maintains a mixture of Tlingit and Scandinavian history. It is known as "Little Norway" for its history and annual Little Norway Festival during May. As in many Alaskan communities, subsistence harvest is an important part of the local way of life. Residents include salmon, halibut, shrimp, and crab in their diet. [ibid] The average household size in Petersburg has decreased over time from 2.56 per household (2000) to 2.36 (2010). During the same period, the number of households increased slightly, from 1,240 (2000), to 1,252 (2010).[2] The number of Petersburg City residents living in group quarters is approximately 46;[1] although this is not associated with fisheries. Between 2008 and 2017 the number of residents eligible for the PFD decreased by -9.06% indicating a reduction in stable residency.[2]

Infrastructure & Transportation

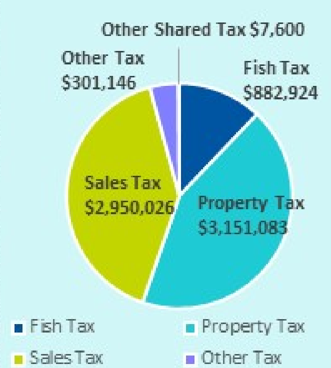
Petersburg is accessible by air and water. The community is serviced twice daily by Alaska Airlines with flights to Juneau and Seattle as well as charter services. A seaplane base is also available. The Alaska Marine Highway provides regular ferry service. Petersburg is on the mainline route which connects Bellingham to Southeast Alaska. The ferry operates five times a week most of the year. Harbor facilities include a petroleum wharf, barge terminals, three boat harbors with moorage for 700 boats, a boat launch, and a boat haul-out. Freight arrives by barge, ferry, or cargo plane. There is no deep-water dock for large ships such as cruise ships. Water in Petersburg is sourced from a 200-million gallon water reservoir.[2] There are three schools with a total enrollment of 467 students.[3]



Current Economy

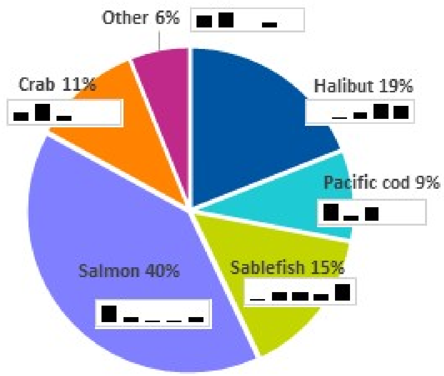
Historically, Petersburg's economy has been based on commercial fishing and timber harvests. Today, Petersburg is one of the top-ranking ports in the U.S. Between 100 to 250 residents work in shore-side processing plants. An estimated 600 to 800 seasonal workers reside in Petersburg between April and November for the fishing industry. A smaller number of seasonal employees also work in the tourism industry, some logging, and for the Tongass National Forest.[4] Although there is no deep-water dock for large ships such as cruise ships,[5] some small-ship cruise lines stop in Petersburg.[6] Local charter boats and fishing lodges are one draw for tourism in the community. Median per capita income (which is available only on the borough level) was estimated to be $36,307 in 2014, decreasing to $34,788 in 2016. The unemployment rate was estimated to be 4% in 2016.[2]

Petersburg 2017 Tax Revenue



Share of harvest revenue landed by species

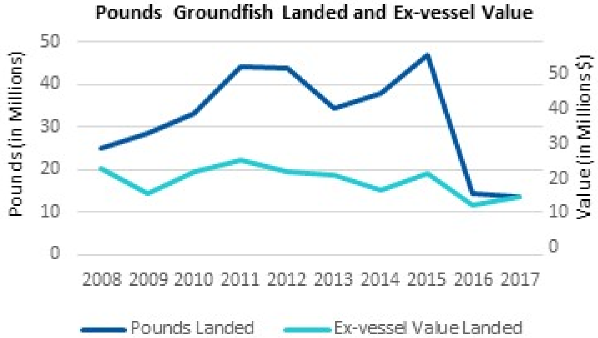
Petersburg 2013-2017 average



Bar charts represent 2013 to 2017 ex-vessel values (2017$) by species landed in the community. The scale of the y-axis is specific to the species.

Harvesting Engagement — HIGH

A portion of the Petersburg fishing fleet is involved in the fisheries management process in Alaska through an industry coalition, the Petersburg Vessel Owners Association.[4] They noted challenges for Petersburg's fishing economy include the loss, degradation, and aging of local commercial fishing infrastructure, high expenses for transportation and shipping to and from Petersburg, and difficulties for the younger generation to enter fisheries due to the high price of permits.[ibid] The amount of volume groundfish harvested has shown an overall decrease of 46% since 2008. During the same time period the associated value decreased by 35% (to 13.5 million in 2017). The largest drop in pounds groundfish harvested was in 2016, falling from 47.1 to 14.3 million pounds (a 70% decrease). The associated value also fell from $18.9 million to $11.7 million (or 38%) in 2016. This dramatic decrease was driven primarily by the drop in Pacific cod harvest. Between 2008 and 2017, vessels owned by residents fluctuated, with an overall decrease from 107 vessels (2008) to 94 (2017), a 12% drop.



Fishing History and Regulatory Background

Petersburg has participated in commercial fisheries since the late 1800s. Commercial harvest of salmon began in the late 1870s and soon after, a commercial fishery began for halibut, with sablefish targeted as a secondary fishery.[1] Today, Petersburg is one of Alaska's major fishing communities. Although salmon continues to be the most abundant and valuable species, Petersburg has a diversified fleet that participates across numerous State and federal fisheries including GOA halibut and sablefish, BSAI and State crab, dive fisheries, and herring. As in many Alaskan communities, subsistence harvest continues to be an important part of daily life. Pacific cod and lingcod are harvested under state regulations, independent of federal fisheries for these species. Halibut and Pacific cod fisheries utilize longline gear, while the Southeast Alaska lingcod fishery uses dinglebar troll gear, a salmon power troll gear modified with a heavy metal bar to fish for groundfish. Management of the Southeast Alaska lingcod fishery includes a winter closure for all users, except longliners, to protect nest-guarding males. Crab fisheries in Southeast Alaska target red, golden and blue king crab, Tanner crab, and Dungeness crab. Dive fisheries for sea cucumber and sea urchin have grown. Petersburg is located in Pacific Halibut Fishery Regulatory Area 2C and Federal Statistical and Reporting Area 659. Petersburg is in House District 35, Senate District R.

Processing Engagement — MED-HIGH

The Petersburg processing sector processed a total volume of 45.5 million pounds fish in 2017; of that 1.3 million pounds were groundfish species. While the processing sector increased volume by 151% from 2008, the volume of groundfish decreased by 35% during the same time. The associated ex-vessel value of groundfish processed increased slightly from $5.5 to $5.9 million (up 7.6%) since 2008. The ratio of groundfish to total landings diminished in the last decade. In 2008, groundfish comprised 11% of total volume processed in Petersburg; this amount fell steeply to 3% of total landings in 2009, and has since remained low. In 2017, groundfish made up 2.8% of total landings (1.3 million pounds).

Citations:

1 American Fact Finder, Retr'd 10/1/2018 https://factfinder.census.gov

2 Alaska Community Survey, Alaska Fisheries Science Center 2013

3 Alaska Fisheries Information Network (AKFIN).(2018).Commercial Comp. AK [dataset]

4 Himes-Cornell, et al. (2013). *Community profiles for North Pacific fisheries* - Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 1

5 Fey, M. et. al (2016) *Fishing Communities of Alaska Engaged in Federally Managed Fisheries.* NPFMC.

6 School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retrieved 08/30/2018 at http://www.eed.state.ak.us/stats/

7 Tax data from AK. Dept. of Revenue, Annual Reports 2008-2017. Retr.' 10/15/2018 from http://tax.alaska.gov/programs/sourcebook/index.aspx; Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retr.'10/20/2018 https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/AlaskaTaxableDatabase.aspx

Community Sketch SITKA

Demographics (self-identified)[1]

Sitka	Population	Gender pop. (%)	Pop. Over 18 (%)	Median household income ($)	White	Am. Indian/AK. Native	Black or African Am.
	8,881	49.5% female 50.5% male	76.5%	$70,160	65.3%	16.8%	0.5%
	Below poverty level (%)	**Housing units**	**Pop. Over 65 (%)**	**High school graduate or higher (%)**	**Asian**	**Native Hawaiian**	**Hispanic or Latino**
	9.2%	4,175	11.4%	93.5%	6.0%	0.3%	4.9%

Area Description

The location of Sitka was settled by the Tlingit several thousand years ago, with the name deriving from the Tlingit Shee At'iká, meaning "People on the Outside of Shee (now Baranof Island)." Fur trading, gold mining and fish canning were mainstays in the town's growth. For the 2010 census, there were 8,881 residents.[1] Community leaders noted that Sitka has approximately 1,800 seasonal workers each year: this annual peak in population is mostly driven by fisheries and tourism. In 2010, the average household size in Sitka was 2.43, (increased from 2.8 in 1990 and 2.61 in 2000). The total number of housing units increased from 2,939 (1990) to 3,278 (2000) to 3,545 (2010), and estimated at 4,220 in 2017[2]. There were no reports of residents living in group quarters between 1990 and 2010. An estimated 224 are unemployed. Between 2008 and 2017 the number of residents eligible for the PFD decreased by -1.80% indicating a slight reduction in stable residency. Sitka was included under the Alaska Native Claims Settlement Act.[1,2]

Harvesting Engagement: **HIGH**

Processing Engagement: **HIGH**

Sea level rise: Probability of shoreline loss between 2 and 1 m/yr is 10-33%

Coastal hazards: **TSUNAMIS**, volcanoes **EARTHQUAKES**, flood, **LANDSLIDES**, dam failure, **EROSION**, severe weather.

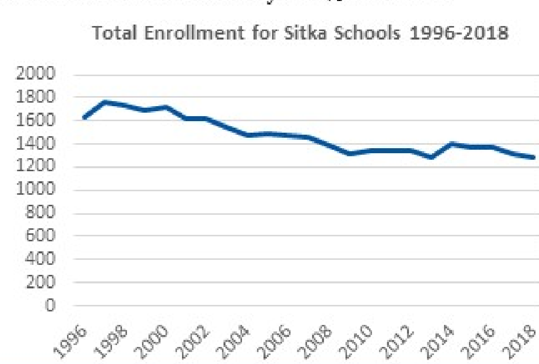
**Bold indicates high hazard potential*

Native Associations & Corporations:

- Shee At'iká, Inc.
- Sealaska Corporation

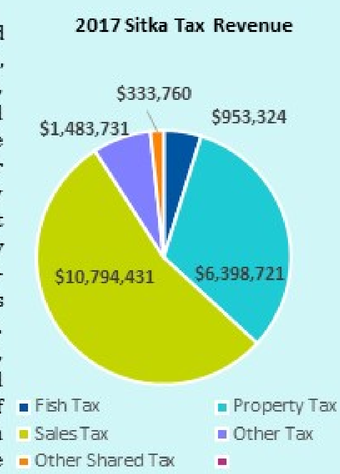
Infrastructure & Transportation

Sitka is accessible by air and water and serviced twice daily with flights to Juneau and Seattle. There are several air taxis and air charters available as well. Sitka operates five small boat harbors with 1,350 slips. The harbors can handle vessels up to 300 feet. A boat launch, haul-out, boat repairs, and other services exist. The privately owned Old Sitka Dock is the only deep water moorage facility in Sitka capable of accommodating large vessels. The state ferry services Sitka three times a week in the summer, less in the winter. Freight arrives by barge and cargo plane. Water is drawn from a reservoir treated, stored, and piped to nearly all homes. There are two hospitals and coastguard medical facilities. Seven schools in Sitka have an enrollment of 1284 students. Enrollment has decreased by 21.5% since 1996.[6]

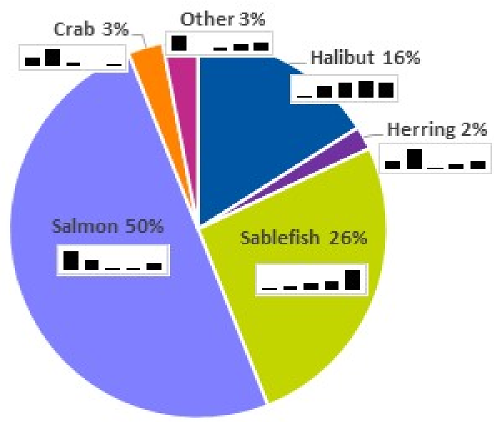


Current Economy

The economy is diversified with processing, tourism, government, healthcare, retail, transportation, and commercial fishing. The seafood industry is a major employer. Community leaders reported that Sitka's economy primarily relies on natural resource-based industries such as fishing, ecotourism (e.g. whale watching, kayaking), and sport hunting and fishing.[2] The waterways of Southeast Alaska are an important resource for the tourism industry and the lifestyle of local residents alike. The cruise ship sector heavily frequents the port. Many rural residents continue to participate in subsistence harvest of marine resources. The median household income is estimated to be $70,160, up from $62,024 (2010). Unemployment is estimated at 3.1%. Sitka receives fisheries-related revenue from the Shared Fisheries Business Tax, the Fisheries Resource Landing Tax, and harbor usage fees. Sitka received $953,324 (5%) in fish related tax in 2017.[7]



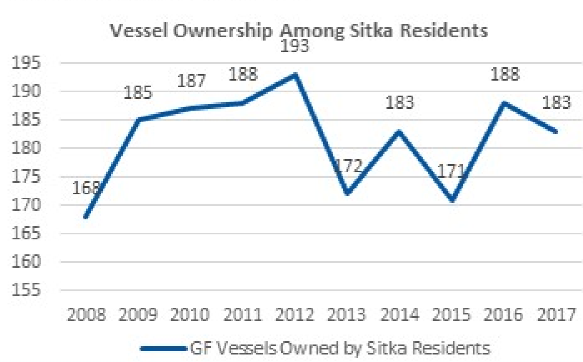
Share of landed revenue by species for resident owned vessels (*Sitka 2013-2017 average)*



Bar charts represent 2013 to 2017 ex-vessel values (2017$) by species landed in the community. The scale of the y-axis is specific to the species.

Harvesting Engagement *HIGH*

Sitka was among the top ports in Alaska in the volume of groundfish harvested and the associated ex-vessel value in 2017. Sitka residents largely participate in groundfish fisheries with longline vessels that target sablefish in State and federal waters. The former necessitates a State limited entry permit while the latter necessitates quota shares. Community leaders noted that commercial fishing boats under 125 feet use Sitka as their base of operations during the fishing season. While the typical vessel ranges between 30 and 600 feet in length, there is a high number of small vessels less than 30 feet that use the port. Between 2008 and 2017, the number of groundfish vessels owned by Sitka residents fluctuated, peaking in 2012 at 193 vessels. While the total number of fishing vessels owned by residents decreased overall by 10 vessels (between 2008-2017), groundfish vessels showed an increase of 15 vessels, from 163 in 2008, to 178 vessels in 2017, hitting the low of 162 resident owned vessels in 2015.



Fishing History and Regulatory Background

The Tlingit people and other residents have historically used a wide variety of marine resources. Subsistence harvests continue to be vital to many, and salmon is an important resource economically and culturally. Salmon and herring fisheries made up over 55% of ex-vessel value in 2017, while groundfish and halibut brought in 35% of ex-vessel value combined. In that same year, sablefish had an ex-vessel value of $16.6 million up from $10.2 million in 2008. Pacific cod and lingcod are also harvested in SE Alaska under state regulations. Demersal rockfish are caught as bycatch. A small directed fishery for flatfish (other than halibut) has also taken place, but effort has declined. Pacific halibut fisheries in SE Alaska are managed by the International Pacific Halibut Commission. Sitka is located in Pacific Halibut Fishery Regulatory Area 2C and Federal Statistical and Reporting Area 650.

Processing Engagement *HIGH*

The majority of processing activity is for salmon (57%), although groundfish make up 35% of processing. Total volume landed in Sitka increased by 34% while the associated value decreased by 1.5% since 2008. Groundfish landings, however, followed a different trend: while pounds landed decreased by 24%, the ex-vessel value increased from $13.8 million (2008) to $19.8 million in 2017 (43% increase).

Table 1: Processing engagement in Sitka

Year	# of Vessel Landings	GF Pounds Landed	GF Ex-vessel Value	% of total value of fish landed
2008	289	6,003,298	$13,796,904	17.5%
2009	291	5,149,161	$12,546,017	18.4%
2010	280	4,883,956	$13,767,637	19.6%
2011	278	4,876,478	$19,780,353	23.2%
2012	294	5,385,744	$17,511,241	29.3%
2013	244	5,229,337	$12,158,861	17.5%
2014	253	4,569,312	$13,403,449	20.9%
2015	254	4,525,840	$14,382,020	25.9%
2016	265	3,874,872	$13,964,503	25.3%
2017	263	4,551,003	$19,783,357	25.5%

Citations:

[1] American Fact Finder, Retrieved 10/1/2018. https://factfinder.census.gov

[2] Alaska Community Survey, Alaska Fisheries Science Center 2013

[3] U.S. Forest Service (n.d.). Introduction to the Tongass, Learning Center. Retrieved 10/1/2018. https://www.fs.usda.gov/main/tongass/learning

[4] Alaska Fisheries Information Network (AKFIN). (2018). Commercial Comp. AK [dataset].

[5] Fey, M., S. Weidlich, N. Leuthold, R. Ames, and M. Downs; 2016. Fishing Communities of Alaska Engaged in Fed. Managed Fisheries. North Pacific Fishery Management Council, 32

[6] School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retrieved 08/30/2018 at http://www.eed.state.ak.us/stats/

[7] Tax data from AK. Dept. of Revenue, Annual Reports 2008-2017. Retr.' 10/15/2018 from http://tax.alaska.gov/programs/sourcebook/index.aspx; Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retr.' 10/20/2018 https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/AlaskaTaxableDatabase.aspx

Community Sketch UNALASKA

Demographics (self-identified)[1]

Unalaska

Population	Gender pop. (%)	Pop. Over 18 (%)	Median household income ($)	White	Am. Indian/AK. Native	Black or African Am.
4,376	31.6% female 68.4% male	86%	$91,635	39.2%	6.1%	6.9%
Below poverty level (%)	**Housing units**	**Pop. Over 65 (%)**	**High school graduate or higher (%)**	**Asian**	**Native Hawaiian**	**Hispanic or Latino**
6.2%	1,199	2.7%	86.7%	32.6%	2.2%	15.2%

Processing Engagement: HIGH

Harvesting Engagement: LOW

Sea level rise: Probability of shoreline loss between 2 and 1 m/yr is 10-33%.

Coastal hazards: **TSUNAMIS**, **EARTHQUAKES**, storm surges, **EROSION**, Flooding, **VOLCANOES**.
**Bold indicates high hazard potential*

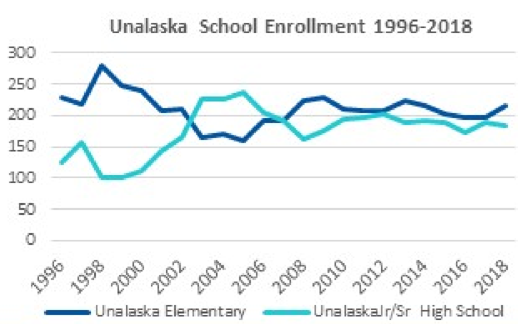
Native Associations & Corporations:
- Ounalashka Corporation
- Aleut Corporation

Area Description

Unalaska overlooks Iliuliuk Bay and Dutch Harbor on Unalaska Island in the Aleutian Chain. Often the name Dutch Harbor is applied to the portion of the city on Amaknak Island, which is connected to Unalaska Island by bridge. The area has been inhabited for thousands of year by the Unangan. The City of Unalaska was incorporated in March 1942. An estimated 2,500 seasonal or transient workers come to Unalaska each year.[1] The population of Unalaska reaches its annual peak between January and April each year (during Pollock "A" Season). With an average household size of 2.46, the total number of households increased from 834 (2000) to 927 (2010), to an estimated 1,167 (2017).[2] In 2010, 2,099 residents lived in group quarters, which is associated with processor housing.[3] Estimated unemployment is 0.08% Between 2008 and 2017, the number of residents eligible for the PFD increased by 15.81 % suggesting an increase in stable residency.[3] Unalaska was included under the Alaska Native Claims Settlement Act (ANCSA) and is federally recognized as a Native village.

Infrastructure & Transportation

Unalaska is serviced by daily scheduled flights from Anchorage. The state ferry operates bi-weekly from Homer between May and September. There are six marine facilities in Unalaska which include 10 docks; three are operated by the city.[3] The International Port of Dutch Harbor serves fishing vessels and shipping, with 5,200 ft. of moorage and 1,232 ft. of floating dock, accommodating vessels up to 200 feet. The small boat harbor provides 238 moorage slips. The Unalaska Marine Center and US Coast Guard Dock offer cargo, passenger, and other port services. All homes and on-shore fish processors are served by the City's piped water system. All on-shore processors generate their own electrical power. Unalaska school enrollment has remained fairly stable over the past decade, with 184 students in 2018.



Current Economy

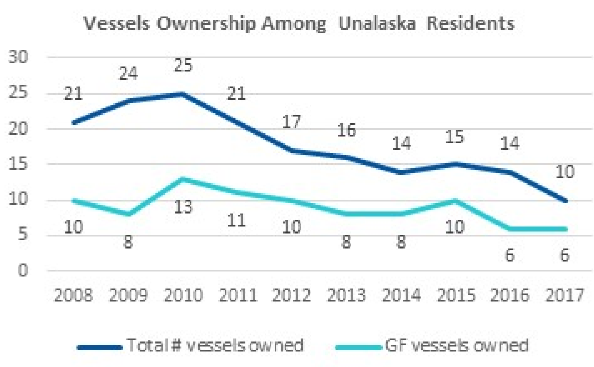
Unalaska's economy is based on commercial fishing, fish processing, and fleet services, such as maintenance, trade, repairs, fuel, and transportation. Onshore and offshore processors provide some local employment; however non-resident workers are usually brought in during peak seasons. Community leaders reported that marine fuel sales tax and fisheries related taxes at least partially supported the following public services: maintaining the harbor, medical and emergency services, educational scholarships, roads, social services, water and wastewater systems, law enforcement, and fire protection.[2] In 2016, the per capita income in Unalaska was estimated to be $35,299 and the median household income was estimated to be $97,083, compared to $25,353 and $80,625 in 2010, respectively.[1]

Fishing History and Regulatory Background

In the early 20th century, seafood processing of salmon, herring, and cod was established in Unalaska; although major fisheries were not established until the late 1920s. By the 1940s, the military presence in the region overshadowed commercial fishing, and Dutch Harbor was mostly repurposed as a naval port. Following World War II. Halibut, salmon, and king crab fisheries began to develop in earnest in the 1960s. During the 1970s, the Bering Sea/Aleutian Islands (BSAI) king crab fishery brought about an economic boom. When crab stocks collapsed in the early 1980s, Unalaska began to transition to a groundfish-based economy. Rapid growth occurred in the BSAI pollock fishery between 1988 and 1992. By 1992, Dutch Harbor was the number one U.S. port in amount and value of commercial fish landed. Today, Dutch Harbor is ranked as #1 port by volume and #2 by value of fish landed.[8] Major varieties of fish processed in Unalaska include king, Tanner (bairdi) and snow (opilio) crab, pollock, Pacific cod, salmon, herring, halibut, sablefish, turbot, Atka mackerel, and rockfish.[4] The area is included in Federal Statistical and Reporting Area 610, Pacific Halibut Fishery Regulatory Area 4A, and the Western Gulf of Alaska Sablefish Regulatory Area. Unalaska did not qualify as a CDQ community because of its previous processing history in BSAI groundfish fisheries. Unalaska is in House District 37, Senate District S.

Harvesting Engagement *LOW*

For some years and species, the number of pounds landed and associated ex-vessel revenue is considered confidential due to a small number of participants. The total volume of groundfish harvested increased by 2.8 million pounds (87%) from 2008 to 2017 (with a peak in 2014). The associated value of groundfish decreased by $1.1 million (35%).[7] Pacific cod and halibut brought in the most revenue for the fleet. The number of fishing vessels owned by Unalaska residents continues to decrease in the past decade, from 21 vessels (2008) to 10 vessels (2017). Groundfish vessels owned by Unalaska residents followed a similar downward trend, decreasing from 10 vessels (2008) to six (2017).[ibid]

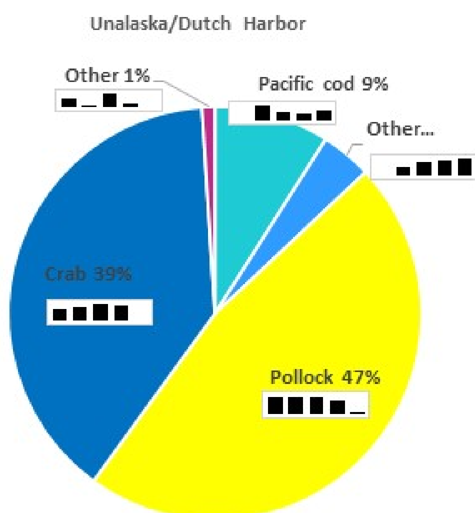


Processing Engagement *HIGH*

For some years and species, the volume of groundfish processed and associated ex-vessel value is considered confidential due to a small number of processing plants. Although the majority of Unalaska residents depend on income derived directly from the commercial fishing and fish processing industry, few have ownership interest in major seafood related firms. Many of the largest shoreside fish processors are wholly- or partially-owned by Japanese interests. Many other large processor vessels (motherships), or floating processors are owned by non-Alaskan firms,[5] although CDQ groups have some ownership interests as well. Between 2008-2017, the volume of groundfish processed has increased by 15%; however the associated ex-vessel value has decreased by 29%.[3]

Share of revenue landed by species for Unalaska

combined 2013-2017 average



Groundfish includes halibut, even though halibut is not in the groundfish FMPs. Bar charts represent 2013 to 2017 ex-vessel values (2017$) by species landed in the community. The scale of the y-axis is specific to the species.

Citations:

[1] American Fact Finder, Retr'd 10/1/2018 https://factfinder.census.gov
[2] Alaska Community Survey, Alaska Fisheries Science Center 2013
[3] Alaska Fisheries Information Network (AKFIN).(2018).Commercial Comp. AK [dataset]
[4] Himes-Cornell, et al. (2013). *Community profiles for North Pacific fisheries - Alaska.* U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 1
[5] Fey, M. et. al (2016) *Fishing Communities of Alaska Engaged in Federally Managed Fisheries.* NPFMC.
[6] School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retrieved 08/30/2018 at http://www.eed.state.ak.us/stats/
[7] Tax data from AK. Dept. of Revenue, Annual Reports 2008-2017. Retr.' 10/15/2018 from http://tax.alaska.gov/programs/sourcebook/index.aspx; Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retr.'10/20/2018 https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/AlaskaTaxableDatabase.aspx
[8] NOAA, NMFS Office of S&T. https://www.st.nmfs.noaa.gov/commercial-fisheries/commercial-landings/index

10.3. A Brief Overview of Alaska Commercial Groundfish Fisheries in Alaska

The North Pacific's commercial fisheries have changed through time with increased technology, labor, market demand, and legislation. The earliest commercial fishing efforts by U.S. vessels in waters off the coast of Alaska emerged in the 1860s, primarily targeting Pacific cod.[12] With the development of diesel engines, commercial fisheries for Pacific halibut and groundfish expanded north to the Gulf of Alaska (GOA) and into the Bering Sea region by the 1920s.[13] By the mid-1900s, fisheries began to develop an increasing variety of groundfish species.

Groundfish fisheries changed dramatically in the wake of World War II as Alaskan commercial fisheries expanded and industrialized.[14] From the end of World War II to the start of Exclusive Economic Zone management under the Magnuson-Stevens Act, North Pacific harvests increased from 8 million mt to 20 million mt. [15] The greatest increase was in the groundfish and crab sector in the Bering Sea Aleutian Islands (BSAI) and Gulf of Alaska (GOA). Groundfish harvest grew to exceed 2 million mt per year in the early 1970s. Technological developments and changes in marketing continued to increase harvests, leading to some concern of overexploitation, particularly by foreign fleets. The 1945 Truman Proclamation stressed the U.S.'s right manage and conserve living marine resources in these areas and to require foreign compliance.[8,16] This claim was not effectively exercised until the MSA was implemented in 1977.

10.3.1 Population trends

Alaska fishing communities represent a diversity of demographic, cultural, socio-economic, and historical conditions. Some are large municipalities that serve as regional economic hubs, such as Anchorage, while other communities are relatively isolated with only a few dozen inhabitants. Population growth in certain areas fluctuates, and is largely driven by resource extraction including fisheries. Of the communities that are highly engaged in Federally managed Groundfish harvesting and processing, Akutan, Homer, and Unalaska had the greatest increases in population between 1990 and 2017 (68.6%, 45.2%, and 40.5% respectively (Figure 10.11, Table 10.6), whereas Kodiak and Petersburg had slight decreases in population over this time period. The population of Sitka has remained the most stable over time. Of these communities, Akutan's population has increased the most with the greatest population increase (137.6%) occurring between 1997 and 2017.

This dramatic transformation coincided with the Magnuson-Stevens Fisheries Management and Conservation Act's "Americanization" of the groundfish fleet in North Pacific waters and the subsequent growth of the fish processing industry, both onshore and at sea.

[12] Rigby, Phillip W., Ackley, David R., Funk, Fritz, Geiger, Harold J., Kruse, Gordon H., and Murphy, Margaret C. (1995). *Management of the Marine Fisheries Resources of Alaska.* Regional Information Report 5J95-04. Juneau, AK: Alaska Department of Fish and Game.

[13] International Pacific Halibut Commission. 1978. *The Pacific Halibut: Biology, Fishery, and Management.* Technical Report No. 16 (Revision of No. 6).

[14] North Pacific Fishery Management Council (June 2004). Final Programmatic SEIS, Appendix B History of Alaska Groundfish Fisheries and Management Practice. Accessed 10 October 2018. https://alaskafisheries.noaa.gov/sites/default/files/sir-pseis1115.pdf

[15] Miles, E. (1979). The management of marine regions: the North Pacific. *Ocean Development & International Law*, *6*(1), 7-30.

[16] Koers, A. W. (1973). International regulation of marine fisheries.

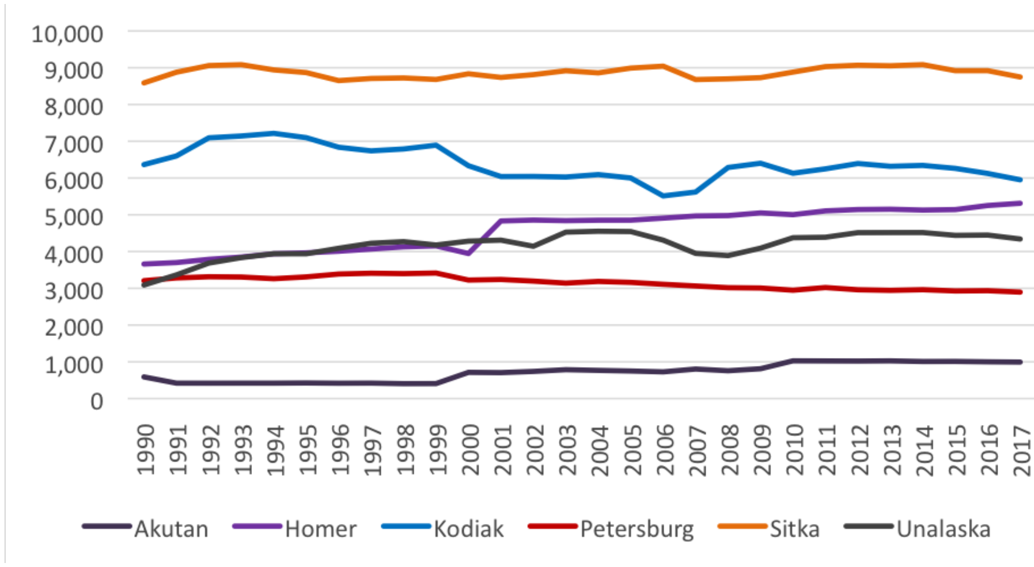


Figure 10.11: Population between 1990 and 2017 of communities highly engaged in commercial FMP groundfish harvesting and processing.

Table 10.6: Population change of communities highly engaged in commercial FMP groundfish harvesting and processing.

	% change 2017-1990	**% change 2017-1997**	**% change 2017-2007**
Akutan	68.59%	137.56%	23.51%
Homer	45.16%	32.56%	6.94%
Kodiak	-6.49%	-12.94%	5.93%
Petersburg	-9.70%	-14.52%	-5.45%
Sitka	1.86%	1.13%	0.81%
Unalaska	40.53%	6.16%	9.93%

Some communities that have experienced rapid population growth have also seen an influx of ethnic diversity as the fishing industry has become a global enterprise that draws labor from around the world. By 2013, there were high percentages of non-Alaskan and foreign-born residents working in fish processing plants and the majority of foreign-born individuals were residing in the Aleutian Islands (Aleutians East 57% and Aleutians West 35%) and Kodiak Island (14%).[17] Asian migrant workers comprise a large portion of fish processing workers in many communities.

In contrast, many communities have experienced population decline in recent years as local economic conditions such as lack of employment and high cost of living drive migration to urban areas such as Anchorage and the Matanuska-Susitna Borough. Some communities may experience economic collapse from seafood processing or cannery closures leading to out-migration.[18] These downturns demonstrate the reliance of small communities on fisheries.

Alaska's population is aging as a whole: the numbers of both males and females 50 years and over has increased in the past sixteen years. Specifically, the number of men and women in the 60-69 age

[17]ADLWD 2015. Alaska Economic Trends. Foreign-Born Alaskans. Alaska Department of Labor and Workforce Development. March 2015, Volume 35, No 3.

[18]Donkersloot, R., Carothers, C., 2016. The Graying of the Alaskan Fishing Fleet. Environment: Science and Policy for Sustainable Development 58, 30-42.

group more than doubled since the year 2000. Alaska also has had a relatively young population composition. The average median age was 32.7 in 2000, which was somewhat younger than the U.S. median of 35.3 in 2000. However, Alaska's median age increased to 34.5 in 2015 and the national median 37.8 in 2015.[19] Although extractive industries, including fisheries, has drawn young laborers to Alaska in recent decades, fewer younger residents of Alaska fishing communities participate in fisheries than in the past.[20]

The ratio of men to women in many Alaska communities is indicative of labor mobility in industries such as fisheries and oil extraction. Many Alaskan communities report a higher ratio of men than women. This is particularly true of communities relying heavily on oil, fishing, and fish processing. When compared to the U.S. population in 2000 and 2016, which has been distributed nearly equally between men and women (49.1% male in 2000, 49.4% male in 2016), Alaska has slightly more males (51.7% male in 2000 and 2016). A considerable number of communities which have had the highest ratio of men to women are located in Southwest Alaska (in the Alaska Peninsula and Aleutian Islands), and in Southeast Alaska. These areas are heavily involved in commercial fishing and fish processing; labor sectors that tend to be male-dominated. For example, as of 2016, Akutan's population composition was 78.1% male and 21.7% female, and Unalaska's was 67.2% male and 32.8% female. Both of these communities are heavily engaged in fisheries with among the highest fishery landings in the U.S.

Some remote Native communities which are likely more stable than employment driven populations, have more balanced gender structures, such as Newhalen (50% male in 2000 and 49.7% male in 2015) and Hooper Bay (49.7% male in 2000 and 53.9% male in 2015). Other Native communities have more women than men, which could also be linked to employment trends. When compared statewide, few communities in Alaska have more females than males (roughly 19% of all communities in 2015).

Population trends can be the result of several factors. Changes in population are possible indicators of a vibrant (or struggling) community, or shifts in only a select segment of the population. For example, while Akutan's population has increased significantly, the local school continues to struggle to remain open. School enrollment has declined since 1996. The State of Alaska requires all public schools to maintain a 10 student minimum enrollment to remain open. The K-12 Akutan School first fell below 10 students in 2006, and has hovered around the threshold since. In 2018, school enrollment was 13. This dichotomy suggests the population growth in Akutan is a factor of local employment (i.e.: the processing plant) rather than family ties to the community.

10.3.2 Current Economy

Marine species were among the earliest and most important of Alaska's commercial resources, especially marine mammals. Commercial fisheries began in the mid-1800s with salted cod, salmon, and herring, and later canned salmon. Lucrative offshore fisheries were conducted by fishing fleets from Russia, Japan and Korea, until the 1976 Magnuson Fishery Conservation and Management Act

[19] Alaska Department of Labor and Workforce Development. 2016. Alaska Population Overview 2015 Estimates.

[20] Donkersloot, R., and C. Carothers. 2016. The graying of the Alaskan fishing fleet. Environment: Science and Policy for Sustainable Development 58, no. 3: 30-42. Online: http://dx.doi.org/10.1080/00139157.2016.1162011.

claimed the area between 3 and 200 miles offshore as the exclusive economic zone of the U.S.[21] Crab and other shellfish, herring, halibut, salmon, and groundfish have all contributed to this important industry for the state, supporting a fishing economy that ranges from family fishing operations to multinational corporations, and transforming the social landscape by the immigration of workers from around the world.

There were 304,556 Alaskan residents employed throughout the State in 2016, compared to 284,000 in 2000. The private sector maintains the highest number of employees (236,086 in 2016 and 219,496 in 2001). The government sector, including state and local levels, also provide considerable employment with 68,470 jobs in 2016 and 74,500 jobs in 2000. In 2000, this was followed by services/miscellaneous (73,300 or 25.8%), trade (57,000 or 20.1%), transportation, communications and utilities (27,300 or 9.6%), manufacturing (13,800 or 4.86%, with seafood processing contributing the bulk of jobs at 8,300 or 2.9%), and mining (10,300 or 3.6%, with oil and gas extraction contributing the most jobs at 8,800 or 3.1%). This distribution changed slightly in 2016, with trade, transportation, and utilities (63,143 or 20.7%) providing the most jobs, followed by educational and health services (45,947 or 15.0%), leisure and hospitality (30,783 or 10.0%) and professional and business services (26,146 or 8.6%).[22]

Commercial fishing and fish processing industries remain important in Alaska's economy, culture, and social wellbeing.[23] Fish harvesting employment (monthly average) increased from 7,959 in 2001 to 8,273 in 2015, and seafood processing workers increased from 22,571 in 2001 to 24,863 in 2015. The non-Alaska resident share of seafood processing workers has increased from 65.6% in 2011 to 70.2% in 2015.[24] Major industries including oil, military, and commercial fishing are integral to the state's continued growth. At the same time, new sectors such as tourism have begun to contribute noticeably to Alaska's economy. Cruise ships, recreational fishing excursions, cultural tourism and eco-tourism are on the rise.

10.3.3 Labor in Alaska's Commercial Fishing Industry

The commercial fishing sector is the largest private employer in Alaska. The fishing industry provides a variety of employment opportunities, including fish harvesting, processing, transport, and dock and harbor work. In 2015, a total of 207 communities had at least one resident that held a CFEC fishing permit; a decline from 215 communities in 2000, and 240 in 1990.[25] According to the CFEC, there were 12,317 permit holders in Alaska communities in 2015. The number of permit holders decreased from 13,271 in 2000, and further still from 15,728 in 1990.

[21] Rigby, Phillip W., Ackley, David R., Funk, Fritz, Geiger, Harold J., Kruse, Gordon H., and Murphy, Margaret C. (1995). *Management of the Marine Fisheries Resources of Alaska.* Regional Information Report 5J95-04. Juneau, AK: Alaska Department of Fish and Game.

[22] Statistics in this paragraph are sourced from 1) Alaska Department of Labor and Workforce Development. (2001). The Year 2000 in Review: Growth Picks up in Alaska in 2000. *Alaska Economic Trends 2001.* Anchorage: Alaska Department of Labor and Workforce Development; and 2) *Alaska Local and Regional Information Database.* Retrieved October 8, 2018 from http://live.laborstats.alaska.gov/alari/.

[23] Carothers, Courtney and Jennifer Sepez. (2005). Commercial Fishing Crew Demographics and Trends in the North Pacific. Poster presented at the *Managing Our Nation's Fisheries: Focus on the Future* Conference, Washington D.C., March 2005. Available at ftp://ftp.afsc.noaa.gov/posters/pCarothers01_comm-fish-crew-demographics.pdf.

[24] Alaska Department of Labor and Workforce Development. 2017. Research and Analysis Statewide Data, Fishing and Seafood Industry Data. Available at: http://live.laborstats.alaska.gov/seafood/seafoodstatewide.cfm. Accessed September 6, 2017.

[25] Alaska Fisheries Information Network (AKFIN). (2017). Community Profile Database, 1991-2016. Data compiled for the Alaska Fisheries Science Center, Seattle.

The number of licensed Alaskan crew members employed annually in Alaskan commercial fisheries has fluctuated over recent decades, from more than 20,145 in 1993, to approximately 10,461 in 2003, and 11,993 in 2015.[26] In addition, the number of communities with at least one licensed crew member has decreased from 209 in 2000 to 195 in 2013. The decline is likely due to a combination factors. Although the majority of licensed crew members are Alaska residents, the labor pool also draws from Washington, other U.S. states, and around the world. The industry remains male-dominated, with women accounting for an average of 11% licensed crew from 2005-2014. In addition, personnel turnover is high; the average crew member holds a license for just 1.8 years.[27] Similar declines were seen in the total number of vessels primarily owned by Alaskan residents, vessels homeported in Alaskan communities and vessels landing catch in Alaskan communities.

The employment data collected by the U.S. Census noticeably under-represents those involved in the fishing industry. The figures originate from Census form questions which are phrased in a way that likely deters answers from self-employed persons (as most fishermen are). In the results of the Census, agriculture, forestry, fishing and hunting were combined together into one reported figure, which makes it difficult to discern which individuals were involved in the fishing portion of the category. In addition, processing sector employment data is not available to at the community level. However, processing sector data is available at a higher aggregation level, such as at regional levels. Employment information for the important offshore processing sector is also not discussed because the effect on Alaska communities is indirect and is brokered for the most part out of Seattle.

10.3.4 Fish Taxes in Alaska

Taxes generated by the fishing industry, particularly the fish processing sector, are important revenue sources for communities, boroughs, and the state. Considered in this analysi are two main sources of fishery taxes in Alaska: shared taxes administered through the State of Alaska, and municipal fisheries taxes independently established and collected at select municipalities. Shared taxes comprise revenue from multiple sources, including liquor sales, electric and telephone cooperatives, etc. The two main shared taxes that are derived from fishing; the fisheries business tax (also known as the raw fish tax), and the fisheries resource landing tax. Table 10.7 presents the number of communities receiving any kind of fishery tax revenue from 2012-2017, which has been generally decreasing over that period.

Table 10.7: Number of communities receiving any kind of fishery tax revenue per year from 2012-2017.

Year	Communities
2012	60
2013	52
2014	55
2015	48
2016	44
2017	41

[26] Alaska Department of Fish and Game. (2017). *Alaska sport fish and crew license holders, 2000 – 2015.* ADF&G Division of Administrative Services. Data compiled by Alaska Fisheries Information Network for the Alaska Fisheries Science Center, Seattle. [URL not publicly available as some information is confidential.]

[27] Carothers, Courtney and Jennifer Sepez. (2005). Commercial Fishing Crew Demographics and Trends in the North Pacific. Poster presented at the *Managing Our Nation's Fisheries: Focus on the Future* Conference, Washington D.C., March 2005. Available at ftp://ftp.afsc.noaa.gov/posters/pCarothers01_comm-fish-crew-demographics.pdf.

State Taxes

The fisheries business tax, implemented in 1990, is levied on businesses that process or export fisheries resources from Alaska. Tax rates vary under the fisheries business tax, depending on a variety of factors, including how well established the fishery is, and whether processing takes place on a shoreside or offshore facility. Although the fisheries business tax is typically administered and collected by the individual boroughs, revenue from the tax is deposited in Alaska's General Fund. According to state statute, each year the state legislature appropriates 25%-50% of the revenue from the tax to the municipality or borough where processing occurs.[28]

The State of Alaska has collected the fisheries resource landing tax since 1994. This tax is levied on processed fishery resources that were first landed in Alaska, whether they are destined for local consumption or shipment abroad. This tax is collected primarily from catcher-processor and at-sea processor vessels that process fishery resources outside of the state's three-mile management jurisdiction, but within the U.S. Exclusive Economic Zone, and bring their products into Alaska for transshipment. Fishery resource landing tax rates vary from 1% to 3%, depending on whether the resource is classified as "established" or "developing." According to state statute, all revenue from the Fishery Resource Landing Tax is deposited in the state's General Fund, but half of the revenue is available for sharing with municipalities where fishery resources are landed.[29]

Municipal Taxes

In addition to these state taxes, some communities have developed local tax programs related to the fishing industry. These include taxes on raw fish transfers across public docks, fuel transfers, extraterritorial fish and marine fuel sales, and fees for bulk fuel transfer, boat hauls, harbor usage, port and dock usage, and storing gear on public land. There is no one source for data on these revenue streams; however, most communities self-report them in their annual municipal budgets collected by the Alaska Division of Community and Regional Affairs. In 2017, 10 communities reported collecting some form of municipal fisheries tax, as well as four boroughs (Aleutians East, Bristol Bay, Kodiak Island, and Lake and Peninsula), which was down from 14 communities in 2016.

Total Fisheries Tax Income

The communities with the highest total fishery related income from 2012-2017 are presented in Figure 10.12. Total fishery tax income includes the fisheries business tax, fisheries resource landing tax, and any municipal raw fish taxes collected. Unalaska consistently brings in the most fishery related tax revenue through its income through the Fishery Business and Fishery Landing taxes as well as leveraging its own municipal raw fish tax.[17-19] It is likely that Unalaska collected a 2% raw fish tax in in 2014 and 2015, and did not self-report, which is why Unalaska taxes fluctuate significantly. Unalaska did experience over a $4,000,000 loss of fishery tax revenue from 2016 to 2017.

As shown in Table 10.8, 12 communities derived 50% or more of their municipal income from fisheries at some point over 2012-2017. Dependence on fishery related tax income is variable, likely due to a number of factors including the amount of revenue generated through other shared taxes, revenue generated through other local municipal taxes, and the vitality of the fisheries being taxed. However,

[28] Alaska Department of Revenue, Tax Division. Annual Reports 2012-2017 http://tax.alaska.gov/programs/sourcebook/index.aspx

[29] Alaska Department of Revenue, Tax Division. Annual Reports 2012-2017 http://tax.alaska.gov/programs/sourcebook/index.aspx

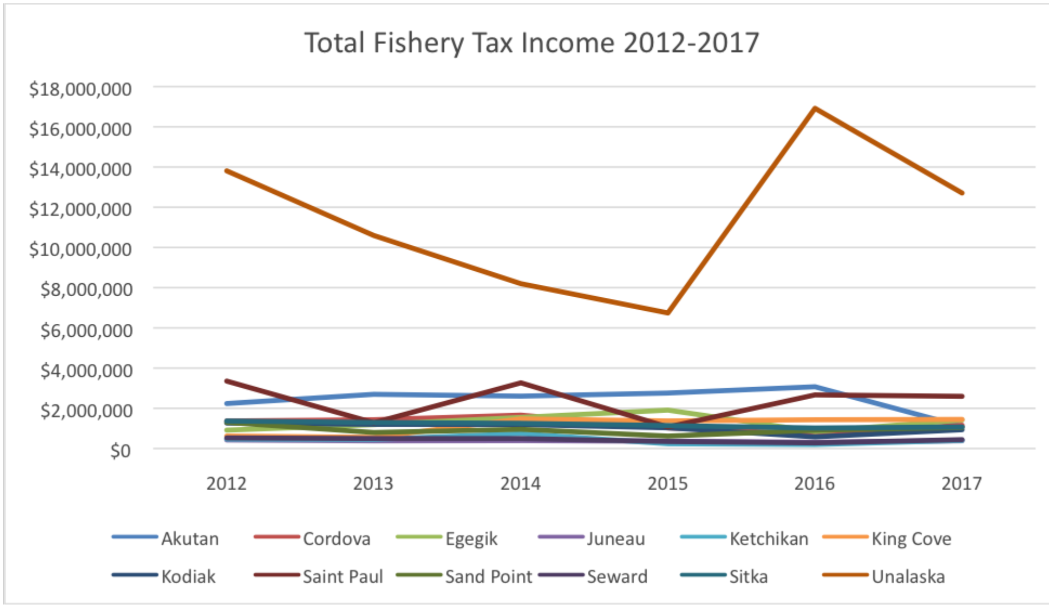


Figure 10.12: Top 12 communities with the highest total fishery related tax income from 2012-2017.

Table 10.8: Communities with 50% or more Total Tax Revenue from Fisheries Taxes, 2012-2017.

	2012	**2013**	**2014**	**2015**	**2016**	**2017**
Akutan	100%	100%	100%	100%	100%	25%
Chignik	100%	100%	n/a	100%	100%	100%
Egegik	100%	100%	100%	100%	100%	100%
Pilot Point	100%	100%	100%	100%	0%	0%
Atka	99%	66%	n/a	44%	n/a	100%
Saint Paul	89%	32%	90%	30%	88%	88%
Sand Point	59%	46%	50%	36%	50%	58%
Port Lions	56%	5%	16%	0%	0%	n/a
Larsen Bay	54%	n/a	n/a	77%	64%	63%
False Pass	41%	31%	44%	81%	78%	78%
King Cove	27%	26%	69%	68%	60%	66%
Togiak	n/a	44%	50%	29%	53%	39%

Notes: n/a should be interpreted as representing communities that did not report their total municipal income, rather than communities lacking fisheries related tax income. Fisheries taxes include shared and municipal taxes.

it is worth noting that a few communities have been consistently and exclusively dependent on fishery tax income from 2012-2017, including Chignik and Egegik. It is also worth noting that until 2017, Akutan was entirely dependent on fishery tax income. In 2017, Akutan implemented a 1.5% sales tax, which generated $3,337,019 and stopped collecting a municipal raw fish tax.

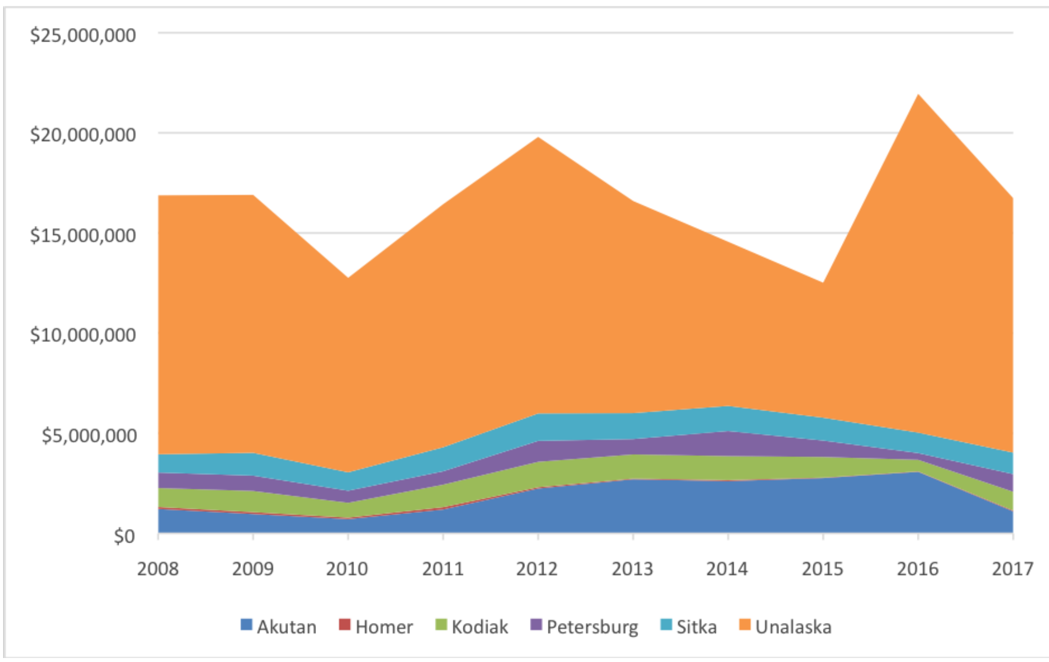


Figure 10.13: Tax Revenue from Fisheries Taxes, 2008-2017 for Highly Engaged Groundfish Communities in Alaska.

11. ECONOMIC PERFORMANCE METRICS FOR NORTH PACIFIC GROUNDFISH CATCH SHARE PROGRAMS

11.1. Introduction

Catch share programs are a fishery management tool that allocates a secure share of the fishery resource to individual fishermen, fishing cooperatives, fishing communities, or other entities to harvest a fixed quantity of fish each year. Catch shares do not directly impact the total allowable catch (TAC) of each species, and are merely a mechanism to allocate the TAC across various individuals and user groups. The North Pacific region has been the most active region in the U.S. in developing catch share programs, and contains 6 of the 16 programs currently in operation throughout the U.S. These programs are: the Western Alaska Community Development Quota (CDQ) (implemented in 1992), Alaska Halibut and Sablefish IFQ (implemented in 1995), American Fisheries Act (AFA) Pollock Cooperatives (implemented in 1999/2000), BSAI Crab Rationalization (implemented in 2005), Non-Pollock Trawl Catcher/Processor Groundfish Cooperatives (Amendment 80, implemented in 2008), and the Central Gulf of Alaska (GOA) Rockfish Program (extended the Rockfish Pilot Program in place from 2007-2011 and was implemented in 2012). This report does not include performance metrics for the CDQ Program and BSAI Crab Rationalization Program, but does provide performance metrics for the Bering Sea Freezer Longline Catcher/Processors fishery. The fisheries included in this chapter account for approximately 67% of all state and federal North Pacific groundfish landings in 2017 as reported in SAFE Table 1 and approximately one third of all U.S. commercial landings (NMFS, 2017).

Catch share programs have a variety of designs which reflect unique circumstances in each fishery and stated goals of the program. In the North Pacific, these designs include individual fishing quota (IFQ) programs such as the Alaska Halibut and Sablefish IFQ program, cooperative programs such as AFA pollock, Amendment 80, and the Central GOA Rockfish Program, combined IFQ and cooperative programs such as the BSAI Crab Rationalization, as well as community allocation programs like the CDQ program. There have been several stated goals for these programs, including: meeting conservation requirements, improving economic efficiency and/or flexibility, improving bycatch management, reducing excess capacity, eliminating derby fishing conditions, and improving safety at sea.

This section develops a consistent set of indicators to assess various dimensions of the economic performance of five catch share programs including the halibut IFQ program (which is managed by NOAA Fisheries and the International Pacific Halibut Commission), the sablefish IFQ program (implemented together with the halibut IFQ program but will be considered separately), the AFA pollock cooperatives program, the Amendment 80 program, and the central GOA Rockfish Program, as well as one quasi-catch share program, the Bering Sea Freezer Longline Catcher/Processors.

These indicators were developed by NOAA Fisheries' regional economists, anthropologists, and sociologists as the most representative indicators of economic performance for which data are available and can be regularly updated and were first summarized in Brinson and Thunberg (2013). These indicators can be broken down into three general categories: catch and landings, effort, and revenue, and their descriptions are listed in Table 11.1.

Table 11.1: Definitions of Economic Performance Indicators.

Indicator	Definition
	Catch and Landings
Quota allocated to Catch Share Program	Annual quota of combined catch share program species, in terms of weight.
Aggregate landings	Annual total weight of combined catch share program species generated by vessels that fish quota.
% Utilization	Portion of target species TAC that is caught and retained within a fishing year. Aggregate Landings divided by Quota allocated to catch share program.
Fishing Effort	
Season length index	The number of days in which at least one vessel was fishing divided by the number of days in the regulatory fishing season.
Active vessels	Annual number of vessels that fish quota and landing one or more pounds of any catch share program species.
Entities holding share	Annual total number of entities/individuals/vessel owners/permit holders receiving quota share at the beginning of the year.
Landings Revenue	
Aggregate revenue from Catch Share species	Annual total revenue of combined catch share program species generated by vessels that fish quota.
Average price	Aggregate revenue from catch share species divided by aggregate landings
Revenue per active vessel	Aggregate revenue divided by active vessels
Gini Coefficient	A measure of the evenness of the distribution of revenue among the active vessels. The Gini coefficient increases as revenues become more concentrated on fewer vessels.

The catch and landings metrics are the annual catch limit (ACL) or quota level, aggregate landings, the % of the quota that was utilized, as well as whether the ACL or quota was exceeded for any species in the program. While the quota amount is set based on the biological condition of the species in the program, the landings and the percentage of the quota that is landed (% utilization) reflect economic conditions and regulatory constraints of the fishery.

The effort metrics are the season length index, the number of active vessels, and the number of entities holding share. The season length index is defined as the number of days in which at least one vessel was fishing divided by the number of days in the regulatory fishing season. This index provides a single, unit-less metric of season length that can be aggregated over multiple areas or species with different season lengths within the same program. The index measures the relative proportion of the legal fishing season during which some or all vessels actively fished. The aggregate program level season length index is calculated as the weighted harmonic mean number of days in which at least one vessel was fishing by area using catch volume as weights and then divided by the regulatory fishing season length. The number of active vessels is one indicator of the scale of participation and effort in the fishery and can indicate changes in the expansion or consolidation of vessels in the fishery after rationalization. The number of entities holding share reflects the number of quota share owners that may be reduced as a result of consolidation or increase with new entrants over time and indicates the level of ownership accumulation in the fishery.

The revenue metrics are the aggregate revenue from catch share species, average prices of catch share species, the revenue per active vessel, and the Gini coefficient. Revenues are a function of landings and prices, which may trend in opposite directions due to changes in the demand for the species that may or may not be caused by the movement to catch share management. Prices may be affected by catch share management, but they are also influenced by external market factors such as price and availability of substitute products, fluctuating exchange rates, and changes in demand. While changes in prices cannot be solely attributed to catch shares, they provide a useful metric to compare the performance of the fishery over time in terms of improving quality and marketability. The Gini coefficient is a measure of the evenness of the distribution of revenue among the active vessels, which increases as revenues become more concentrated on fewer vessels, and is useful to examine the distributional impacts of catch share programs across vessels.[1]

Where possible, performance metrics are compared to a baseline period prior to catch share program implementation (typically the average of three years prior to program implementation). However, other factors that occur concurrently with, but are unrelated to, catch share implementation, such as changing market conditions or species biomass, will affect the economic performance of the fishery and are not accounted for in this analysis. Therefore, while these metrics may increase or decrease after catch share implementation, one should be cautious in assuming cause and effect. These metrics are useful to track changes in the economic performance of North Pacific catch share programs over time, but are not necessarily a comprehensive evaluation of the economic performance of these fisheries, management programs, or of catch share programs in general. Some attempt is made to interpret the trends and provide context for the results, but a thorough examination of what is driving the trends is currently beyond the scope of this report.

11.2. North Pacific Halibut IFQ Program

Management Context

The North Pacific Halibut IFQ program was implemented simultaneously with the North Pacific Sablefish IFQ Program, but the sablefish IFQ program will be considered separately below. Halibut in the North Pacific are commercially caught by catcher vessels (CVs) that deliver their catch onshore and catcher/processor vessels (CPs) that catch and process their catch at sea using longline gear. Halibut are also caught as prohibited species catch (PSC) by vessels using trawl gear which means they cannot be retained by these vessels. The IFQ program only applies to halibut caught with longline gear in the directed commercial fishery. In addition to the directed commercial fishery, there are substantial recreational and subsistence sectors that depend on the halibut resource. Beginning in 2014, charter operators are able to lease a limited amount of commercial IFQ in areas 2C and 3A as part of the Pacific Halibut Catch Sharing Plan.[2] Additionally, through the Community Development Quota (CDQ) Program, a percentage of the Bering Sea and Aleutian Islands (BSAI) halibut catch limits, which vary by management area, is allocated to entities representing eligible Western Alaska communities designated in the Magnuson-Stevens Act. However, this section only examines the performance of the halibut IFQ portion of the program.

[1] The Gini coefficient is impacted by the number of vessels over which the index is calculated and will decrease as marginal participants with low levels of revenue exit the fishery.

[2] https://alaskafisheries.noaa.gov/sites/default/files/csp-faq1115.pdf

Halibut fisheries off the coast of Alaska are managed by two agencies: the International Pacific Halibut Commission (IPHC) and the North Pacific Fishery Management Council (NPFMC). The IPHC is responsible for assessment of the halibut stock and establishes the annual Total Constant Exploitation Yield (which is comparable to an ACL for the directed commercial fishery). The NPFMC is responsible for allocating the catch limits established for the halibut management areas off the coast of Alaska among various user groups. The halibut IFQ program was developed by the NPFMC and implemented by NOAA Fisheries in 1995 to manage the directed commercial halibut fishery in Alaska. Prior to the IFQ program, the fishery operated as a derby and often only lasted a few days per year in certain areas. Quota Share (QS) was initially issued based on both historic and recent participation of persons who, in 1988, 1989, or 1990, owned or leased vessels with qualifying landings. QS allocations were issued in amounts commensurate with creditable halibut landings during the "best five" of 7 years from 1984-1990. The primary objectives of the IFQ Program are to: 1) eliminate gear conflicts; 2) address safety concerns; and 3) improve product quality and value.

The Halibut and Sablefish IFQ program includes a cost recovery provision in which the fishermen pay a fee based on the cost to the government to manage the program. Recoverable costs cannot exceed 3% of the total ex-vessel value of the fishery and include the costs related to management, data collection, and enforcement of a Limited Access Privilege Program (LAPP) or Community Development Quota Program. Cost recovery began in 2000 for the halibut IFQ program and has ranged from $1.91 million to $3.34 million and 1.0% to 3% of the ex-vessel value of the fishery, with 2015 and 2016 being the only years the fishery reached the 3% limit.[3]

Catch Share Privilege Characteristics

There are two forms of quota in the Halibut and Sablefish IFQ Program, QS and the annual allocation of IFQ in pounds derived from the QS. The QS are a revocable, indefinite privilege that entitles the holder to a share of the total area- and vessel class-specific IFQ allocated each year. Individuals as well as non-individuals (such as a corporation) can hold QS and IFQ. Prior to the beginning of each fishing season, IFQ is allocated to QS holders based upon their held QS, the total allowable catch (TAC) in each area which is recommended by the IPHC, and the total amount of QS in each management area (QS pool). QS and the resulting IFQ are designated for use in specific areas and on vessels of a specific size. These provisions are intended to limit catch by area and maintain a fleet with a range of vessel sizes. The IFQ Program also contains a number of QS and IFQ use restrictions, including use caps and designation of small QS blocks that are intended to prevent consolidation and maintain participation opportunities for small operations and new entrants. IFQ are valid only for one year, but there are rollover provisions that allow QS holders to carry over to the next year up to 10% of their unused IFQ and any overages (up to 10%) are taken from the following year's IFQ allocation. There are a total of 32 species and area specific quota allocations with a total of 55 unique types of halibut IFQ due to the existence of blocked and unblocked QS in some areas.

Catcher vessel QS are transferable to other initial issuees or to those who have become transfer-eligible through obtaining NOAA Fisheries' approval by submitting an Application for Eligibility to Receive QS/IFQ. To be eligible, potential QS/IFQ recipients must be a U.S. citizen and have 150 or more days of experience working as part of a harvesting crew in any U.S. commercial fishery. Halibut QS can be sold with or without the annual IFQ derived therefrom (plus adjustments from prior year QS used). However, CV IFQ can be leased annually to other eligible permit holders only

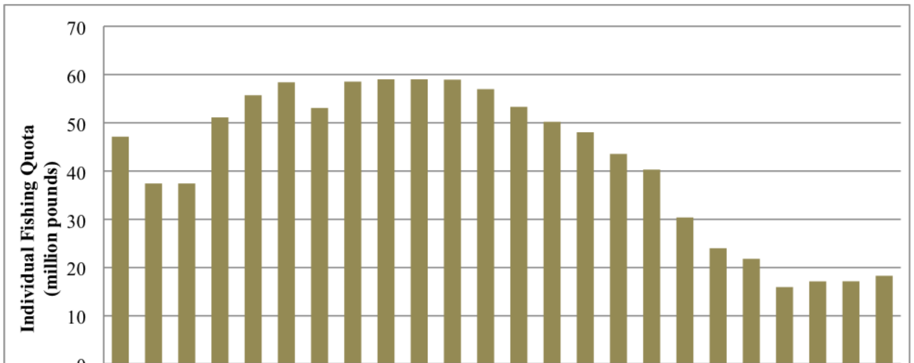
[3]The cost recovery fee for the Halibut and Sablefish IFQ Program is assessed for halibut and sablefish together, these numbers reflect our apportionment of the total fees collected to halibut based on the ratio of ex-vessel value.

under limited circumstances. Non-individual entities new to the program are only able to purchase QS or lease IFQ for the largest vessel class of "catcher/processor" quota (category A).

The IFQ Program has a number of excessive share provisions. There are QS holding caps on both individuals as well as entities. No person, individually or collectively, can hold/control more than 0.5%-1.5% of halibut QS in specific areas and combinations of areas. In addition, vessel use caps limit each vessel to harvesting from 0.5%-1% of the halibut TAC in specific areas and combinations of areas. Halibut CDQ fishing is not subject to excessive share provisions. There are also owner on-board requirements for CV QS and IFQ to limit the use of hired skippers. The NPFMC and NOAA Fisheries have also implemented a revolving loan program to assist entry level and small vessel fishermen acquire loans. The loan program is funded through a portion of the cost recovery fees collected.

Catch and Landings Performance Metrics

The catch and landings performance metrics include the amount of IFQ allocated to the program, the landings of IFQ halibut, and the percentage of the IFQ that is landed (percent utilization). Annual metrics are compared with a "baseline" period prior to program implementation, which is the average of the three years prior to program implementation (1992-1994). Between the baseline and 2017, IFQ allocated and landings have fallen by 61% and 63%, respectively, while the percent utilization fell from 102% (on average exceeding the allocation) during the baseline to 96% in 2017. The IFQ and landings had an initial decline for 2 years after IFQ implementation, but then steadily increased to a high in 2002 of 58.1 million pounds caught of the total allocation of 59 million pounds (Figures 11.1 and 11.2). With the exception of keeping the same 59 million pound allocation in 2003, the IFQ and landings of IFQ halibut dropped every year from 2002 to 2014, but has experienced a small increase each year since reaching a low in 2014. The IFQ allocation and landings in 2017 are 69% and 70% less than their peak IFQ program values in 2002.



	Baseline	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Halibut	47.1	37.4	37.4	51.1	55.7	58.4	53.1	58.5	59.0	59.0	58.9	57.0	53.3	50.2	48.0	43.5	40.3	30.4	24.0	21.8	16.0	17.1	17.2	18.3

Figure 11.1: IFQ allocated under the halibut IFQ program.

Utilization initially fell from over 100% of the allocation to 86% in the first year after program implementation. While IFQ utilization varies from year to year, it has only dropped below 95% in two years, 1995 at 86% and 1998 at 92%, and overall averages 96.6% for all years following program implementation (Figure 11.3).

The statewide catch limit (similar to an ACL) was exceeded during the baseline period in 1993, but has not been exceeded since program implementation. Additionally, there were several area

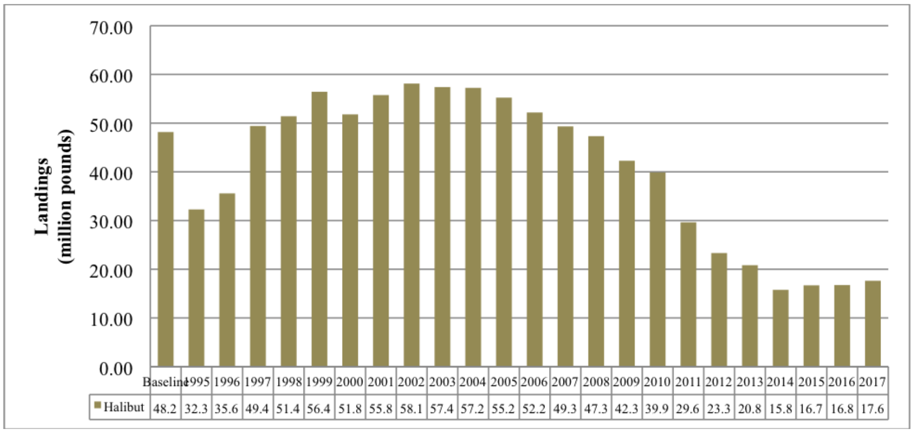


Figure 11.2: Landings of halibut in the halibut IFQ program.

allocations that were exceeded during the baseline period, 4 in 1992, 8 in 1993, and 5 in 1994. In contrast, only 4 area allocations have been exceeded since program implementation in 1995 including area 3B in 2003, areas 3A and 3B in 2010, and area 3A in 2014.

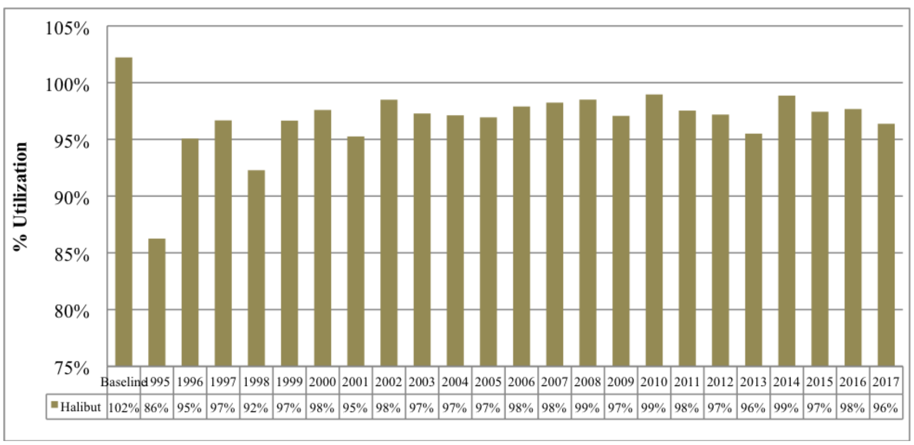


Figure 11.3: Percent of the allocated IFQ that is landed in the halibut IFQ program.

Effort Performance Metrics

The effort performance metrics include the season length index, the number of active vessels, and the number of entities holding QS. The season length index is defined as the number of days in which at least one vessel was fishing divided by the number of days in the regulatory fishing season. This index is necessary to create a single unit-less metric of season length that can be aggregated over all 8 areas, in which vessel participation varies throughout the season. This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished for halibut IFQ. During the baseline, some areas were only open to fishing for halibut for a few days (for the most demanded areas) while others were open for most of the year. To calculate an aggregate halibut IFQ program season length index, we use the weighted harmonic mean number of days active by area using catch as weights and then divide by the regulatory fishing season length. For the baseline period, we assume a 246 day regulatory fishing season which is the number of days allowed for the first 8 years post-IFQ and is the best hypothetical season length to use to compare pre-IFQ with post-IFQ. Using these definitions, the season length index in the baseline period is 0.01, which corresponds to 3.27 active days per year during the baseline period. Upon implementation of the

IFQ Program, fishing was allowed for 246 days and there were 176 active days in the halibut IFQ fishery in 1995 which corresponds to a season length index of 0.72. Over the course of the halibut IFQ program, the season length index has fluctuated between 0.65 – 0.81 (Figure 11.4), with 2017 using the lowest percentage of available time to fish since program implementation.

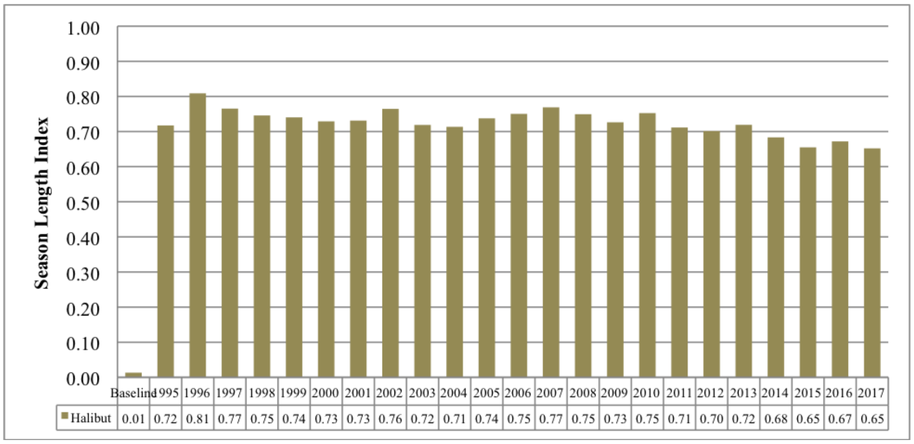


Figure 11.4: Halibut IFQ program season length index.

The number of active vessels reflects the number of halibut vessels with any commercial landings of IFQ Program halibut in a given year. The baseline value represents the average number of unique vessels per year with commercial halibut landings from 1992-1994. After IFQ program implementation, there was a 40% reduction in the number of active vessels overall, from 3,432 vessels in the baseline period to 2,060 vessels in 1995 (Figure 11.5). In years after program implementation (1996-2017), the average annual decrease in the number of active vessels fishing halibut was 4%, leaving 836 unique vessels active in the halibut IFQ fishery in 2017.

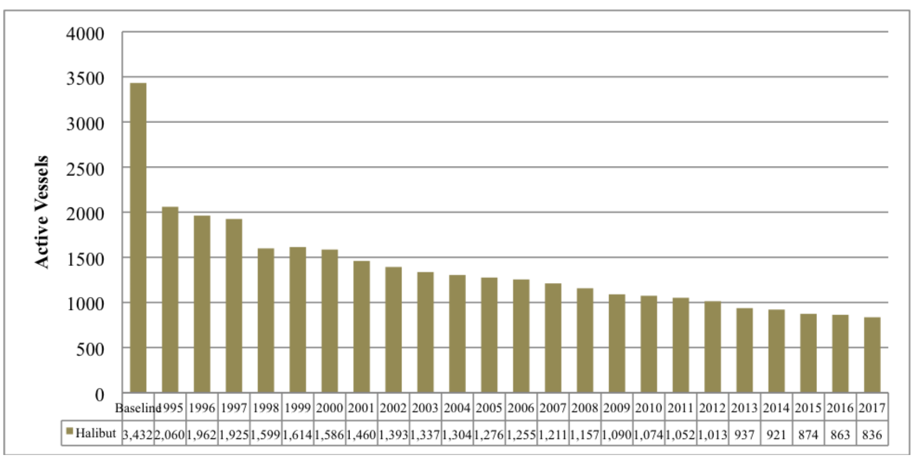


Figure 11.5: Number of active vessels in the halibut IFQ program.

There were 4,829 entities holding halibut QS at the beginning of the program. The number of entities has declined steadily since initial allocation. In 2017, 2,398 entities held QS, which is a reduction of 50.3% relative to the initial level in 1995 (Figure 11.6).

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from halibut IFQ, average prices of halibut IFQ, the revenue per active vessel, and the Gini coefficient which measures the concentration

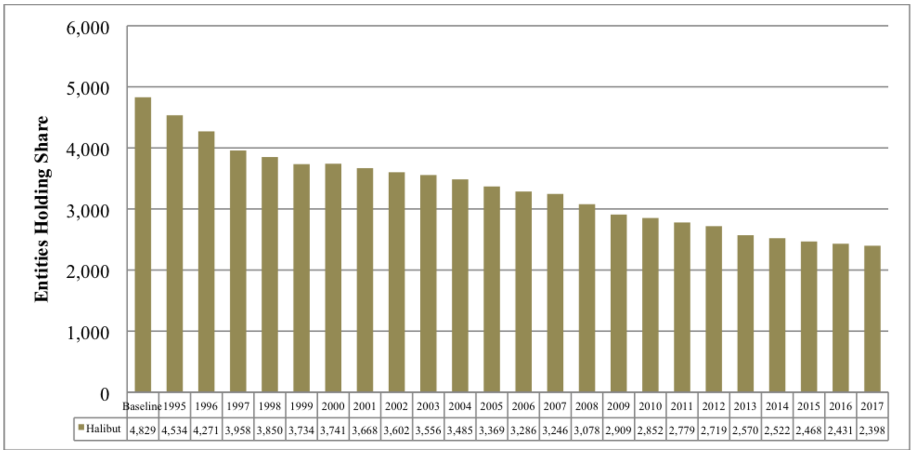


Figure 11.6: Number of entities holding QS in the halibut IFQ program.

of revenues among active vessels. Revenues are adjusted for inflation using the Gross Domestic Product (GDP) price deflator and are reported in 2010 equivalent dollars. Aggregate revenue from halibut IFQ has been higher for all years after program implementation relative to the baseline period (Figure 11.7). Halibut IFQ revenue was generally increasing through 2007, when revenues reached a peak of $223 million, but has declined since that time, falling to an average of $94 million from 2013-2017.

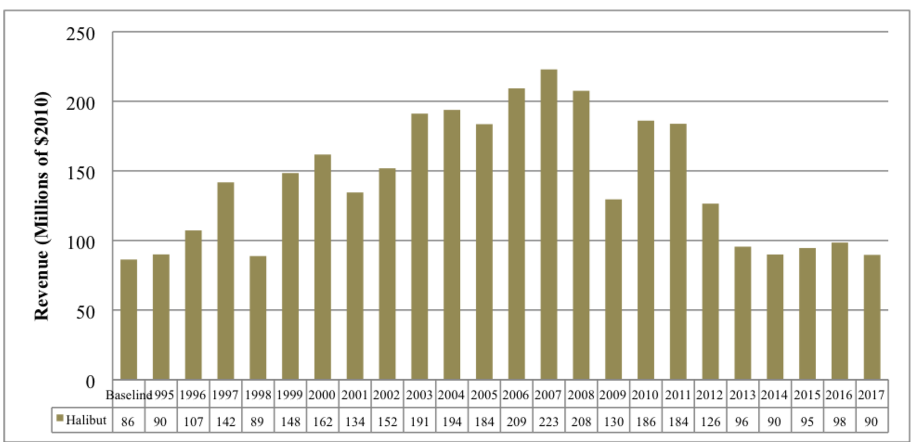


Figure 11.7: Halibut IFQ program revenue.

The average real price per pound of halibut has been higher in each year since program implementation, with the exception of 1998. Real average prices of halibut increased by 179% from $1.83/lb during the baseline to $5.08/lb in 2017 (Figure 11.8). There is substantial variation in the average prices which varied annually by -40% to 53% over the course of the halibut IFQ program, but there is a general upward trend with an average annual rate of change of 7.5%, despite a nearly 14% decline in from 2016 to 2017.

Halibut IFQ revenue per vessel has been above the baseline value for all years after program implementation as a function of both revenue increasing and the number of vessels declining relative to the baseline. The real revenue per active vessel increased by 327% from a baseline value of $25,000 to $107,000 in 2017 (Figure 11.9). Revenue per vessel increased from the baseline nearly every year and reached a high in 2007 at over $180,000 per vessel, but has generally declined after 2007, with a

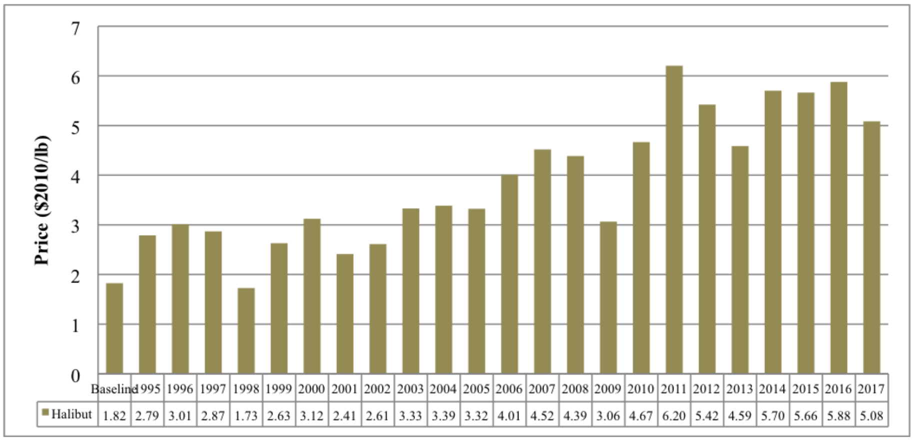


Figure 11.8: Halibut IFQ program price per pound.

substantial reduction beginning in 2012. Both revenues and the number of active vessels declined in 2017 relative to 2016, resulting in an overall decrease in revenue per vessel by 6% in 2017.

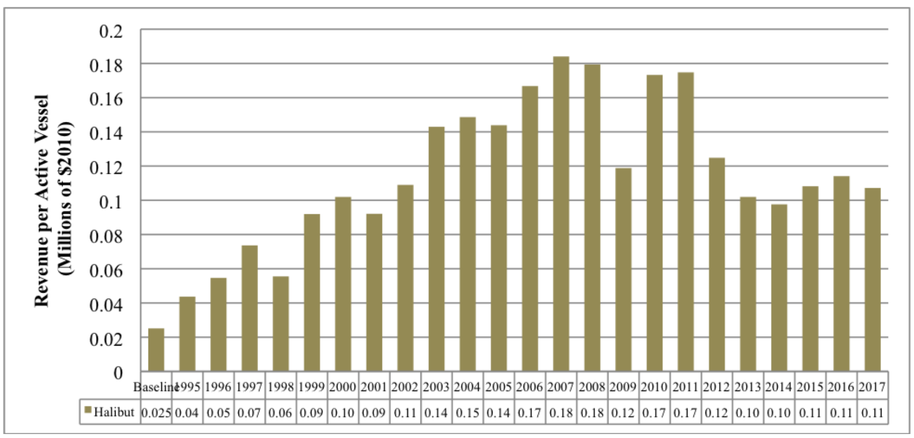


Figure 11.9: Halibut IFQ program revenue per active vessel.

The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the halibut IFQ program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore the value of the Gini coefficient increases as revenue becomes more concentrated on a subset of vessels within the active fleet, but may also decrease with the exit of smaller vessels as the active fleet transitions to fewer and more homogeneous vessels. The Gini coefficient for the baseline period (Gini = 0.59) is lower than at any point since IFQ program implementation, which implies a more even distribution of vessel revenues before program implementation (Figure 11.10). After the initial increase in the Gini coefficient from 0.59 during the baseline to 0.66 in 1995, the Gini coefficient remained relatively stable after program implementation through 2011. There has been a trend toward a declining Gini coefficient (increasing revenue equality across vessels) in this fishery, starting from 0.70 in 2011 to 0.61 in 2014 to the lowest Gini coefficient since program implementation of 0.60 in from 2015-2017.

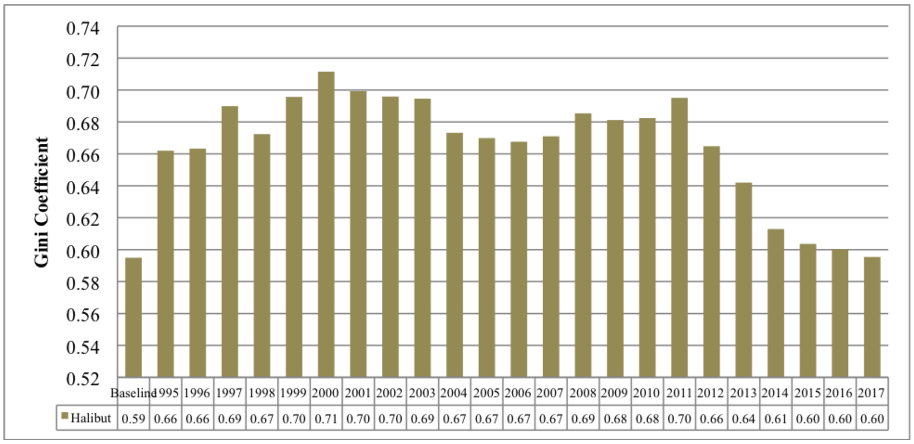


Figure 11.10: Halibut IFQ program Gini Coefficient.

11.3. North Pacific Sablefish IFQ Program

Management Context

The North Pacific Sablefish IFQ Program was implemented simultaneously with the North Pacific Halibut IFQ Program, but they will be assessed separately in this report. Sablefish (also known as black cod) in the North Pacific are commercially caught by catcher vessels (CVs) that deliver their catch onshore and catcher/processor vessels (CPs) that catch and process their catch at sea using longline (hook-and-line, jig, troll, and handline), pot, and trawl gear, but the IFQ program only applies to longline and pot gears. Twenty percent of the Bering Sea and Aleutian Islands (BSAI) sablefish total allowable catch (TAC) allocated to vessels using hook-and-line or pot gear and 7.5% of the sablefish TAC allocated to trawl gear are reserved for use in the Community Development Quota (CDQ) program. There is not a substantial recreational sector for sablefish in the North Pacific. Similar to the Halibut IFQ program, this section only examines the performance of the sablefish IFQ portion of the program.

The sablefish IFQ program was developed by the North Pacific Fishery Management Council (NPFMC) and implemented by NOAA Fisheries in 1995. The sablefish IFQ program is managed by the NPFMC, which is responsible for establishing Annual Catch Limits (ACLs) and TACs for sablefish and allocating TACs among various user groups. Prior to the IFQ program, the fisheries operated as a derby fishery which often lasted a few days per year in some management areas. Quota Share (QS) was initially issued to persons based on both historic and recent participation of persons who, in 1988, 1989, or 1990, owned or leased vessels with qualifying landings. Quota share were issued in amounts commensurate with creditable landings during the “best five” of 6 years 1985-1990. The primary objectives of the IFQ Program are to 1) eliminate gear conflicts; 2) address safety concerns; and 3) improve product quality and value.

The Halibut and Sablefish IFQ Program includes a cost recovery provision whereby the fishermen are assessed a fee based on the cost to the government to manage the program. The costs that can be recovered include the costs related to management, data collection, and enforcement of a Limited Access Privilege Program (LAPP) or Community Development Quota Program, and cannot exceed 3% of the total ex-vessel value of the fishery. Cost recovery began in 2000 for sablefish IFQ and has ranged from \$0.75 million to \$2.32 million and 1.0% to 3% of the ex-vessel value of the fishery, with 2015 and 2016 being the only years the fishery reached the 3% limit.[4]

Catch Share Privilege Characteristics

There are two forms of quota in the sablefish IFQ Program, QS and annual IFQ in pounds derived from QS. Quota shares are a revocable, indefinite privilege that entitles the holder to a share of the total area- and vessel class-specific IFQ allocated each year. Quota share holders can be individuals or non-individuals (such as a corporation). Prior to the beginning of each fishing season, IFQ is allocated to QS holders based upon their held QS, the total amount of quota in each management area (QS pool), and the total allowable catch (TAC) in each area. Quota shares and the derived IFQ are specified for use in particular areas and on vessels of a particular size. These conditions are intended to maintain a diverse fleet of vessels and limit catch by area. The IFQ program also includes use caps and small QS blocks that are intended to limit consolidation and maintain participation opportunities for small operations and new entrants. IFQ are valid only for one year, but there are provisions that allow QS holders to carry over to the next year up to 10% of their unused IFQ and any overages (up to 10%) are taken from the following year's IFQ allocation. There are a total of 18 species and area specific quota allocations with a total of 36 unique types of sablefish QS due to the existence of blocked and unblocked QS in each area.

Sablefish quota share can be sold with or without the annual IFQ derived from the quota share. Catcher vessel quota share can be transferred to other initial issuees or to those who have become eligible to receive QS by transfer. To be eligible, potential QS/IFQ recipients must be a U.S. citizen and have worked as part of a harvesting crew in any U.S. commercial fishery for at least 150 days. IFQ can be leased annually to other eligible permit holders under limited circumstances. Non-individual entities that are not initial issuees are only able to purchase QS or lease IFQ for the largest vessel class of "catcher/processor" quota (category A). The IFQ Program has a number of excessive share provisions. There are ownership caps on both individuals as well as entities. No individual can hold/control more than 1% of sablefish QS in specific areas and combinations of areas. In addition, vessel use caps limit each vessel to harvesting 1% of the sablefish TAC in specific areas and combinations of areas. Sablefish CDQ fishing is not subject to the excessive share provisions. There are also limits on the use of hired skippers through a requirement that the holder of QS be on board when using CV QS and IFQ. There is also a revolving loan program implemented by the NPFMC and NOAA Fisheries to assist entry level and small vessel fishermen acquire funding. The loan program is capitalized through a portion of the cost recovery fees collected.

Catch and Landings Performance Metrics

The catch and landings performance metrics include the amount of IFQ allocated to the program, the landings of IFQ sablefish, and the percentage of the IFQ allocated that is landed (percent utilization). Annual metrics are compared with a "baseline" period prior to program implementation, which is the average of the three years prior to program implementation (1992-1994). Between the baseline and 2017, the IFQ allocation and landings have fallen by 53% and 58%, respectively, while the percent utilization fell from 98% during the baseline to 88% in 2017. The IFQ allocation and landings have followed a cyclical pattern since the baseline with IFQ allocation and landings falling initially after program implementation to 1999, followed by an increase from 2000 to 2004, another

[4] The cost recovery fee for the Halibut and Sablefish IFQ Program is assessed for halibut and sablefish together. These numbers reflect our apportionment of the total fees collected to sablefish based on the ratio of ex-vessel value.

decline between 2005 and 2010, an increase in 2011 and 2012, followed by a decline from 2013-2016 and a slight increase in 2017 (Figures 11.11 and 11.12).

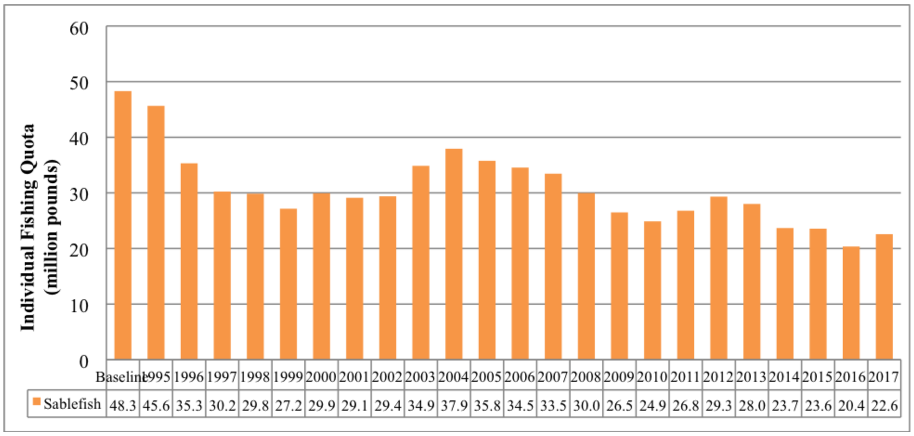


Figure 11.11: IFQ allocated to the sablefish IFQ program.

Figure 11.12 displays the landings of sablefish as part of the program and also separates the landings by CVs and CPs for all years of the program. Overall program landings have declined by 58% in 2017 relative to the baseline, but CV landings have declined by 55% while CP catch has declined by 78%. CPs land on average 12% of the total landings, but the CP share has ranged from 9% in 1994 to 16% in 1999, after which point the CP share of the total landings has generally been declining to approximately 6% on average from 2014-2017.

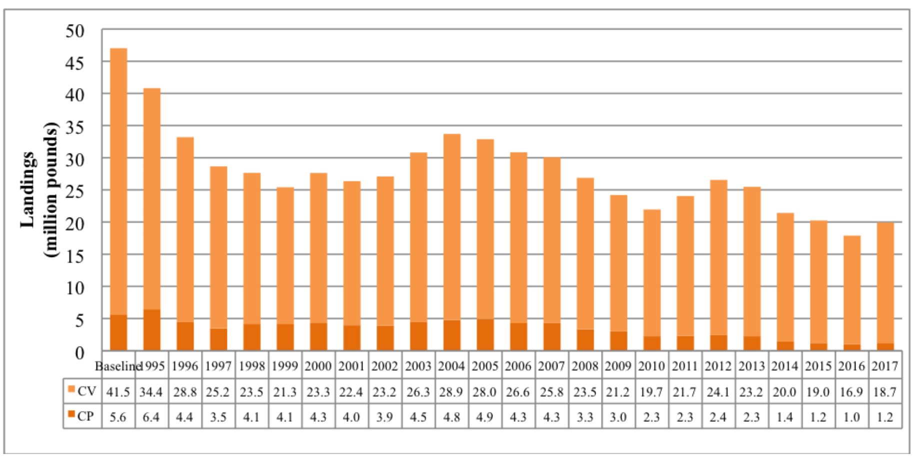


Figure 11.12: Landings of sablefish in the sablefish IFQ program.

Utilization initially fell after program implementation, and appears to be slightly counter-cyclical with the IFQ and landings, always at a lower than baseline level. There was a large decrease in utilization in 2015 to a low of 86% that slightly rebounded in 2016 and 2017 to 88% (Figure 11.13). However, while the utilization is lower after program implementation compared with the baseline, the annual catch limit (ACL) has not been exceeded in any year since implementation. In the three years prior to implementation, the utilization rates were 85%, 111%, and 99% of the available ACL, respectively, which skews the utilization rate of the baseline closer to 100% because of the overage in 1993. Additionally, there were several area-allocations that were exceeded during the baseline period, 3 in 1992, 5 in 1993, and 1 in 1994, while only 3 area allocations have been exceeded since program implementation in 1995.

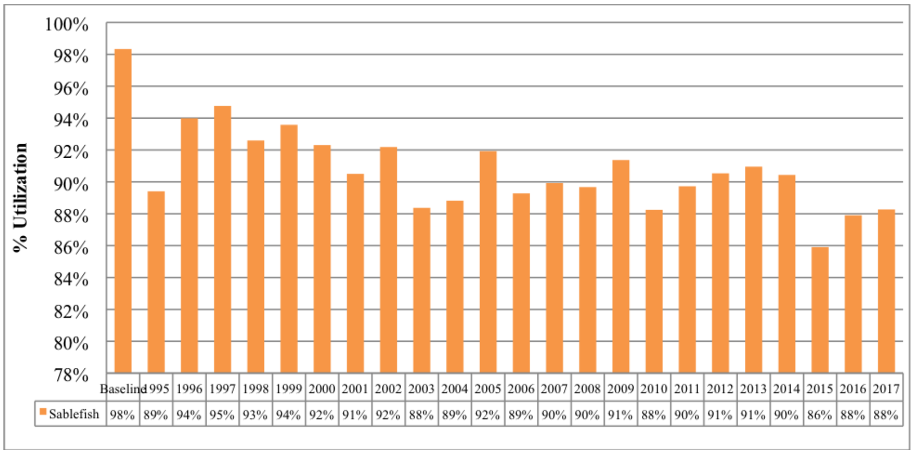


Figure 11.13: Percent of the IFQ allocation that is landed in the sablefish IFQ program.

Effort Performance Metrics

The effort performance metrics include season length index, the number of active vessels, and the number of entities holding QS. The season length index is defined as the number of days in which at least one vessel was fishing divided by the number of days in the regulatory fishing season. This index is necessary to create a single unit-less metric of season length that can be aggregated over all 6 sablefish areas, in which levels of vessel participation vary throughout the season. This index measures the relative proportion of the legal fishing season during which one or more vessels actively fished sablefish IFQ. During the baseline, some areas were only open to fishing for sablefish for a few days (for the most demanded areas) while others were open for most of the year. To calculate an aggregate sablefish IFQ program season length index, we use the weighted harmonic mean number of days active by area using catch as weights and then divide by the regulatory season length. For the baseline period, we assume a 246 day regulatory season length which is the number of days allowed for the first 8 years post-IFQ and is the best hypothetical season length to use to compare pre-IFQ with post-IFQ. Using these definitions, the season length index in the baseline period is 0.07. Upon implementation of the IFQ Program, fishing was allowed for 246 days and the season length index for 1995 was 0.96. The number of active days increased from a baseline average of 17 days to 235 days in 1995. Over the course of the sablefish IFQ program, the average number of active days is 237 per year and the season length index has fluctuated between 0.93 – 0.98 (Figure 11.14).

The number of active vessels reflects the number of sablefish CVs and CPs with any commercial landings of IFQ Program sablefish in a given year. The baseline value represents the average number of unique vessels per year with commercial sablefish landings from 1992-1994. After program implementation, there was an initial 46% reduction in the number of active vessels overall, which decreased from 1,139 vessels in the baseline period to 610 vessels in 1995 (Figure 11.15). In the first year after program implementation, a larger share of CVs (47%) left the fishery than CPs (23%). In the following three years (1996-1998), the average annual decrease in the number of active vessels fishing sablefish was 8% (11% for CPs and 8% for CVs), but from 1999 to 2017 the decline has slowed to a 3% annual rate overall and for CVs and a 5% annual rate for CPs. This results in a 74% reduction in active vessels between the baseline and 2017.

There were 1,054 entities holding Sablefish QS in 1995. The number of entities has declined over time to 809, or 23% fewer entities holding QS by 2017 (Figure 11.16).

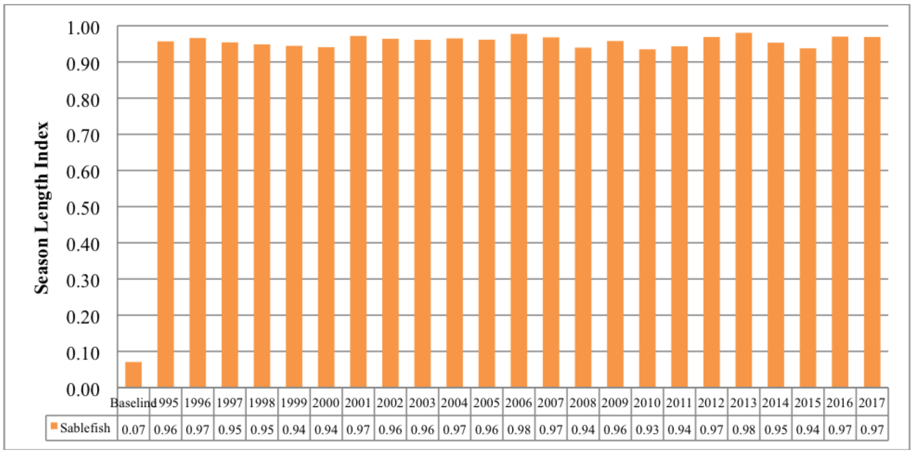


Figure 11.14: Sablefish IFQ program season length index.

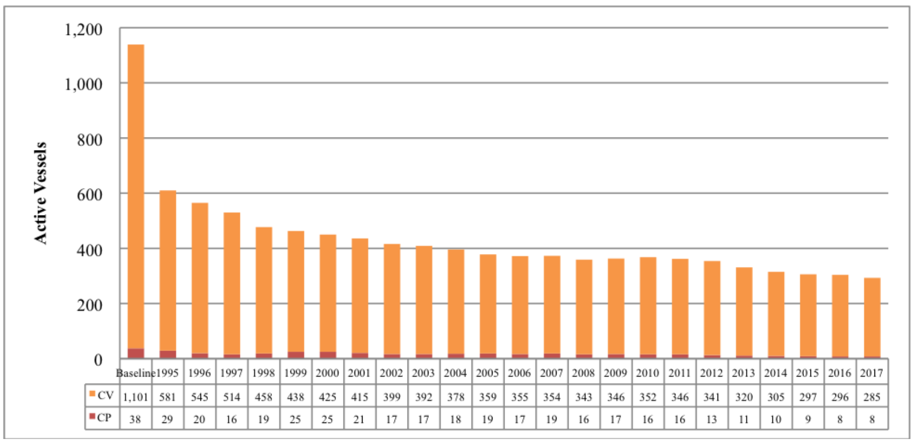


Figure 11.15: Number of active vessels in the sablefish IFQ program.

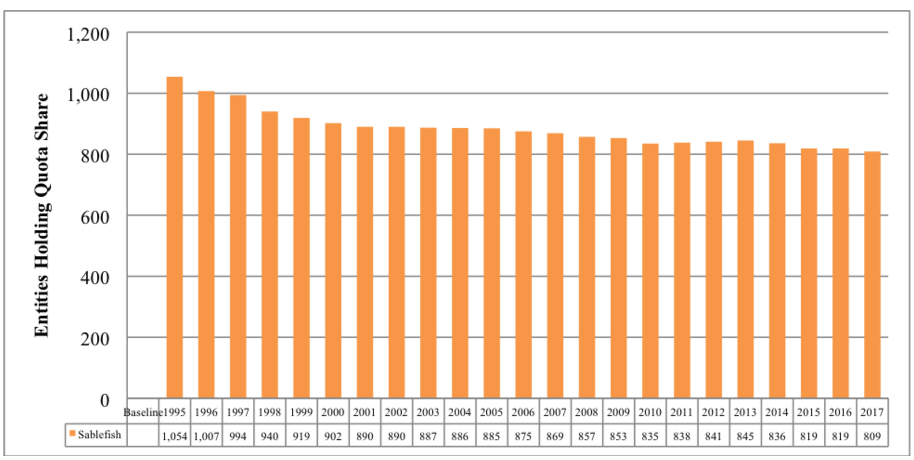
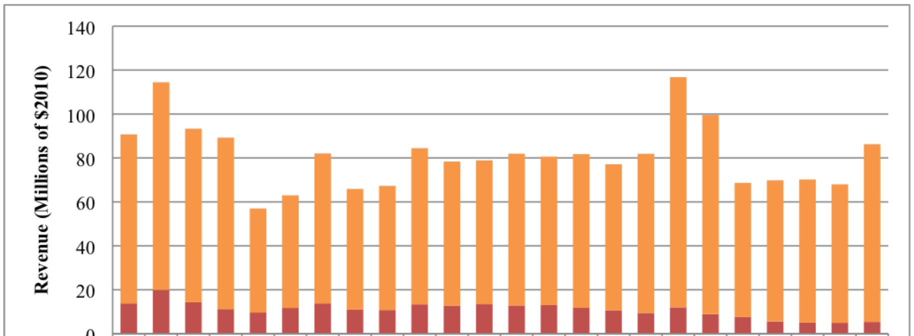


Figure 11.16: Number of entities holding QS in the sablefish IFQ program.

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from sablefish IFQ, average prices of sablefish IFQ, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among the active vessels. Revenues are adjusted for inflation by using the

Gross Domestic Product (GDP) price deflator and are reported in 2010 equivalent dollars. For the Sablefish IFQ Program, revenues are reported in their native format, such that the price received by CVs is the weighted annual ex-vessel price while the price received by CPs is the weighted annual first-wholesale price. This enables a comparison between the revenues that each type of vessel receives on offloading their catch from the vessel. In the first year of program implementation, sablefish IFQ revenue initially increased by 26% from $91 million during the baseline to $115 million in 1995 overall, which was the result of an increase of 45% for CPs and of 23% for CVs compared to the baseline (Figure 11.17). Sablefish IFQ revenue declined to a low in 1998 of $57 million and was below the peak in 1995 every year afterwards until 2011 which is a program level high of $117 million. However, sablefish IFQ revenue was back below the baseline level from 2013-2017, despite a 27% increase between 2016 and 2017.



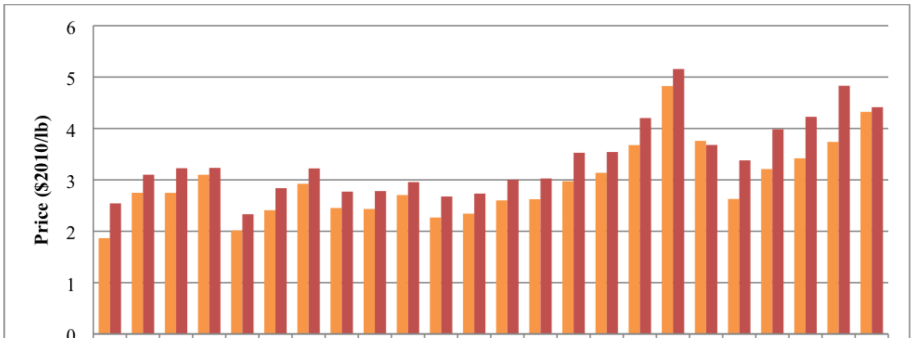
	Baseline	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CV	76.9	94.5	79.0	78.0	47.4	51.3	68.3	54.9	56.5	71.1	65.6	65.5	69.1	67.6	70.0	66.5	72.4	104.8	90.7	61.0	64.3	65.1	63.0	80.9
CP	13.8	19.9	14.3	11.2	9.6	11.7	13.8	11.0	10.8	13.4	12.8	13.4	12.9	13.1	11.8	10.7	9.5	12.0	8.9	7.6	5.6	5.1	5.0	5.4

Figure 11.17: Sablefish IFQ program revenue.

As the CV sector revenues are in ex-vessel value and CP sector revenues are in first wholesale value, the weighted average price per ton of sablefish varies by, and is reported separately for, each sector. The average price per pound of sablefish increased for both CVs and CPs since program implementation. Real average prices of sablefish increased by 123% from $1.95/lb during the baseline to $4.33/lb in 2017 with CVs benefiting more than the CPs with prices increasing by 132% and 74%, respectively (Figure 11.18). There is substantial volatility in average prices which have varied annually by -34% to 44% over the course of the sablefish IFQ program, with CPs receiving higher prices (real average price of $3.43) than CVs (real average price of $3.00). In addition CPs have a lower coefficient of variation in prices, indicating that CP prices are less variable than CV prices on an annual basis.

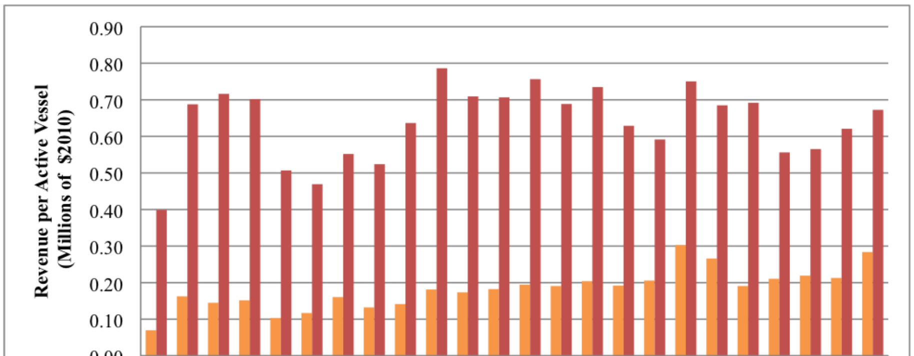
Sablefish IFQ revenue per vessel increased by 269% from a baseline of $80,000 to $294,000 in 2017, with the majority of revenues accruing to the CVs which increased by 307% (from $70,000 in the baseline to $284,000 in 2017) while CP revenues increased by 69% (from $401,000 in the baseline to $673,000 in 2017) (Figure 11.19).

The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the sablefish IFQ program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore, the value of the Gini coefficient increases as revenue becomes more concentrated on a subset of vessels within the active fleet, but may also decrease with the exit of smaller vessels as the active fleet transitions to fewer and more homogeneous vessels. This is demonstrated in the difference in Gini coefficient for the baseline period for all



	Baseline	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CV	1.87	2.75	2.75	3.10	2.02	2.41	2.92	2.45	2.43	2.70	2.27	2.34	2.60	2.62	2.97	3.14	3.68	4.83	3.76	2.63	3.21	3.42	3.74	4.32
CP	2.54	3.10	3.23	3.23	2.33	2.84	3.22	2.77	2.78	2.96	2.68	2.73	3.00	3.03	3.53	3.54	4.20	5.16	3.68	3.38	3.98	4.23	4.83	4.41

Figure 11.18: Sablefish IFQ program price per pound.



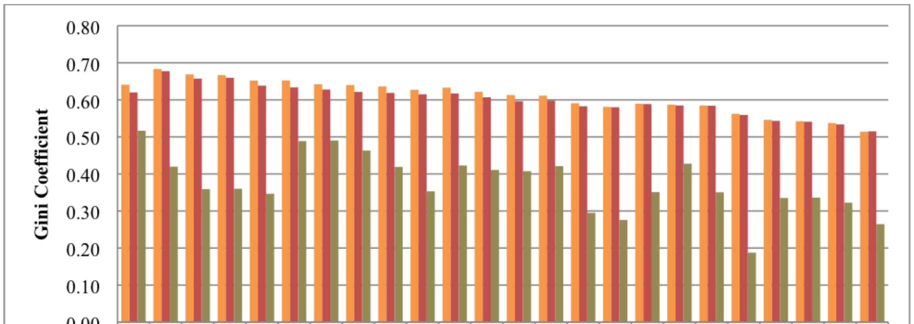
	Baseline	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CV	0.070	0.16	0.14	0.15	0.10	0.12	0.16	0.13	0.14	0.18	0.17	0.18	0.19	0.19	0.20	0.19	0.21	0.30	0.27	0.191	0.21	0.22	0.21	0.28
CP	0.399	0.69	0.72	0.70	0.51	0.47	0.55	0.52	0.64	0.79	0.71	0.71	0.76	0.69	0.73	0.63	0.59	0.75	0.68	0.692	0.56	0.57	0.62	0.67

Figure 11.19: Sablefish IFQ program revenue per active vessel.

vessels (Gini = 0.64) which implies a less even distribution in vessel revenues compared with the Gini coefficient for either the CVs only (Gini = 0.62) or for the CPs only (Gini = 0.52) (Figure 11.20). This is because the revenue per vessel among CVs and CPs is very different (Figure 11.19) and when all vessels are combined together in the Gini coefficient, it implies a less even distribution of revenue than examining the within vessel-type revenue distribution. There has been a general movement toward a more even distribution of vessel revenue in the sablefish IFQ program overall and for CVs since program implementation, falling from 0.64 and 0.62 to 0.51 and 0.52 in 2017, respectively. The distribution of CP revenue has become more even since program inception from 0.52 in the baseline to 0.26 in 2017, and while it shows a lot more variation throughout the years, the Gini coefficient has always been below 0.52 meaning that the revenue accruing to CPs has become more equal among vessels compared with the baseline. The Gini coefficient reached its lowest level overall and for the CV sector in 2017, which could be a result of less active vessels exiting the fishery as the number of active vessels is at their lowest level for both sectors since before the baseline period (Figure 11.15).

11.4. American Fisheries Act (AFA) Pollock Cooperatives Program

Management Context



	Baseline	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Sablefish	0.64	0.68	0.67	0.67	0.65	0.65	0.64	0.64	0.64	0.63	0.63	0.62	0.61	0.61	0.59	0.58	0.59	0.59	0.58	0.56	0.55	0.54	0.54	0.51
CV	0.62	0.68	0.66	0.66	0.64	0.63	0.63	0.62	0.62	0.61	0.62	0.61	0.60	0.60	0.58	0.58	0.59	0.58	0.58	0.56	0.54	0.54	0.53	0.52
CP	0.52	0.42	0.36	0.36	0.35	0.49	0.49	0.46	0.42	0.35	0.42	0.41	0.41	0.42	0.30	0.28	0.35	0.43	0.35	0.19	0.34	0.34	0.32	0.26

Figure 11.20: Sablefish IFQ program Gini Coefficient.

There are three types of vessels that participate in the Bering Sea and Aleutian Islands (BSAI) walleye pollock fishery: catcher vessels (CVs) that deliver their catch onshore, catcher/processors (CPs) that catch and process their catch at sea, and motherships that are at-sea processors receiving codends from CVs but do not catch any of their own fish. Pollock in the BSAI management area are targeted only with pelagic (midwater) trawl gear. Landings average slightly above 1 million metric tons per year, which represents over half of Alaska groundfish production volume and make it the largest fishery in the United States by volume. Ten percent of the BSAI total allowable catch (TAC) is allocated to communities through the Community Development Quota (CDQ) Program. There is no recreational sector for pollock in the North Pacific.

The American Fisheries Act (AFA) Pollock Cooperatives Program was established by the U.S. Congress under the American Fisheries Act in 1998, and was implemented for the CP sector in 1999 and the CV and mothership sectors in 2000. The goals of the AFA were to resolve frequent allocation disputes between the inshore (CVs) and offshore (CPs and motherships) sectors and reduce externalities as a result of the race for fish. The AFA established minimum U.S. ownership requirements, vessel and processor participation requirements, defined the list of eligible vessels, finalized the TAC allocation among sectors, provided an allocation to the CDQ Program, and authorized the formation of cooperatives. The allocation of the Bering Sea TAC to the AFA (after the 10% allocation to the CDQ program and incidental catch allowance in other fisheries are deducted), is 50% to the CV sector, 40% to the CP sector, and 10% to the mothership sector. Additionally, nine vessels were decommissioned as part of the AFA for a total cost to the remaining participants of $90 million.

Catch Share Privilege Characteristics

Participation in the AFA pollock fishery is permitted only by the vessels listed in the American Fisheries Act, and those eligible vessels are authorized to form cooperatives which receive an allocation (exclusive harvest privilege) of a percentage of the Bering Sea pollock TAC from NOAA Fisheries. Seven inshore cooperatives have formed between CVs and eligible shoreside processors, and CVs are required to deliver 90% of their BSAI pollock to a cooperative member processor. The CV cooperatives are allocated a portion of the pollock TAC as a directed fishing allowance based on the catch history of its member vessels. The CP and mothership sectors have each formed a voluntary cooperative to receive and harvest the exclusive privilege allocated to the sector. Starting in 2011 with the passage of Amendment 91 to the BSAI Fishery Management Plan, incentive plan agreements (IPA) were put in place for AFA participants to self-regulate and reduce the number of incidentally caught salmon in the pollock fishery and allowed NOAA Fisheries to allocate transferable prohibited species catch (PSC) allowance for Chinook salmon to vessels in the pollock fishery.

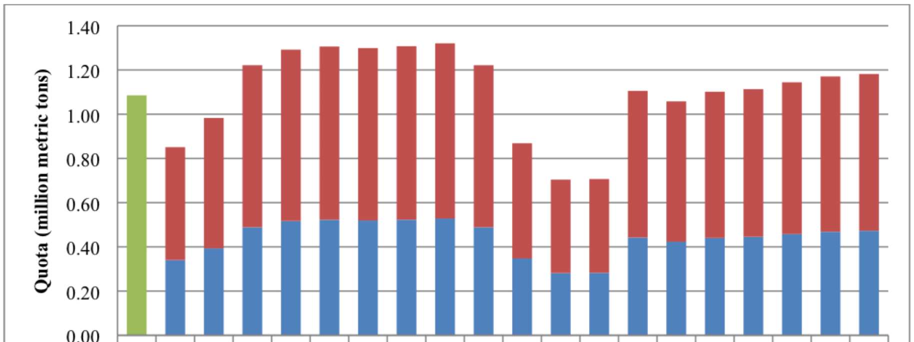
Catch share privileges under the AFA are revocable, but were allocated in perpetuity. There is a single cooperative in the CP and mothership sectors, and contracts among members of the cooperative have been developed to allocate their catch across vessels. Catcher vessel cooperatives can exchange directed fishing allowance among their member vessels as they see fit, but since the CV cooperative allocations are based on the membership of their vessels, vessels have to change cooperatives to exchange CV directed fishing allowance across cooperatives. If a vessel owner decides to change cooperatives, the vessel is required fish for one year in the limited access fishery and is not allowed to participate in the cooperative system, unless the vessel owner's current cooperative approves delivery to another cooperative member processor. Catcher vessel cooperatives are also able to contract with non-member AFA eligible vessels to harvest a portion of their allocation. The contract must be approved by both the non-member vessel and that vessel's cooperative, which is similar to a quota lease. There are also excessive use caps in both the inshore harvesting and processing sectors which state that no entity can harvest more than 17.5% or process more than 30% of the directed fishing allowance of pollock allocated to the inshore sector.

Catch and Landings Performance Metrics

The catch and landings performance metrics include the amount of pollock TAC (quota) allocated to the program, the landings of AFA pollock, and the percentage of the quota allocated that is landed (percent utilization). These annual metrics are compared with a "baseline" period prior to program implementation, which is the average of the three years prior to any part of the program implementation (1996-1998). The baseline quota value represents the average total non-CDQ directed pollock allocation (inshore and offshore). For this report, the CV and mothership sectors are combined into a single CV sector which remains separate from the CP sector. Between the baseline and 2017, the overall quota has increased by 8.9%, while landings increased by 16.2%, and the percent utilization increased from 93.6% during the baseline to 99.9% in 2017 (Figures 11.21, 11.22, and 11.23). The quota and landings both fell the year after program implementation, but increased substantially thereafter and were relatively stable from 2001-2007. After a few small year classes of fish recruiting into the fishery, the quota was cut substantially in 2008 and remained low through 2010, leading to lower catches during those years. However, the quota increased in 2011 above the baseline level and remained near or above baseline levels for 2012-2017, which resulted in a slightly larger harvest as well as a larger share of the quota being utilized from 2012-2017 compared with the baseline.

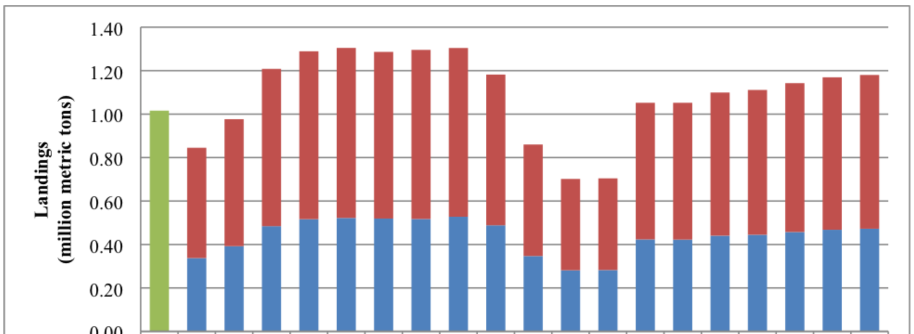
Figure 11.22 also separates the landings by catcher vessel and mothership sectors (CV) and catcher/processor sector (CP) for all years of the program. Overall program landings have increased by 16.2% in 2017 relative to the baseline, but the CP sector landings declined by 4.6% while the CV landings increased by 36.0%, which is largely a function of the reallocation of quota under the AFA. Prior to AFA, the offshore sector (motherships and CPs) were allocated 60% of the non-CDQ directed pollock TAC, leaving 40% for the inshore sector (CVs). The AFA changed the allocations to 40% for the catcher/processors (CP sector), 50% for the CV sector, and 10% for the mothership sector, and in this report the CV sector includes both CVs and mothership vessel landings.

As a result of ending the race for fish, utilization (% of the quota that is landed) increased substantially after the AFA. With the exception of the CV sector in 2007 and both sectors in 2011,



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Baseline	1.085																			
CV		0.51	0.59	0.73	0.78	0.78	0.78	0.78	0.79	0.73	0.52	0.42	0.42	0.66	0.63	0.66	0.67	0.69	0.70	0.71
CP		0.34	0.39	0.49	0.52	0.52	0.52	0.52	0.53	0.49	0.35	0.28	0.28	0.44	0.42	0.44	0.45	0.46	0.47	0.47

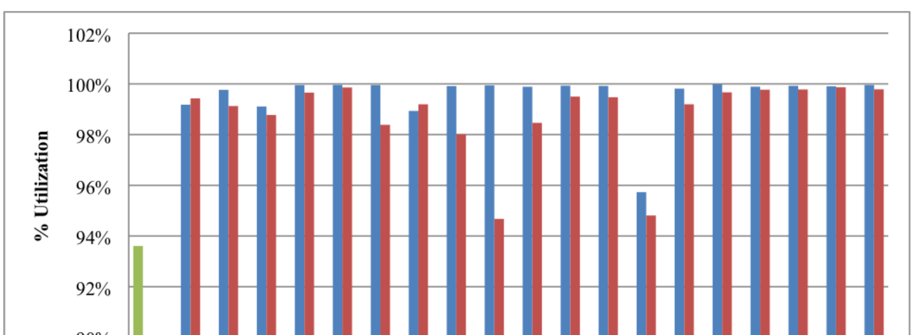
Figure 11.21: Quota allocated to the AFA Pollock Program.



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Baseline	1.016																			
CV		0.51	0.58	0.72	0.77	0.78	0.77	0.78	0.78	0.69	0.51	0.42	0.42	0.63	0.63	0.66	0.67	0.69	0.70	0.71
CP		0.34	0.39	0.48	0.52	0.52	0.52	0.52	0.53	0.49	0.35	0.28	0.28	0.42	0.42	0.44	0.44	0.46	0.47	0.47

Figure 11.22: Landings of AFA pollock.

utilization has always been above 98% since program implementation. With the exception of 1999 and 2005, the CP sector has always exceeded the utilization of the CV sector, which is interesting as 1999 was the year in which the CP sector had active cooperatives and the CV sector did not.

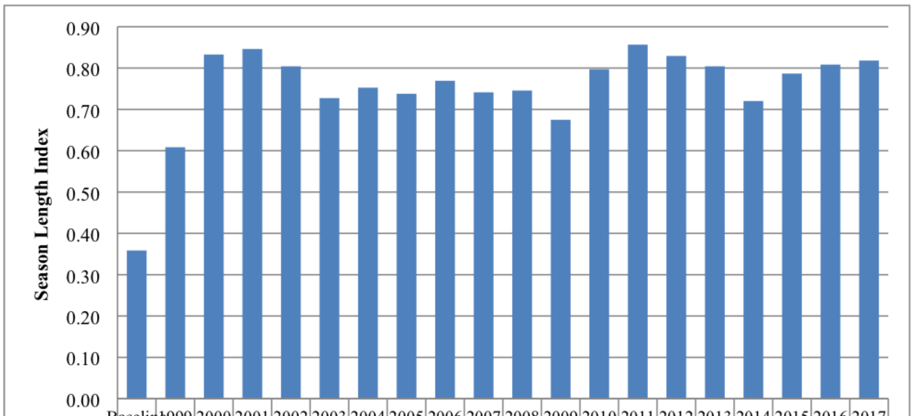


	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Baseline	93.61																			
CP		99.18	99.77	99.11	99.95	99.96	99.96	98.93	99.91	99.94	99.89	99.93	99.92	95.73	99.81	99.98	99.89	99.93	99.91	99.96
CV		99.43	99.13	98.77	99.66	99.86	98.39	99.19	98.01	94.68	98.46	99.50	99.47	94.81	99.20	99.67	99.77	99.78	99.87	99.79

Figure 11.23: Percent of the allocated quota that is landed in the AFA Pollock Program.

Effort Performance Metrics

The effort performance metrics include the number of active vessels, the number of entities receiving an exclusive harvest privilege in the AFA pollock program (quota), and the season length index. The season length index is defined as the number of days in which at least one vessel was fishing divided by the maximum regulatory season length permissible for the fishery, equal to 286 days (opening on January 20th and closing on November 1st). This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished for pollock. For the baseline period, we assume the same 286 day regulatory open period which allows for a relative comparison of the season length pre-AFA with post-AFA. During the baseline, the average number of active days was 103, resulting in a season length index of 0.36. Upon implementation of the AFA, vessels increased the amount of time fishing and the number of active days increased to 174 days in 1999 and 239 days in 2000, which implies a season length index of 0.61 and 0.83, respectively. Since 2001, the number of active days has varied between 193 and 245 days, which implies that the season length index has fluctuated between 0.67 – 0.86 (Figure 11.24).



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AFA	0.36	0.61	0.83	0.85	0.80	0.73	0.75	0.74	0.77	0.74	0.75	0.67	0.80	0.86	0.83	0.80	0.72	0.79	0.81	0.82

Figure 11.24: AFA Pollock Program season length index.

The number of active vessels reflects the number of AFA pollock CV and CP vessels with any commercial landings of AFA pollock in a given year. The baseline value represents the average number of unique vessels per year with commercial pollock landings from 1996-1998. After program implementation, the number of active vessels declined from 147 in the baseline to 140 in 1999 and down to 113 in 2000 which represents a decline of 23% between the baseline and 2000 (Figure 11.25). There was actually a small increase in the number of CVs in 1999 since AFA had not yet been implemented for that sector, but the number of CVs declined to 98 in 2000 and remained relatively stable in the low nineties and high eighties thereafter. The number of CPs declined from 34 during the baseline period to 23 in 1999 and then down to 15 in 2000, and remained between 14 and 18 in all years since.

The number of entities receiving an exclusive harvest privilege in the AFA Pollock Program, defined as the number of unique AFA permits for CVs and CPs, remained nearly constant from 2000 through 2013 between 130-133 entities but declined to 126 in 2014 and 2015 and 125 in 2016 and 2017 (Figure 11.26). This is likely due to the fairly restrictive provisions in the original AFA to restrict removing or replacing vessels, but may change in the near future as AFA vessel replacement provisions are utilized.

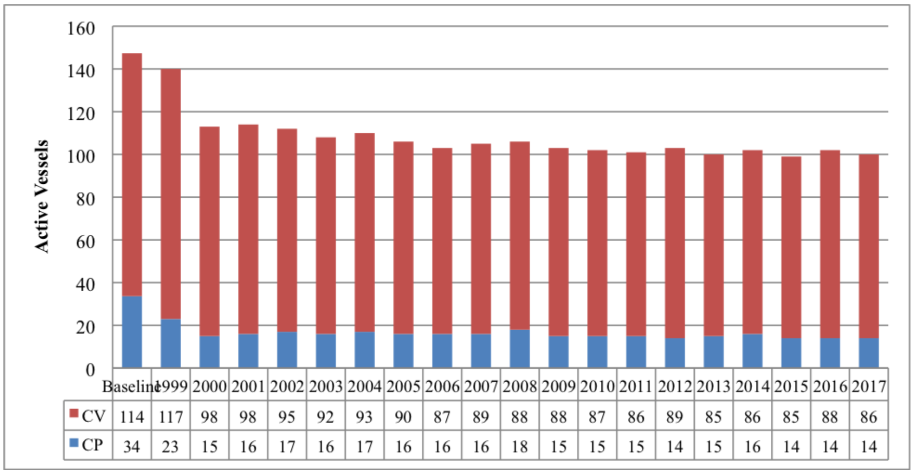


Figure 11.25: Number of active vessels in the AFA Pollock Program.

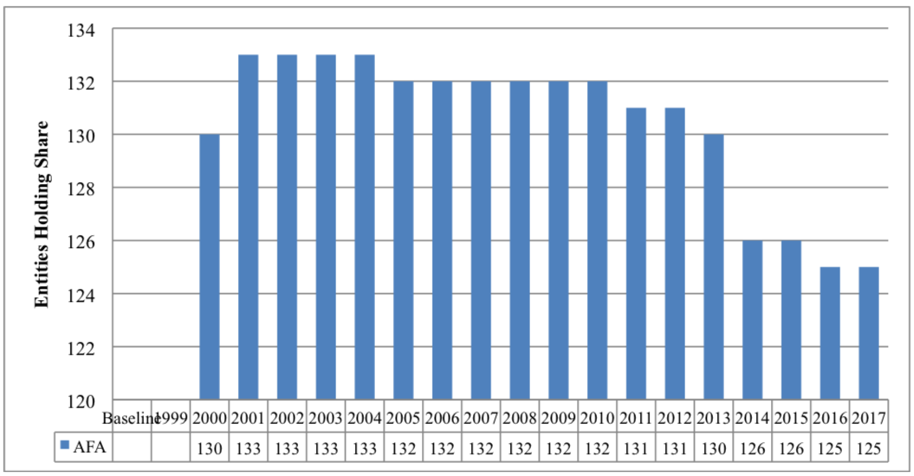
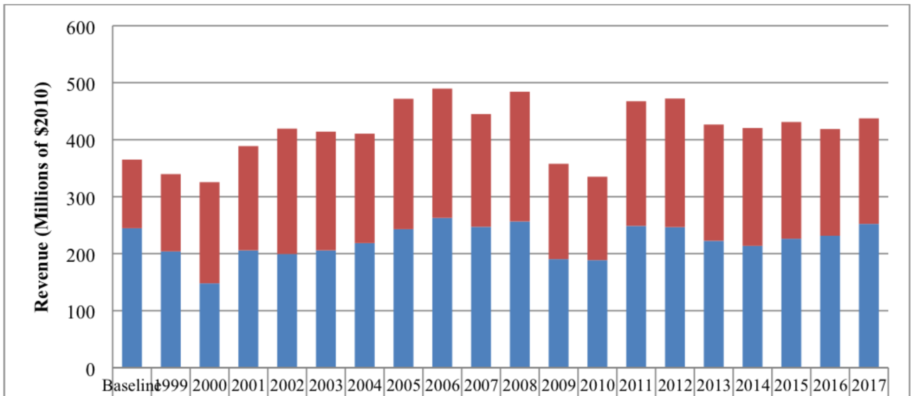


Figure 11.26: Number of entities receiving an exclusive harvest privilege in the AFA Pollock Program.

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from AFA pollock, average prices of AFA pollock, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among the active vessels. Revenues are adjusted for inflation by using the GDP price deflator and are reported in 2010 equivalent dollars. For the AFA Pollock Program, revenues are reported in their native format, such that the price received by CVs is the weighted annual ex-vessel price while the price received by CPs is the weighted annual first wholesale price. This enables a comparison between the revenues that each type of vessel receives on offloading their catch from the vessel. Total program revenue declined the first two years of the program from $367 million during the baseline to $340 million and $325 million in 1999 and 2000, respectively (Figure 11.27). Aggregate revenues were above the baseline levels for 15 of the 19 years since program implementation, from 2001-2008 and 2011-2017. The highest annual real pollock revenue occurred in 2006 at $490 million (in year 2010 dollars).

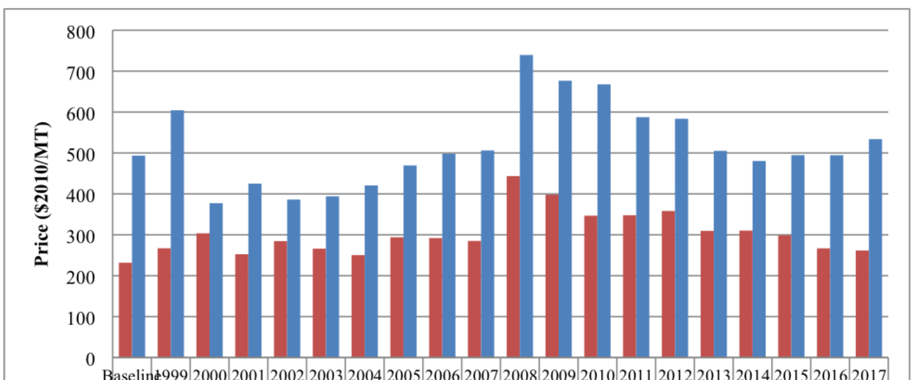
As the CV sector revenues are in ex-vessel value and CP sector revenues are in first wholesale value, the average price per ton of pollock varies by, and is reported separately for, each sector. Real average prices of pollock increased between the baseline and 2017 by 13% from $232/ton to



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CV	120	136	178	183	220	208	192	229	227	198	228	167	146	219	226	204	207	205	187	185
CP	245	204	148	206	199	206	219	243	263	247	257	190	189	249	247	223	214	226	231	252

Figure 11.27: AFA Pollock Program revenue.

$262/ton ex-vessel for CVs and by 8% for CPs from $494/ton during the baseline to $534/ton in 2017 (Figure 11.28). The CV sector experienced a larger increase in price compared with the CP sector since implementation of the AFA program, and prices for the CV sector have always been higher compared with the baseline while prices for the CP sector were below baseline prices for 8 of the 19 years. There is some variation in annual average prices, which varied annually from -38% to 46% for CPs and from -17% to 56% for CVs over the course of the AFA Pollock Program, and the CPs have a higher coefficient of variation in prices (0.19) than the CVs (0.17).

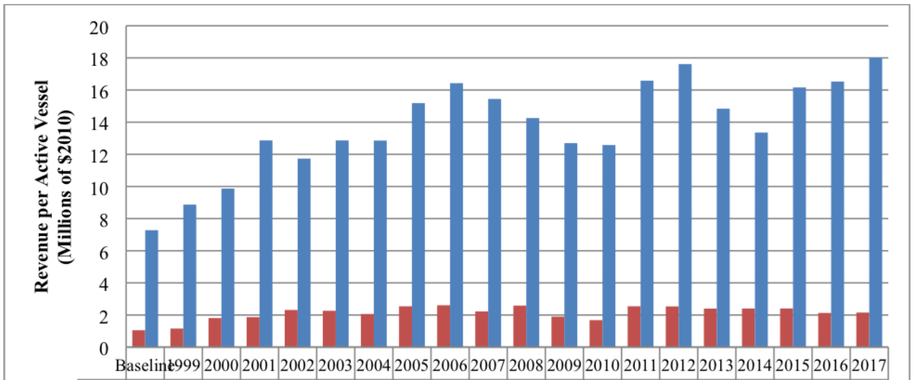


	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CV	232	267	304	253	285	266	250	294	292	285	444	398	347	348	358	310	310	299	267	262
CP	494	604	377	425	386	394	421	470	498	506	739	677	668	588	584	505	480	495	495	534

Figure 11.28: AFA Pollock Program price per metric ton.

Both the CV and CP sectors experienced a more than doubling in revenue per vessel over the course of the AFA Pollock Program, by 104% for CVs (from $1.06 million during the baseline to $2.15 million in 2017) while CP revenue per vessel increased by 148% (from $7.28 million in the baseline to $18.0 million in 2017) (Figure 11.29). Both sectors also experienced an increase in real revenue per vessel in all years compared with the baseline value.

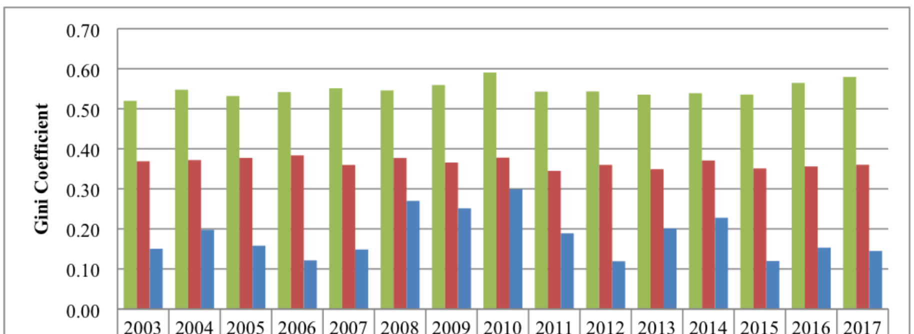
Due to a portion of the catch missing harvesting vessel identification prior to the implementation of the NOAA Fisheries Catch Accounting System (CAS) in 2003, the Gini coefficient for the AFA Pollock Program is presented only for 2003 through 2013. The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the AFA Pollock Program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CV	1.05	1.16	1.81	1.87	2.32	2.26	2.07	2.54	2.61	2.22	2.59	1.90	1.68	2.54	2.54	2.40	2.40	2.41	2.13	2.15
CP	7.28	8.87	9.87	12.8	11.73	12.8	12.8	15.1	16.4	15.4	14.2	12.7	12.5	16.5	17.6	14.8	13.3	16.1	16.5	18.0

Figure 11.29: AFA Pollock Program revenue per active vessel.

earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore the value of the Gini coefficient increases as revenue becomes more concentrated on a subset of vessels within the active fleet, but may also decrease with the exit of smaller vessels as the active fleet transitions to fewer and more homogeneous vessels. This is demonstrated in the difference in Gini coefficient for 2003 for all vessels (Gini = 0.52) which implies a less even distribution of vessel revenues compared with the Gini coefficient for either the CVs only (Gini = 0.37) or for the CPs only (Gini = 0.15) (Figure 11.30). This is because the revenue per vessel among CVs and CPs is very different (Figure 11.29) and when all vessels are combined together in the Gini coefficient, it implies a less even distribution of revenue than examining the within vessel-type revenue distribution. There has been a slight increase in vessel revenue concentration since 2003 in the AFA Pollock program overall. The Gini coefficient for the overall AFA program increased from 0.52 to 0.58 between 2003 and 2017, while both the CV and CP sectors experienced a small 0.01 decline in the Gini coefficient in 2017 relative to the baseline.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AFA	0.52	0.55	0.53	0.54	0.55	0.55	0.56	0.59	0.54	0.54	0.54	0.54	0.54	0.56	0.58
CV	0.37	0.37	0.38	0.38	0.36	0.38	0.37	0.38	0.34	0.36	0.35	0.37	0.35	0.36	0.36
CP	0.15	0.20	0.16	0.12	0.15	0.27	0.25	0.30	0.19	0.12	0.20	0.23	0.12	0.15	0.14

Figure 11.30: AFA Pollock Program Gini coefficient.

11.5. BSAI non-Pollock Trawl Catcher-Processor Groundfish Cooperatives (Amendment 80) Program

Management Context

The Bering Sea/Aleutian Islands non-Pollock Trawl Catcher-Processor Groundfish Cooperatives Program (also known as Amendment 80) was implemented in 2008 for those groundfish catcher/processors (CPs) fishing in the Bering Sea/Aleutian Islands (BSAI) region that were not specifically listed as eligible to participate in the American Fisheries Act (AFA) Pollock Cooperatives Program. NOAA Fisheries identified 28 CP vessels that are eligible to participate in the Amendment 80 Program (Amendment 80 sector) and has issued Amendment 80 quota share (QS) to 27 eligible persons. The program provides an allocation of six groundfish species including Atka mackerel, Aleutian Islands Pacific ocean perch, flathead sole, Pacific cod, rock sole, and yellowfin sole, prohibited species catch (PSC) allowances for halibut and crab, as well as sideboard limits for five groundfish species in the Gulf of Alaska (GOA) to Amendment 80 vessels, and authorizes program participants to form cooperatives. Amendment 80 vessels are typically smaller in size and processing capacity than the AFA CPs. Prior to the Amendment 80 program, these vessels primarily produced headed and gutted products, but as the race for fish has been eliminated and Amendment 80 initially implemented increased groundfish retention standards, they are increasingly producing other product forms[5].

The goals of the Amendment 80 program are to improve retention, utilization, and reduce bycatch for the Amendment 80 sector. The program also includes sideboard allowances in the GOA for pollock, Pacific cod, Pacific Ocean perch, northern rockfish, pelagic shelf rockfish (dusky rockfish) to limit these vessels' participation in other fisheries to their historic levels. One cooperative formed in 2008 that included 16 of 24 participating vessels while the other vessels participated in the Amendment 80 limited access sector until 2011 when those vessels formed a second cooperative.

Catch Share Privilege Characteristics

Amendment 80 QS allocations are tied to the respective eligible vessels (or to the associated LLP in cases where a vessel is lost or is withdrawn from the program), and are allocated to their cooperative based on the vessel's catch history. Amendment 80 vessels that do not join a cooperative do not receive an exclusive harvest privilege and must fish in the Amendment 80 limited access sector. Amendment 80 QS can be transferred by selling the vessel, its permits, and accompanying catch history. It is also possible to sell Amendment 80 QS separate from an Amendment 80 vessel under specific circumstances, but sellers are required to include all allocated Amendment 80 QS species in the sale, and therefore would be precluded from participating in the Amendment 80 fishery. Amendment 80 cooperatives can transfer annual QS pounds, called cooperative quota (CQ), to other Amendment 80 vessels within and between cooperatives. Amendment 80 catch share privileges are revocable, but were allocated in perpetuity. The Amendment 80 Program has an excessive share provision that limits a person to holding 30% of the QS and CQ assigned to the Amendment 80 sector. Vessel use caps also limit an Amendment 80 vessel to harvesting 20% of the Amendment 80 species catch limits allocated to the Amendment 80 sector.

Catch and Landings Performance Metrics

The catch and landings performance metrics for the Amendment 80 Program include the amount of Amendment 80 species allocated to the program, the landings of Amendment 80 species in the Amendment 80 Program, and the percentage of Amendment 80 species allocated to the program that is landed (percent utilization). Annual metrics are compared with a "baseline" period prior to

[5]NOAA Fisheries removed the requirement for vessels to meet the Groundfish Retention Standards (78 FR 12627, February 25, 2013). Under the current rules, the Amendment 80 cooperatives annually report groundfish retention performance, but there is no longer a minimum retention standard.

program implementation, which is the average of the three years prior to program implementation (2005-2007). Between the baseline and 2017, species allocations have returned to their baseline levels but landings have increased by 11% (Figures 11.31 and 11.32). Aggregate species allocations to the Amendment 80 program has increased relative to the baseline level every year since program implementation until 2017, and was substantially above the baseline level from 2008-2010. This is largely the result of the groundfish species allocation process in the BSAI management area. The aggregate catch of all federally managed BSAI groundfish species may not exceed 2 million metric tons, which is thought to be the maximum amount of catch that can be sustainably harvested from the BSAI ecosystem. As shown in the previous section, AFA pollock (plus CDQ and incidental catch of pollock) makes up a majority of the 2 million ton cap in most years because pollock is a highly valued target species. This means Amendment 80 species catch limits are not necessarily driven by the abundance and stock condition of those species, but are also a function of the biomass of pollock. Most Amendment 80 species total allowable catches (TAC) are set well below their acceptable biological catch (ABC), and the TACs of species allocated to the Amendment 80 Program cannot be increased without reducing the TAC of some other BSAI groundfish species.

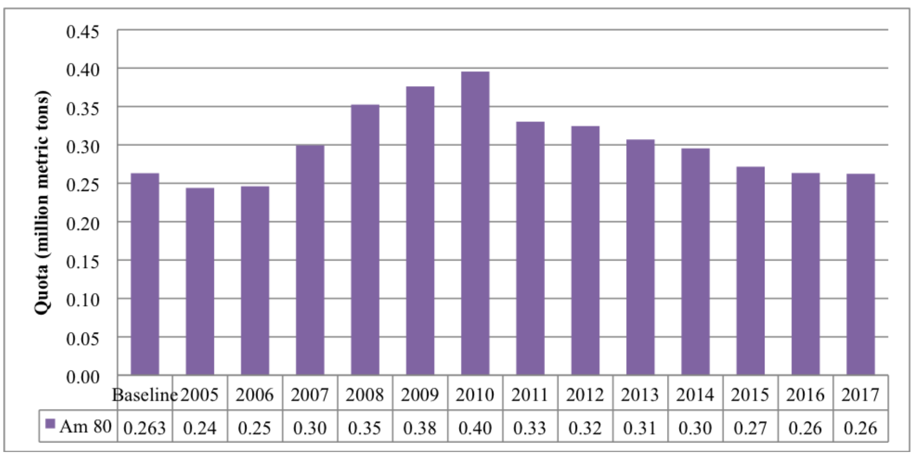


Figure 11.31: Aggregate quota allocated to the Amendment 80 Program.

As a result of the historically low AFA pollock TACs from 2008-2010, the allocations of Amendment 80 species to the Amendment 80 Program was much larger than during the baseline. Similarly, the landings in the Amendment 80 program were larger than their baseline levels in all years following implementation (Figure 11.32).

Even as landings have increased in the Amendment 80 program, the percent utilization fell from 76.1% during the baseline to 60% in 2009 and 2010, but increased above the baseline level from 2013-2017 and reached a high of 89% in 2017 (Figure 11.33). The lowest utilization rate occurred in 2010 at 60.81% in a year when the aggregate quota was 50% larger than the quota available during the baseline and aggregate landings were 20% larger than during the baseline. Target species landings are also limited by the vessels' allocation of halibut PSC, and also increasingly by the allocation of the Pacific cod TAC to the Amendment 80 Program, which is less than the sector's historical harvest levels. The inability of these vessels to catch the entire quota is also a function of the program having only between 18 and 22 vessels active in the fishery, all of which are operating near their maximum capacity.

Effort Performance Metrics

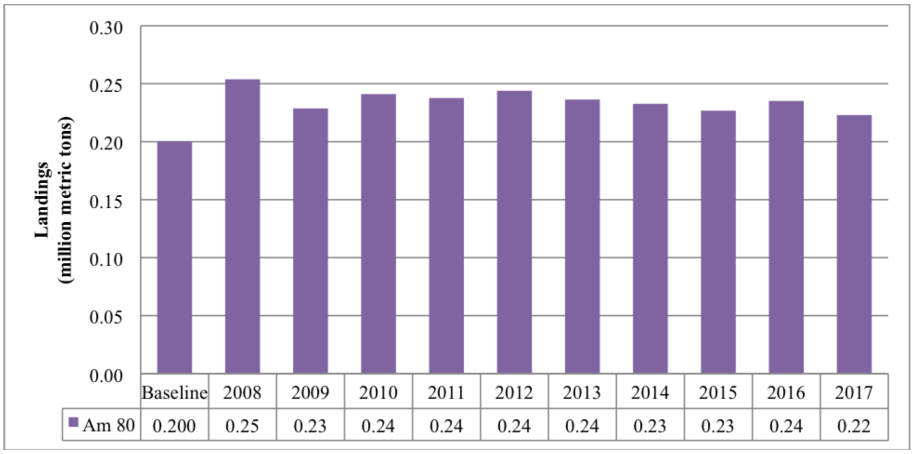


Figure 11.32: Aggregate landings of species allocated to the Amendment 80 Program.

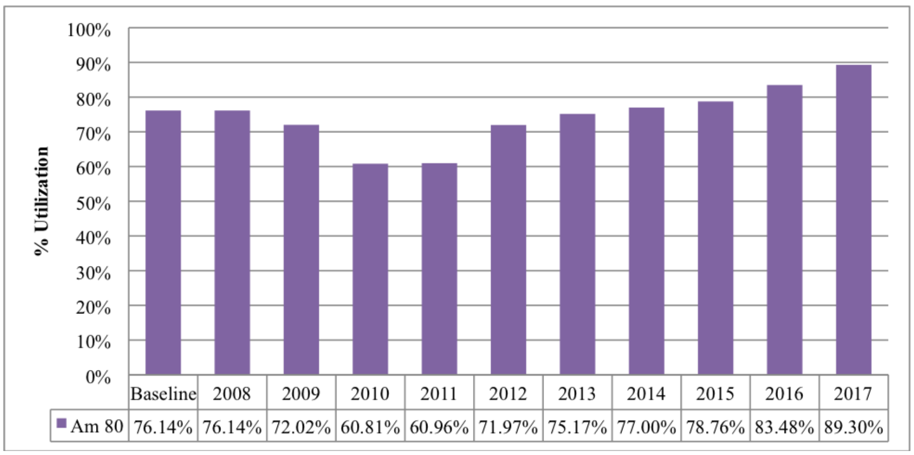


Figure 11.33: Percent of the allocated quota that is landed in the Amendment 80 Program.

The effort performance metrics include the number of active vessels, the number of entities holding Amendment 80 QS, and the season length index. The season length index is defined as the number of days in which at least one vessel was fishing divided by the maximum regulatory season length possible for the fishery, equal to 346 days, which is an opening on January 20th and closure on December 31st.[6] This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished Amendment 80 species allocations each year. For the baseline period, we assume the same 346 day regulatory open period which allows for a constant comparison of the season length before and after the implementation of Amendment 80. During the baseline, the average number of active days for these vessels was 258, the maximum regulatory season length was 346, and therefore the season length index in the baseline period was $258/346 = 0.75$. After implementation of Amendment 80, vessels were better able to manage their halibut PSC use when targeting Amendment 80 species and increased their number of active days to an average of 324 days from 2008-2017, which implies an average season length index of 0.94 over that same period (Figure 11.34).

The number of active vessels reflects the number of Amendment 80 eligible CP vessels with any reported landings of Amendment 80 species in a given year. The baseline value of 22 vessels represents

[6] The maximum regulatory season length was 347 days in 2008, 2012, and 2016 due to the leap year.

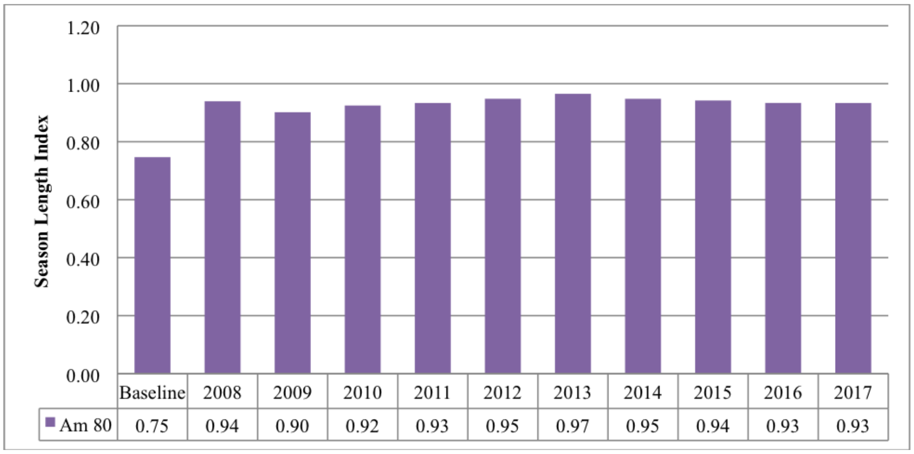


Figure 11.34: Amendment 80 Program season length index.

the average number of unique vessels per year from 2005-2007. After program implementation there were still 22 vessels active in the fishery, which is not surprising given that overcapitalization is not a problem in this fishery and reducing capacity was not identified as an objective of the program (Figure 11.35). The number of active vessels declined from 2008 to 2009 from 22 to 21 active vessels as a result of the sinking of the *F/V Alaska Ranger*. There was also a decrease of one vessel in 2010, 2012, and 2013, which resulted in 18 active vessels from 2013-2016. One additional vessel participated in 2016 and 2017, for a total of 19 active vessels.

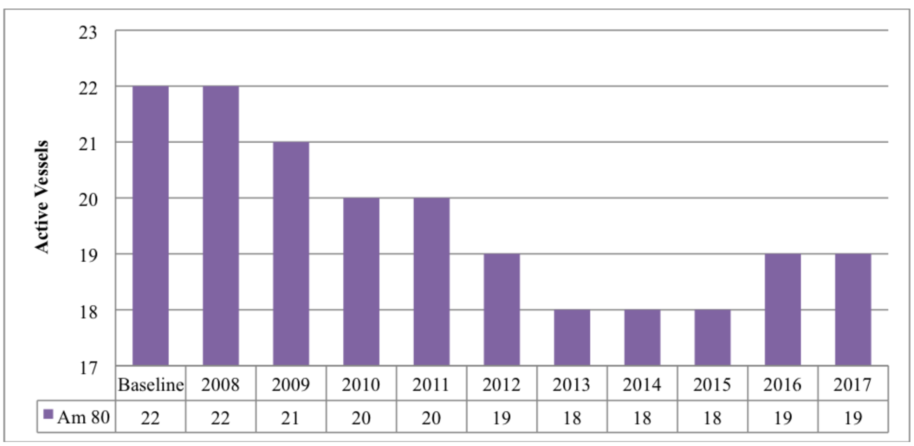


Figure 11.35: Number of active vessels in the Amendment 80 Program.

There were 28 entities (vessels) that were deemed eligible for the Amendment 80 program before implementation of the program. The owner of one eligible CP did not elect to apply for and receive Amendment 80 QS because the vessel fishes exclusively in the GOA, which accounts for the one less entity holding share since program implementation for 2008-2017 (Figure 11.36).[7] Two permits were not issued quota in 2016 resulting in a decrease in the number of entities holding share to 25, but have rebounded in 2017 back up to 27 entities.

Revenue Performance Metrics

[7] The baseline number of entities (vessels) was obtained from the regulations in Table 31 of the final rule implementing the program. Available online here: http://www.alaskafisheries.noaa.gov/frules/72fr52668.pdf.

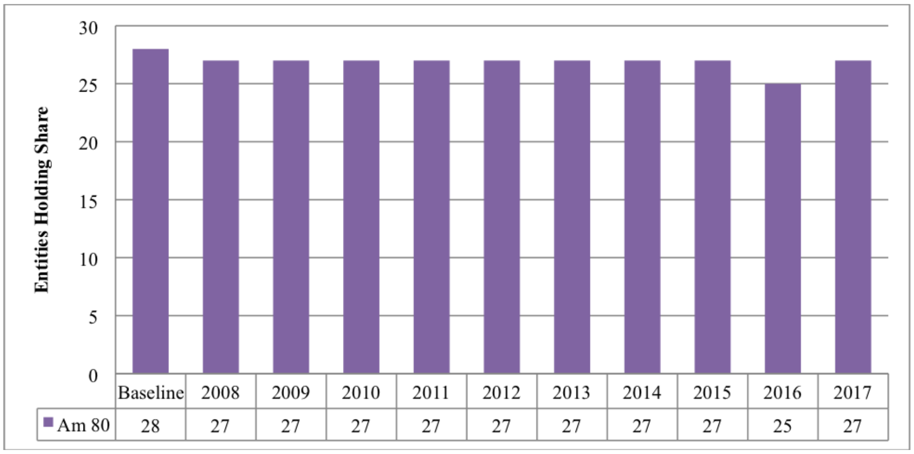


Figure 11.36: Number of entities holding quota share in the Amendment 80 Program.

The revenue performance metrics are the aggregate revenue from Amendment 80 Program species, average prices of Amendment 80 species, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among active vessels. As all vessels in the Amendment 80 program are CPs, revenues are reported as first wholesale value of the processed fish products that are offloaded from the vessels. First wholesale revenues are adjusted for inflation by using the GDP price deflator and are reported in 2010 equivalent dollars. In the first year of program implementation, Amendment 80 revenue initially increased by 5% in 2008 to \$244 million overall (Figure 11.37). Amendment 80 revenue declined to \$206 million in 2009 which is below the baseline revenue, but revenues were above the baseline levels for 2008 and 2010-2012 after program implementation, while dropping below baseline values from 2013-2016. Revenues have again increased above baseline levels in 2017 at \$257 million.

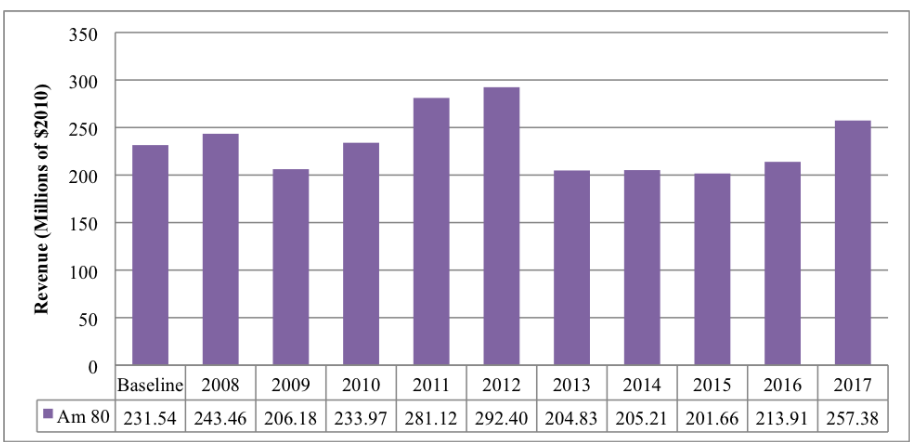


Figure 11.37: Amendment 80 Program first wholesale revenue.

The weighted average real price per metric ton of all Amendment 80 species declined below the baseline level for the first three years of the program, increased above baseline price levels during the following two years (2011-2012), but fell to their lowest level in 2013 and remained low through 2016. Real average prices of Amendment 80 species increased by 27% in 2017 to return to their baseline level in 2017 (Figure 11.38). Real weighted average prices do not vary as much as in many of the other programs, possibly because reported Amendment 80 prices are aggregated over several species and vessels have the ability to change targets to species with higher prices, with annual changes that range between -28% and 27% over the course of the Amendment 80 Program.

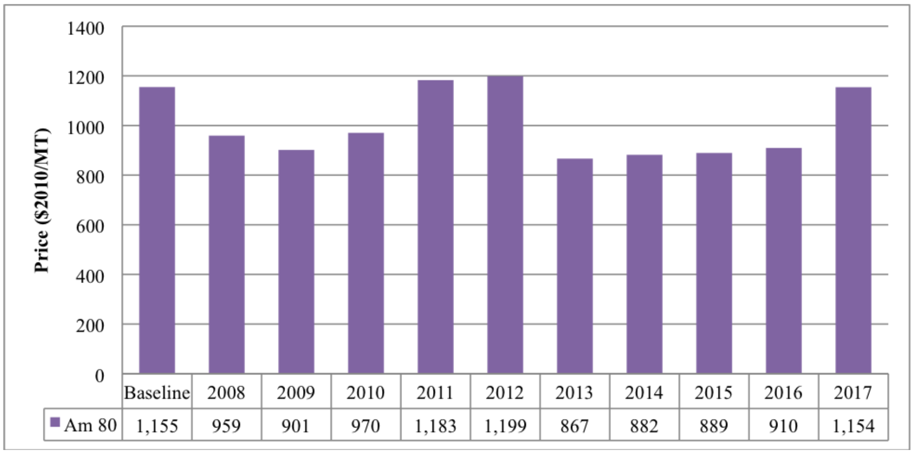


Figure 11.38: Amendment 80 Program weighted average price per metric ton across all species.

Amendment 80 first wholesale revenue per vessel increased by 29% from a baseline of $10.5 million to $13.5 in 2017 (Figure 11.39). Revenues per vessel were below their baseline level in 2009, but were above the baseline for all other years of the program.

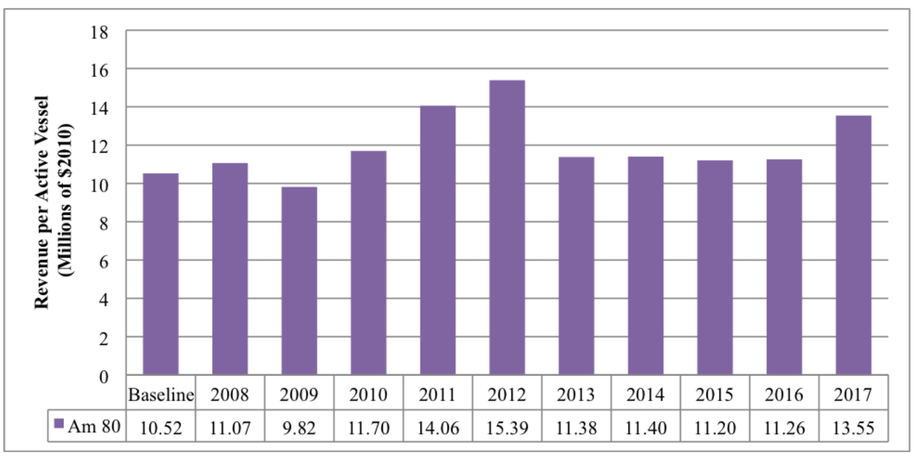


Figure 11.39: Amendment 80 Program revenue per active vessel.

The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the Amendment 80 program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore the value of the Gini coefficient increases as revenue becomes more concentrated on a subset of vessels within the active fleet, but may also decrease with the exit of smaller vessels as the active fleet transitions to fewer and more homogeneous vessels. The Gini coefficient has varied over the course of the Amendment 80 Program from a baseline level of 0.25, to a low of 0.15 in 2013, and a high of 0.28 in 2009 (Figure 11.40). The low Gini coefficient, compared with other Alaska programs included in this report, for all years is a function of the relative similarity of the Amendment 80 vessels and the small number of active vessels, all of which operate at near-maximum capacity.

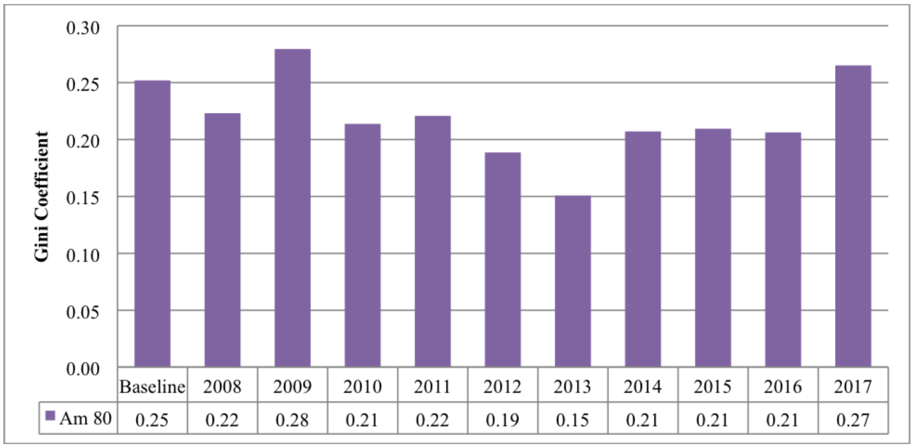


Figure 11.40: Amendment 80 Program Gini coefficient.

11.6. Bering Sea/Aleutian Islands Freezer Longline Catcher/Processors (Hook-and-Line Catcher/Processor Sector Targeting Pacific Cod)

Management Context

The Bering Sea/Aleutian Islands (BSAI) Freezer Longline Catcher/Processors (also known as the Freezer Longliners) are a group of catcher/processor (CP) vessels that are eligible to harvest the hook-and-line CP sector allocation for BSAI Pacific cod. Since 2003, Freezer Longliners are required to have hook-and-line Pacific cod CP endorsements on their federal groundfish License Limitation Program (LLP) license to target Pacific cod using hook-and-line gear and process the catch onboard. These Freezer Longliners are allocated a fixed percentage of the targeted BSAI Pacific cod allocation that is allocated to the hook-and-line CP sector. From 2000 to 2007, the hook-and-line CP sector was allocated 40.8% of the BSAI Pacific cod non-Community Development Quota (CDQ) total allowable catch (TAC). The passage of Amendment 85 increased their share of the BSAI targeted non-CDQ Pacific cod TAC to 48.7% from 2008 to the present. In 2007, the sector voted to obtain a $35 million NOAA Fisheries loan to purchase and retire 4 groundfish LLP licenses with hook-and-line CP endorsements. The Longline Catcher Processor Subsector Single Fishery Cooperative Act was passed by Congress in 2010 and allows Freezer Longliners participating in the BSAI directed Pacific cod fishery to form a single harvest cooperative. The Act also requires NOAA Fisheries to implement regulations to allow the establishment of a harvest cooperative within two years of receiving a request from at least 80% of the eligible hook-and-line CP LLP license holders. However, while the vessels participating in this fishery have formed a voluntary cooperative (the Freezer Longline Coalition or FLC), they have not taken steps that would require NOAA Fisheries to write regulations allowing the formation of a cooperative. The voluntary cooperative has been operating since the B season of 2010, and this report separates the 2010 A and B seasons to delineate the beginning of what is essentially a voluntary catch share program in the B season of 2010. While this sector is not currently recognized as a Limited Access Privilege Program (LAPP) or a catch share program by NOAA Fisheries, they are included in this report because since the second half of 2010, the sector effectively operates as a catch share program.

Catch Share Privilege Characteristics

Similar to the CP and mothership sectors in the AFA program, the FLC is a voluntary cooperative formed to coordinate harvests among its member vessels. The hook-and-line CP sector is currently allocated 48.7% of the BSAI non-CDQ Pacific cod TAC. As described in the previous section, NOAA Fisheries has not implemented regulations for a cooperative program, therefore NOAA Fisheries has not issued BSAI Pacific cod quota share to the Freezer Longliners. There are 8 other sectors fishing for Pacific cod in the BSAI which also receive sector allocations, but only the Amendment 80 sector has formed cooperatives among of all of its member vessels to coordinate the harvest of Pacific cod under a catch share program. However, the formation of the FLC allows Freezer Longliners within the sector to arrange private contracts among vessel owners to specify the allocation of catch among member vessels to maximize the value of their allocation.

Catch and Landings Performance Metrics

The catch and landings performance metrics include the amount of the BSAI Pacific cod TAC allocated to hook-and-line CP sector (which can be caught only by the Freezer Longliners in the Federal Exclusive Economic Zone), the landings of Pacific cod by the Freezer Longliners, and the percentage of the hook-and-line CP Pacific cod sector allocation that is landed (percent utilization). Annual metrics are reported for the years 2003-2017 and do not include a "baseline" period because this sector is not yet formally defined as a catch share program by NOAA Fisheries. Between 2003 and 2017, the sector allocation and landings have increased by 15% and 14%, respectively, while the percent utilization was 99.7% in 2003 and has once again increased to above 99% at 99.5% in 2017 (Figures 11.41, 11.42, and 11.43).

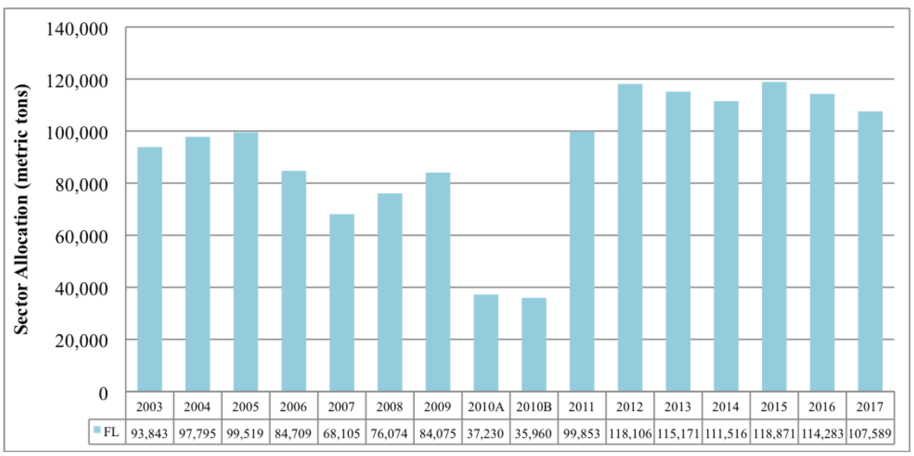


Figure 11.41: Freezer Longline sector allocation for BSAI Pacific cod.

The sector allocation and landings have varied between 2003 and 2017, with the highest sector allocations occurring between 2012-2016 averaging 115,589 metric tons and landings averaging 108,275 over the same period. The sector allocation and landings varied from lows of 68,105 metric tons and 67,980 metric tons in 2007 to a high of 118,106 metric tons allocated and 112,934 metric tons landed in 2012.

Utilization was above 95% from 2003-2012, but fell to 91.7% in 2013 and 89.9% in 2014 before increasing to 94.3% in 2015, 96.7% in 2016, and 99.5% in 2017 (Figure 11.43). Sector allocation utilization averaged 98.9% from 2003-2010 A season, but has declined to an average of 95.1% after the formation of the voluntary cooperative in the 2010 B season through 2017. The Pacific cod hook-and-line CP sector allocation was exceeded in 2003, from 2005-2009, and for the 2010 A season based on total catch (retained weight plus the estimated weight of discards), however the allocation has not been exceeded since the formation of the voluntary cooperative in the B season of 2010. As the Pacific cod hook-and-line CP sector is only 1 of 9 sectors harvesting Pacific cod, the aggregate

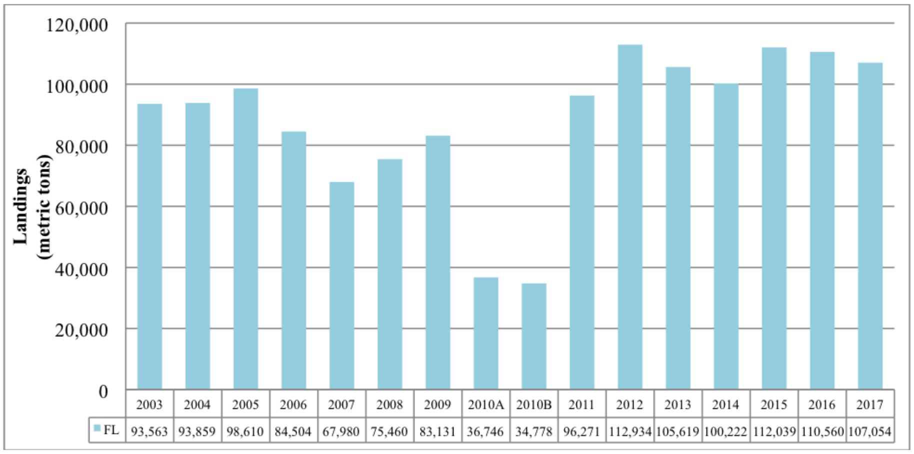


Figure 11.42: Landings of BSAI Pacific cod by Freezer Longline vessels.

federal BSAI Pacific cod TAC was only exceeded in 2003, 2007, 2010, and 2016. However, since 2006 the BSAI Pacific cod Federal TAC has been set to account for a State-managed fishery for Pacific cod inside State of Alaska waters, and the overall target catch (Federal TAC plus State guideline harvest level (GHL)) was not exceeded in 2007, 2010, or 2016. The acceptable biological catch (ABC) has not been exceeded in any year since 1994.

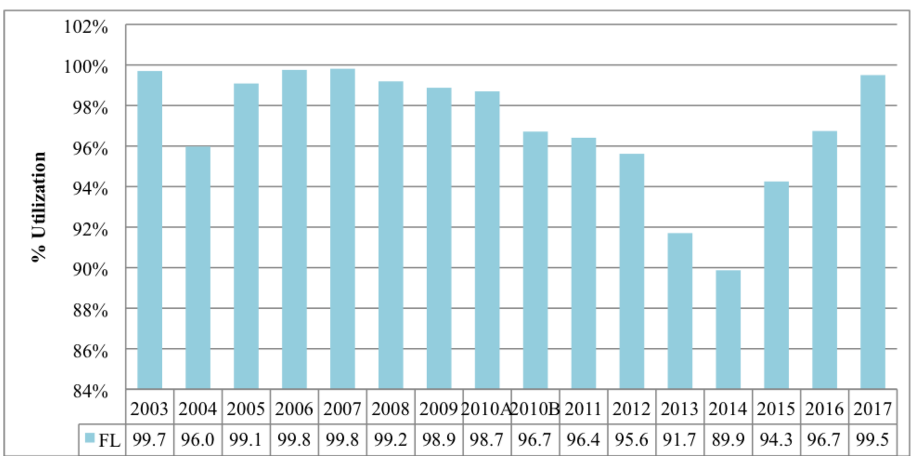
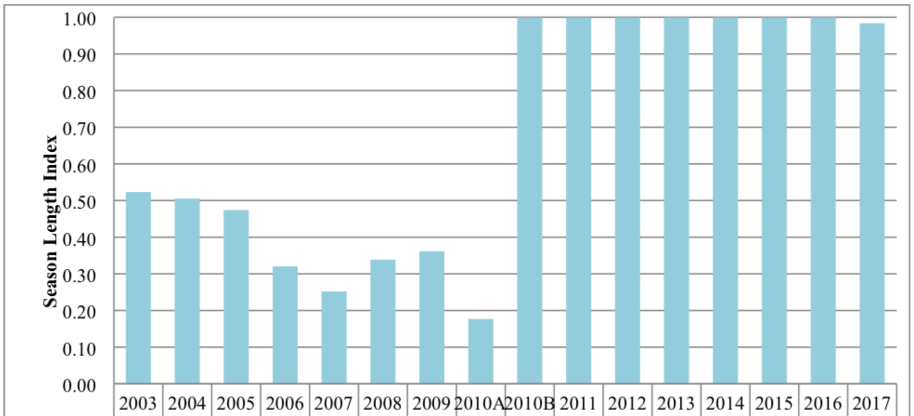


Figure 11.43: Percent of the BSAI Pacific cod sector allocation caught by eligible Freezer Longline vessels.

Effort Performance Metrics

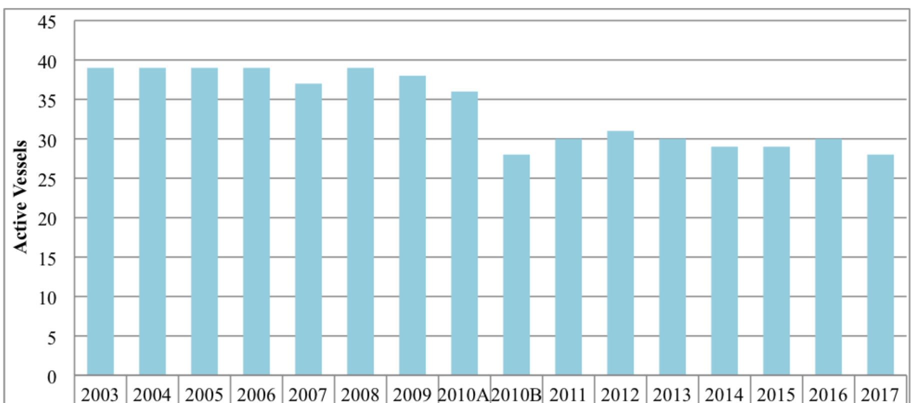
The effort performance metrics include the season length index, the number of active vessels, and the number of hook-and-line CP LLP licenses. The season length index is defined as the number of days in which at least one vessel was fishing divided by the maximum regulatory season length possible for the fishery, equal to 365 days in normal years and 366 days in leap years. This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished the hook-and-line CP sector allocation. Prior to the formation of the FLC (2003-2009), the average number of active days for these vessels was 145 days (season length index = 0.40) while in the first six full years after the formation of the FLC (2011-2016) they have used 365 and 366 days (season length index = 1.00) in an attempt to catch their entire allocation, falling slightly in 2017 to 0.98 (Figure 11.44). This change in the amount of the season that is utilized is what would be expected with the ending of a race for fish that likely occurred prior to the formation of the FLC.



	2003	2004	2005	2006	2007	2008	2009	2010A	2010B	2011	2012	2013	2014	2015	2016	2017
FL	0.52	0.51	0.47	0.32	0.25	0.34	0.36	0.18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98

Figure 11.44: Freezer Longline sector season length index.

The number of active vessels reflects the number of Freezer Longline vessels with any commercial landings of BSAI Pacific cod in a given year. The number of active vessels was quite stable between 2003 and 2009 at an average of approximately 39 vessels, but after the formation of the FLC, only approximately 30 vessels continued to fish during 2011-2017, with a two vessel decline in 2017 for a decline of 28% since 2003.



	2003	2004	2005	2006	2007	2008	2009	2010A	2010B	2011	2012	2013	2014	2015	2016	2017
FL	39	39	39	39	37	39	38	36	28	30	31	30	29	29	30	28

Figure 11.45: Number of active Freezer Longline vessels.

There were 46 license limitation program (LLP) licenses with endorsements to operate as a CP with hook-and-line gear in the Bering Sea or Aleutian Islands in 2003. The number of LLPs declined to 37 from 2008-2011, was reduced by 1 to 36 from 2012-2014, and experienced another 2 entity decline in 2017 to 34 entities, which was 26% less than the 2003 (Figure 11.46).

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from BSAI Pacific cod, average prices of Pacific cod, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among the active vessels. Revenues are adjusted for inflation by using the GDP price deflator and are reported in 2010 equivalent dollars. Real first wholesale revenue increased by 20% from $143 million in 2003 to $178 million in 2017, with an overall average of $144 million

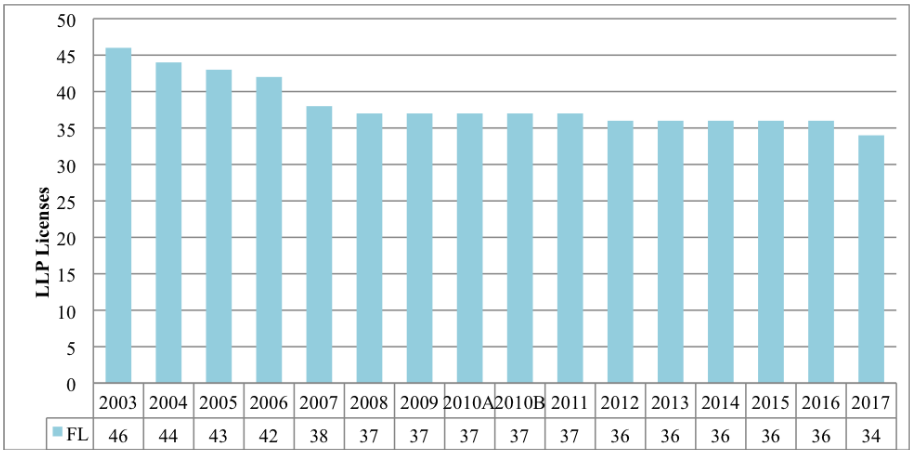


Figure 11.46: Number of LLP licenses with endorsements to operate as a CP with hook-and-line gear in the Bering Sea or Aleutian Islands.

from 2003-2017 (Figure 11.47). Even with higher sector allocations and landings over the period 2011-2017, first wholesale revenues are higher in 2017 than the previous peak that occurred in 2006 as prices rebounded significantly in 2017 (Figure 11.48).

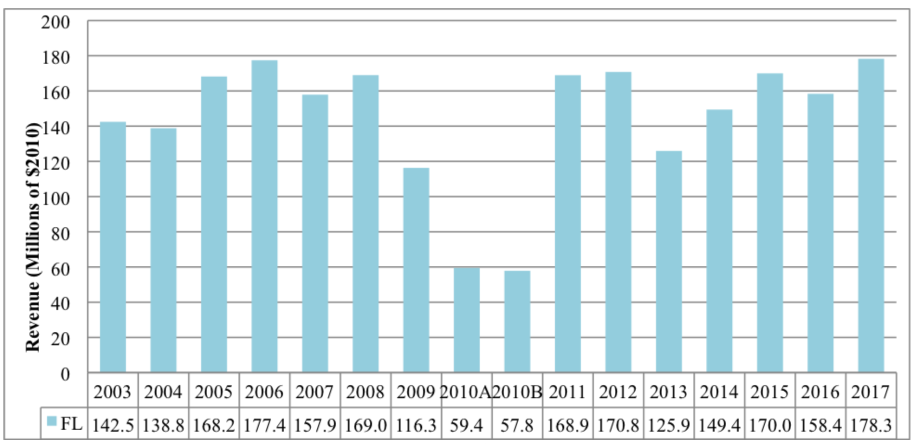


Figure 11.47: Freezer Longline sector BSAI Pacific cod first wholesale revenue.

The average price per ton of Pacific cod received by Freezer Longline vessels was on average $1,501/ton from 2003-2004, increased to a high of $2,323/ton in 2007, but experienced a dramatic decline to $1,399 in 2009. Prices rebounded somewhat from 2010-2012, averaging $1,637 from 2010-2012 (Figure 11.48), but then fell to a new low of $1,192/ton in 2013. Prices from 2014-2016 were slightly below their 2009 levels around $1,500/ton, but increased by 16% in from 2016 to 2017 to $1,665/ton. The shift toward lower prices over the past 8 years is likely the result of increased supply of substitute products for Pacific cod including Atlantic cod and other whitefish species. Prices have increased by 9% between 2003 and 2017, but the price in 2017 was 28% below the peak prices observed in 2007.

Revenue per active vessel in the Freezer Longline sector increased by 74% or $3.7 million in 2003 to $6.4 million in 2017 (Figure 11.49). As a result of the FLC, there were fewer active vessels in the 2010 B season and in 2011-2017 compared with previous time periods, which has resulted in an increase in revenue per active vessel for this sector.

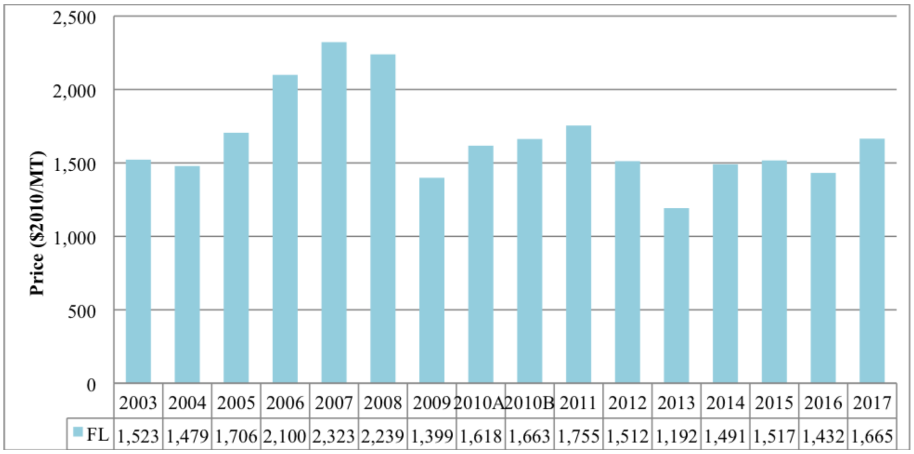


Figure 11.48: Freezer Longline sector BSAI Pacific cod price per metric ton.

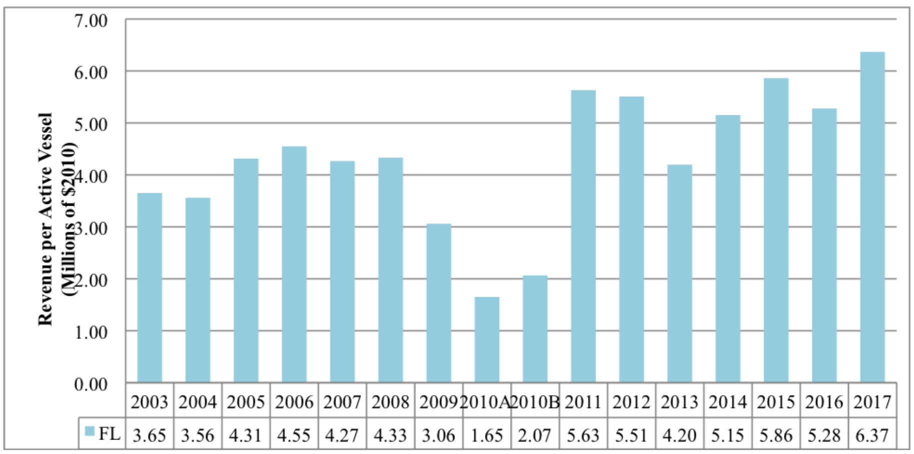


Figure 11.49: Freezer Longline sector revenue per active vessel.

The Gini coefficient measures the evenness of the distribution of revenue among vessels in the hook-and-line CP sector in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore the value of the Gini coefficient increases as revenue becomes more concentrated on a subset of vessels within the active fleet, but may also decrease with the exit of smaller vessels as the active fleet transitions to fewer and more homogeneous vessels. Between 2003 and 2006, there was a decline in the Gini coefficient (movement toward a more even distribution) from 0.22 in 2003 to 0.13 in 2006 (Figure 11.50). However, vessel revenues became more concentrated from 2007-2012, with a 2012 Gini coefficient of 0.27, but fell to an average of 0.23 from 2013-2017. The formation of the voluntary cooperative in the 2010 B season allowed a number of vessels to exit the fishery which concentrated the revenues on a smaller number of vessels which lead to a relatively large 23% increase in the Gini coefficient between the 2010 A and 2010 B seasons.

11.7. Central Gulf of Alaska Rockfish Program

Management Context

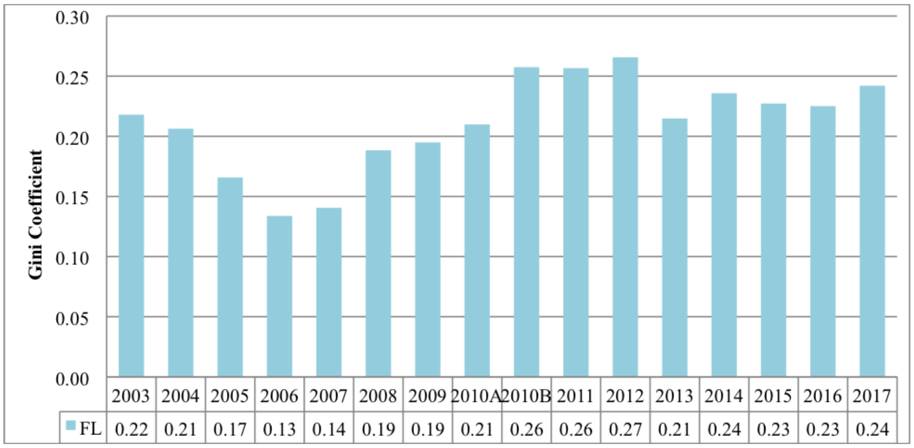


Figure 11.50: Freezer Longline sector BSAI Pacific cod Gini coefficient.

The Central Gulf of Alaska Rockfish Program (Rockfish Program) that was implemented in 2012 is a ten year extension of a pilot program that ran from 2007-2011 under similar regulations. Prior to 2007, the fishery operated under the License Limitation Program (LLP). The Rockfish Program is a cooperative program that allocates exclusive harvesting privileges to catcher vessel (CV) and catcher/processor (CP) vessel cooperatives using trawl gear for rockfish primary and secondary species as well as an allocation for halibut prohibited species catch (PSC). The rockfish primary species are northern rockfish, Pacific Ocean perch, and pelagic shelf (dusky) rockfish. The rockfish secondary species are Pacific cod, rougheye rockfish, shortraker rockfish, sablefish, and thornyhead rockfish. The rockfish program also includes a small entry level longline fishery, but vessels participating in the entry level longline fishery are not eligible to join cooperatives, are not allocated exclusive harvest privileges, and therefore do not hold quota share.

The Rockfish Program was designed to improve resource conservation and improve economic efficiency by establishing cooperatives that receive exclusive harvest privileges. The four goals of the program are to 1) reduce bycatch and discards; 2) encourage conservation-minded practices; 3) improve product quality and value; and 4) provide stability to the processing labor force. The Rockfish Program allows CPs to form cooperatives and allows CVs to form cooperatives in association with shoreside processors in Kodiak, AK, but these CVs are not required to deliver to the processor with which their cooperative has formed an association. This allows shoreside processors in Kodiak to better time deliveries of rockfish and salmon in the summer months.

The Rockfish Program includes a cost recovery provision whereby the fishermen are assessed a fee based on the cost to the government to manage the program. The costs that can be recovered include the costs related to management, data collection, and enforcement of a Limited Access Privilege Program (LAPP) or Community Development Quota Program, and cannot exceed 3% of the total ex-vessel value of the fishery. Cost recovery was not part of the Rockfish Pilot Program (2007-2011), but it was implemented in 2012 with the implementation of the Rockfish Program. Cost recovery fees are assessed for harvests of Rockfish Program primary and secondary species by participants using trawl gear. Cost recovery fees are not assessed for harvests of Rockfish Program species by participants in the limited entry longline fishery because they do not receive an exclusive harvest privilege. In 2016, the Rockfish Program fee was approximately 2.8% of the ex-vessel revenue in the fishery.

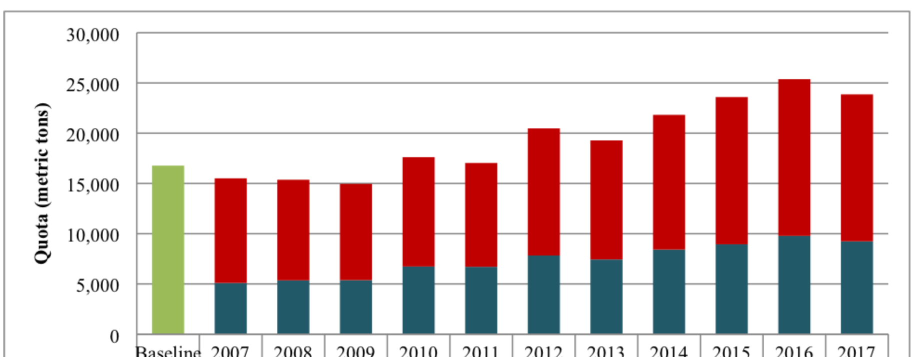
Catch Share Privilege Characteristics

Rockfish Program quota share (QS) are allocated to eligible LLP license holders, but that LLP license must be assigned to a Rockfish Program cooperative in order to participate in the Rockfish Program. Cooperative quota (CQ) for Rockfish Program primary species, secondary species, and halibut PSC is allocated annually to each cooperative based on the QS holdings of its membership. Quota share for Rockfish Program primary species were allocated to eligible LLP license holders based on their catch history of those species, so the LLP owners have a limited ability to sell their QS, which can be transferred only by selling their LLP license on which the Rockfish Program QS is designated. Cooperatives within a sector can transfer CQ within and between cooperatives, subject to excessive share limits. Catcher vessel cooperatives cannot transfer CQ to CP cooperatives, but CP cooperatives are allowed to transfer CQ to cooperatives in either sector (with the exception of rougheye or shortraker rockfish CQ).

The Rockfish Program allocated revocable shares and the Rockfish Program is only authorized until December 31st, 2021 (10 years from the start of the program). The Rockfish Program includes excessive share provisions, which include the following: No person may hold or use more than 4% of the CV QS and resulting CQ, or 40% of the CP QS and resulting CQ; No CV co-op may hold or use more than 30% of the CV QS issued under the program; No vessel may harvest more than 8% of the CV CQ or 60% of the CP CQ; and no processor may receive or process more than 30% of the CV CQ.

Catch and Landings Performance Metrics

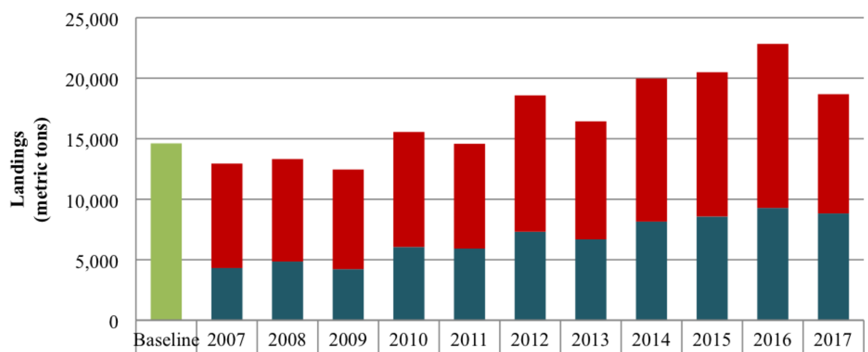
The catch and landings performance metrics include the amount of Rockfish Program species total allowable catches (TACs) allocated to the program, the landings of Rockfish Program species in the Rockfish Program, and the percentage of allocated species that are landed (percent utilization). Annual metrics are compared with a "baseline" period prior to the implementation of the Rockfish Pilot Program in 2007, which is the average of the three years prior to Rockfish Pilot Program implementation (2004-2006). Compared with the baseline, the species TAC allocations and landings in 2017 increased by 42% and 28%, respectively, while the percent utilization fell from 87.1% during the baseline to 78% in 2017 (Figures 11.51, 11.52, and 11.53). The species TAC allocations and landings have been relatively stable between the baseline and 2011, with a large increase in allocations and landings occurring in the first year of the Rockfish Program (2012) and have generally been increasing through 2016 but experienced a decline of 6% in allocations and 18% in landings between 2016 and 2017.



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Baseline	16,774											
CV		10,411	10,010	9,577	10,876	10,330	12,646	11,841	13,405	14,649	15,592	14,621
CP		5,098	5,358	5,380	6,737	6,708	7,830	7,441	8,418	8,945	9,784	9,242

Figure 11.51: Rockfish Program species quota allocated to the Rockfish Program.

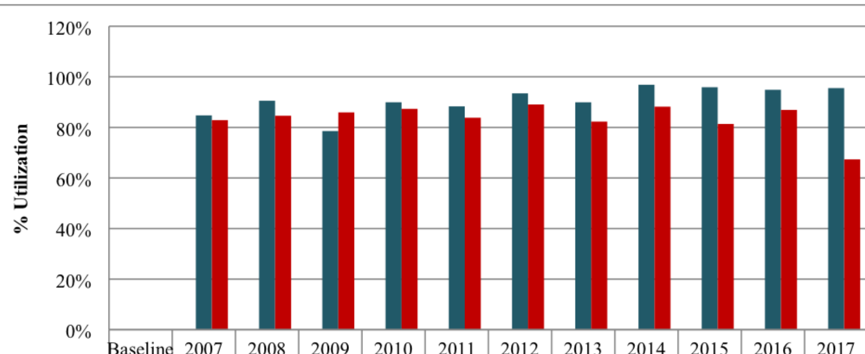
Figure 11.52 also separates the landings by CVs and CPs for all years of the program. Overall program landings have increased by 28% in 2017 relative to the baseline, with CV landings increasing by 45% and CP landings increasing by 15%. CPs land on average 40% of the total Rockfish Program landings, but the CP share decreased from 42% during the baseline to 37% during the Rockfish Pilot Program (2007-2011), and increased to 42% in the first six years of the Rockfish Program (2012-2017).



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Baseline	14,617											
CV		8,628	8,469	8,229	9,498	8,659	11,262	9,745	11,823	11,919	13,550	9,848
CP		4,320	4,851	4,226	6,058	5,924	7,319	6,691	8,154	8,577	9,282	8,830

Figure 11.52: Aggregate landings of all Rockfish Program species in the Rockfish Program.

Utilization of the allocated species by sector is reported in Figure 11.53. The percent utilization of the CV sector has varied throughout the period, ranging from a high of 92% in 2012 to a low of 78% in 2017. Utilization by the CP sector is higher than the utilization by the CV sector in all years except 2009, but it is much more variable than the CV sector, experiencing a low of 79% in 2009 and a high of 97% in 2014. There was a 23% reduction in the utilization of the CV sector between 2016 and 2017, which may have been influenced by declines in other groundfish species that led to a scaling back of overall fishing effort in 2017.



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Baseline	0.0%											
CP		84.7%	90.5%	78.6%	89.9%	88.3%	93.5%	89.9%	96.9%	95.9%	94.9%	95.5%
CV		82.9%	84.6%	85.9%	87.3%	83.8%	89.1%	82.3%	88.2%	81.4%	86.9%	67.4%

Figure 11.53: Percent of the allocated species that are landed in the Rockfish Program.

Effort Performance Metrics

The effort performance metrics include the season length index, the number of active vessels, and the number of entities holding Rockfish Program QS. The season length index is defined as the number of days in which at least one vessel was fishing divided by the maximum regulatory season length possible for the fishery, equal to 199 days in all years (opening on May 1st and closing on November 15^{th}). This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished Rockfish Program species allocations. The number of active days for these vessels increased significantly from 12 days during the baseline to an average of 167 days per year from 2007-2017, which corresponds to a season length index of 12/199 = 0.06 during the baseline and averaged 167/199=0.84 from 2007-2017 (Figure 11.54).

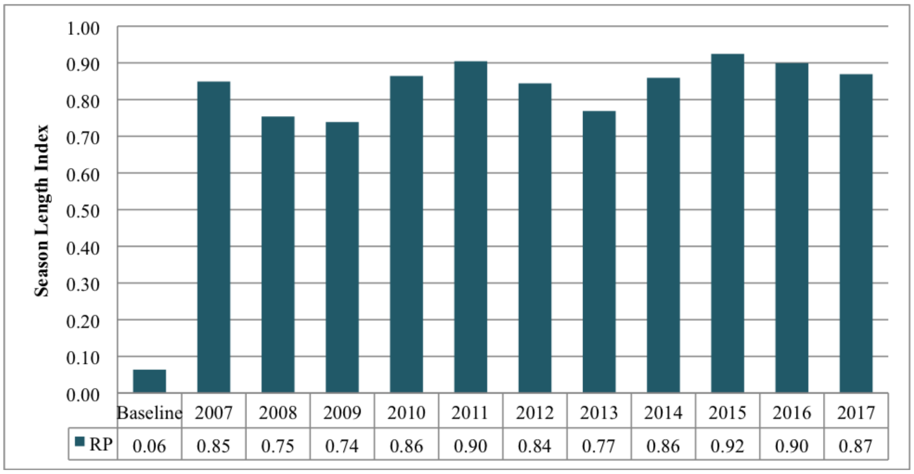


Figure 11.54: Rockfish Program season length index.

The number of active vessels reflects the number of Rockfish Program CVs and CPs with any commercial landings of Rockfish Program species in a given year, and includes the entry-level longline CVs as active vessels in the program. The total number of active vessels has increased from 42 vessels during the baseline to 55 vessels participating in the fishery in 2017. The number of CVs has varied from 33 and 52 vessels, while the number of CPs varied between 4 and 9 vessels (Figure 11.55). It is interesting to note that 4 CPs landed 47% of the total program landings in 2017 while 51 CVs landed the remaining 53% of the Rockfish Program species allocations.

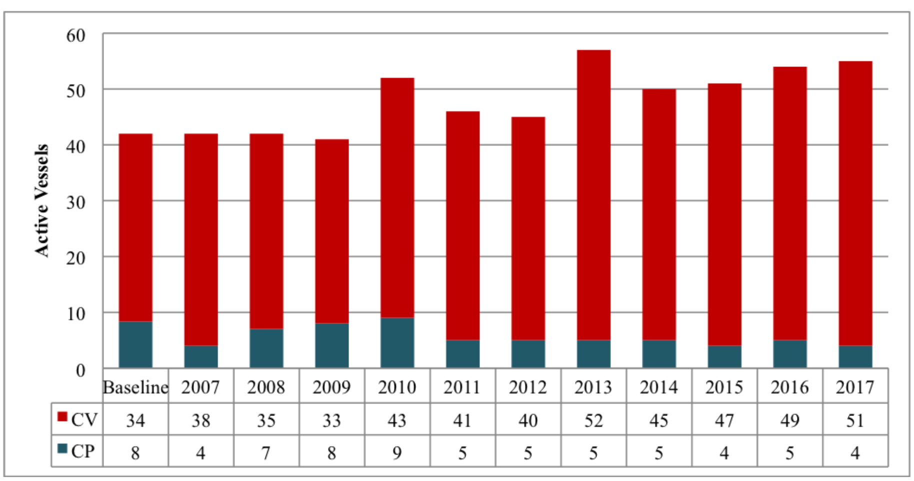


Figure 11.55: Number of active vessels in the Rockfish Program.

The number of entities holding QS (LLP licenses) in the Rockfish Program has been increasing throughout the Rockfish Pilot Program (2007-2011) and has remained stable at 57 LLP licenses for most of the Rockfish Program (2012 to 2016) and declined to 55 in 2017 (Figure 11.56).

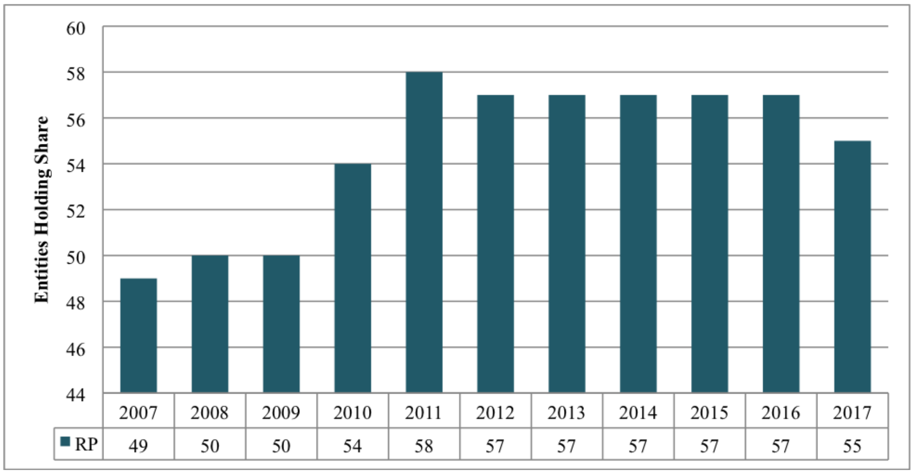


Figure 11.56: Number of entities holding QS in the Rockfish Program.

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from Rockfish Program species, average prices of Rockfish Program species, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among the active vessels. Revenues are adjusted for inflation by using the GDP price deflator and are reported in 2010 equivalent dollars. For the Rockfish Program, revenues are reported in their native format, such that the price received by CVs is the weighted annual ex-vessel price while the price received by CPs is the weighted annual first-wholesale price. This enables a comparison between the revenues that each type of vessel receives on offloading their catch from the vessel. Rockfish Program revenue has increased by 27% between the baseline and 2017, from $12.4 million during the baseline to $15.7 million in 2017 (Figure 11.57). The CP sector experienced a 37% increase in revenues while the CV sector only experienced a 9% increase in average revenues in 2017 compared with the baseline even after a 19% decline from 2016 to 2017. While landings have increased for both sectors in 2017 relative to the baseline, as shown below, overall prices have decreased by 2%, with the CP sector experiencing a 13% decline and the CV sector experiencing a 3% decrease.

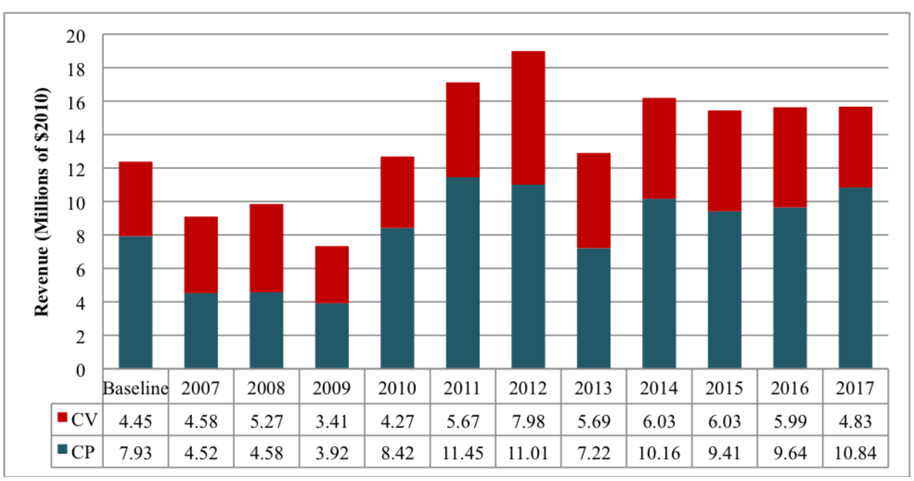


Figure 11.57: Rockfish Program revenue.

As the CV sector revenues are in ex-vessel value and CP sector revenues are in first wholesale value, the weighted average price per ton of Rockfish Program species varies by, and is reported separately for, each sector. Real weighted average prices of Rockfish Program species decreased between the baseline and 2017 by 3% from $506/ton to $491/ton for CVs, and declined 13% from $1,417/ton to $1,227 for CPs (Figure 11.58). There is substantial variation in the average prices for each sector which varied annually from -28% to 50% for CPs and from -33% to 46% for CVs between 2007 and 2017, and the CPs have a higher coefficient of variation in prices at 0.23 than the CVs at 0.17.

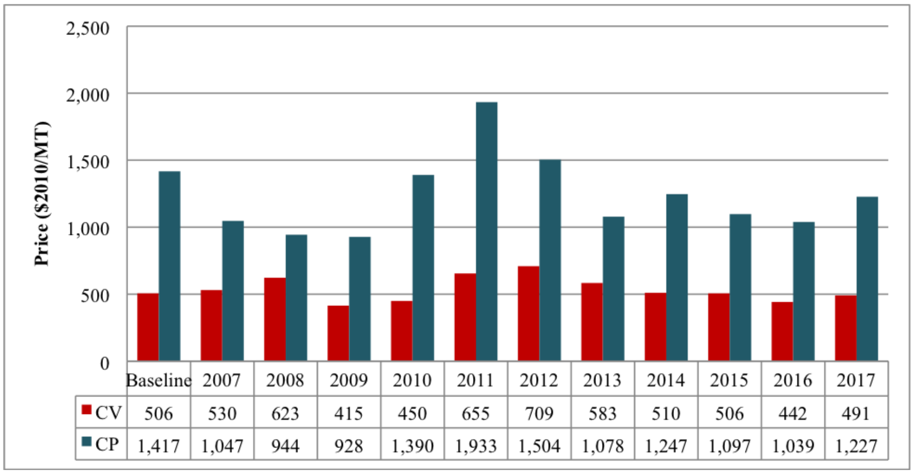


Figure 11.58: Weighted average of all Rockfish Program species price per metric ton.

Rockfish Program revenue per vessel overall increased by 8% from $265,028 during the baseline to $284,920 in 2017. The CP revenue per vessel increased by 119% from $1.3 million during the baseline to $2.7 million during 2017, while revenue per CV declined by almost 17%, from $113,651 during the baseline to $94,784 in 2017 (Figure 11.59), which is driven by a 22% decrease between 2016 and 2017.

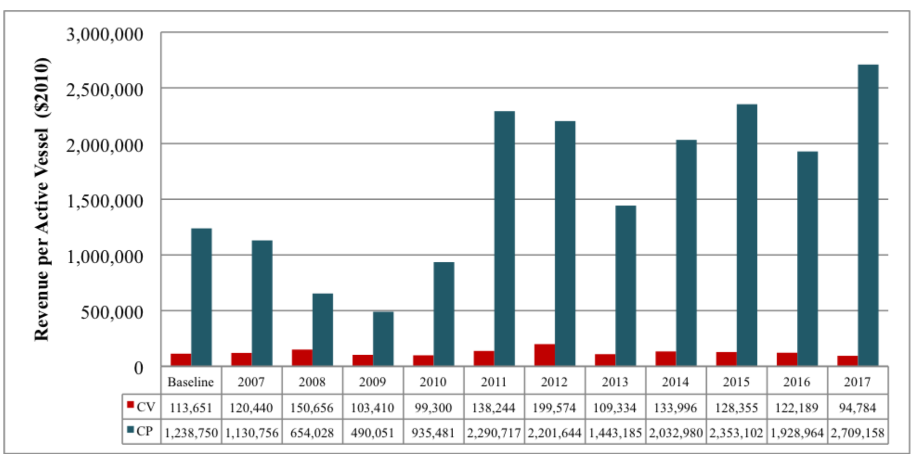
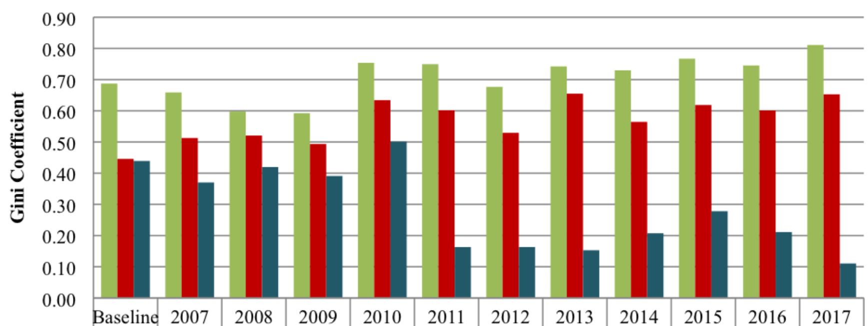


Figure 11.59: Rockfish Program revenue per active vessel.

The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the Rockfish Program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore the value of the Gini coefficient increases as revenue becomes more concentrated on a subset of vessels within the active fleet, but may also decrease with the exit of smaller vessels as the active fleet transitions to fewer and more homogeneous vessels. This is demonstrated in the difference in Gini coefficient during the baseline for all Rockfish Program (RP) vessels (Gini = 0.69) which implies a less even distribution of vessel revenues compared with either the CVs only (Gini = 0.45) or for the CPs only (Gini = 0.44) (Figure 11.60). This is because the revenue per vessel among CVs and CPs is very different (Figure 11.59) and when all vessels are combined together in the Gini coefficient, it implies a less even distribution of revenue than examining the within vessel-type revenue distribution. The Gini coefficient of Rockfish Program vessel revenue for all vessels increased from 0.69 during the baseline to 0.81 in 2017, which suggests an increase in concentration in vessel revenues among all vessels. The CV sector experienced an increase in the Gini coefficient from 0.45 during the baseline to 0.65 in 2017. The CP sector experienced a substantial decline in the Gini coefficient (movement toward a more even distribution), from 0.44 during the baseline to an average of 0.20 from 2012-2016 and a new low of 0.11 in 2017, which suggests the 4 or 5 remaining CP vessels participating in the Rockfish Program from 2012-2017 have a more equal split of revenues than the 8 vessels that participated in the baseline.



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
RP	0.69	0.66	0.60	0.59	0.75	0.75	0.68	0.74	0.73	0.77	0.75	0.81
CV	0.45	0.51	0.52	0.49	0.63	0.60	0.53	0.65	0.56	0.62	0.60	0.65
CP	0.44	0.37	0.42	0.39	0.50	0.16	0.16	0.15	0.21	0.28	0.21	0.11

Figure 11.60: Rockfish Program Gini coefficient.

11.8. Discussion and Conclusion

This report summarizes economic performance metrics from 5 catch share programs and the Bering Sea Freezer Longline Catcher/Processors fishery in the North Pacific for a period prior to program implementation through 2017. Table 11.2 reports the percentage changes between 2017 and 2016 for each of the 10 performance metrics listed in Table 11.1 for all programs in this report. This table reflects short term changes in the economic conditions of the program for 2017 relative to 2016.

Quota declined in 2 of 6 programs while landings declined in only 1 of the 6 programs. The sablefish IFQ program had the largest increase in quota and landings at 11% for both. The GOA Rockfish Program experienced the largest decrease in landings at -18%. The percent utilization increased in two programs, remained constant in two, and declined in the other two, with a 13% decline in the GOA Rockfish Program. The season length index remained fairly constant across programs with the index did not changing by more than 3% in any program. The number of active vessels declined in four programs, but increased in in the GOA Rockfish Program. While there was little change in the number of entities holding share for most programs, but four experienced small or moderate declines. Revenue declined in only the halibut IFQ Program and increased in four others, with substantial increases of 27%, 20%, and 13% in the Sablefish IFQ, Amendment 80, and Freezer Longline fisheries, respectively. Prices only decreased in the halibut IFQ Program while they increased in the other five, with big increases in the Sablefish IFQ, Amendment 80, Freezer Longline, and GOA Rockfish Programs at 14%, 27%, 16%, and 23%, respectively. Revenue per vessel declined in two programs, but increased by 325, 20%, and 21% in the Sablefish IFQ, Amendment 80, and GOA Rockfish Program, respectively. The Gini coefficient decreased (more equal distribution) in four programs, including a 29% reduction in the Amendment 80 Program, and increased (less equal distribution) in the halibut and sablefish IFQ Programs.

It is also useful to compare the economic performance of our catch share programs in 2017 to a longer term average of performance to provide additional context for these metrics. Table 11.3 reports the percentage changes between 2017 and the mean values from the previous 5 year period (2012-2016) for each of the 10 performance metrics listed in Table 11.1.

Trends in quota were very different across programs. The AFA Pollock and GOA Rockfish Programs and experienced an increase in quota of 6% and 12%, while the Halibut IFQ Program, Sablefish IFQ Program, Amendment 80 Program, and the Freezer Longline fishery experienced declines of 13%, 11%, 12%, and 7%, respectively. Landings trends were similar to trends in quota with the exception of the GOA Rockfish Program where quota increased by 12% but the landings decreased by 1%. The percent utilization fell meaningfully only the GOA Rockfish Program, showed a small increase in Freezer Longline fishery, and a large increase of 20% in the Amendment 80 Program. The season length index declined in three programs, was constant in one, and increased in two. Active vessels fell in four of six programs with the Halibut IFQ program and Sablefish IFQ program decreasing by 11%. There has been a slight decrease in the number of entities holding share in all but the Amendment 80 program. Revenue declined substantially in the Halibut IFQ Program (22%), while increasing by 5% in the sablefish IFQ Program, 10% in the Amendment 80 Program, and by 15% in the Freezer Longline fishery. Prices decreased in three programs, with declines of 9%, 7%, and 4% in the halibut IFQ Program, AFA Pollock, and Rockfish Programs, respectively. Prices for the sablefish IFQ program, Amendment 80, and Freezer Longline fishery increased by 19%, 17%, and 17%, respectively. Revenue per vessel declined in two programs, including by 11% in the halibut IFQ program and 12% in the Rockfish Program, but revenue per vessel increased by 19% in the sablefish IFQ Program and 22% in the Freezer Longliner fishery. The Gini coefficient decreased (more equal distribution) in four programs and increased in two with the Amendment 80 Program experiencing a 34% decrease.

Comparing 2017 with the previous 5 years, the Halibut IFQ program experienced declines in 9 of the 10 economic performance metrics, with quota, landings, active vessels, revenue, and revenue per vessel declining by 13%, 14%, 11%, 22%, and 1%, respectively. The sablefish IFQ program experienced declines in 5 of the 10 performance metrics with declines in quota, landings, and active vessels of 11%, 12%, and 11%, respectively. The AFA Pollock program had increases in 5 metrics and declines in 5, with quota and landings increasing by 6% and 7%, respectively while prices fell 7%. Four performance metrics declined for the Amendment 80 program with quota and the Gini coefficient declining by 12% and 34%, respectively, while percent utilization, revenue, and prices have increased by 20%, 10%, and 17%, respectively. The Freezer Longline fishery had increases in four metrics and declines in six, with increases in revenue, price, and revenue per vessel by 15%, 17%, and 22%, respectively. The Rockfish Program had two metrics increase over this period with quota increasing by 12%, while the percent utilization, revenue per vessel, and Gini coefficient fell 11%, 12%, and 10%, respectively.

Table 11.2: Percentage change in Catch Share Performance Metrics for 2016 to 2017.

Catch Share Program	Quota	Landings	% Utilization	Season Length	Active Vessels	Entities	Revenue	Price	Revenue per vessel	Gini*
Halibut	7%	5%	-1%	-3%	-3%	-1%	-9%	-14%	-6%	-1%
Sablefish	11%	11%	0%	0%	-4%	-1%	27%	14%	32%	-4%
AFA	1%	1%	0%	1%	-2%	0%	4%	4%	7%	3%
Amendment 80	0%	-5%	7%	0%	0%	8%	20%	27%	20%	-2%
Freezer Longline	-6%	-3%	3%	3%	-7%	-6%	13%	16%	21%	8%
GOA Rockfish	-6%	-18%	-13%	-3%	4%	-4%	0%	23%	-3%	9%

Notes: * Color scheme is reversed to indicate that increases in the Gini reflect increases in inequality of revenues across vessels.

Table 11.3: Catch Share Performance Metrics 2017 values compared with the average of 2012-2016.

Catch Share Program	Quota	Landings	% Utilization	Season Length	Active Vessels	Entities	Revenue	Price	Revenue per vessel	Gini*
Halibut	-13%	-14%	-1%	-6%	-11%	-7%	-22%	-9%	-11%	-6%
Sablefish	-11%	-12%	-1%	1%	-11%	-3%	5%	19%	19%	-8%
AFA	6%	7%	1%	2%	-1%	-2%	0%	-7%	1%	7%
Amendment 80	-12%	-5%	20%	-1%	2%	1%	10%	17%	9%	4%
Freezer Longline	-7%	-1%	6%	-2%	-6%	-6%	15%	17%	22%	4%
GOA Rockfish	12%	-1%	-11%	0%	9%	-4%	-2%	-4%	-12%	10%

Notes: * Color scheme is reversed to indicate that increases in the Gini reflect increases in inequality of revenues across vessels.

11.9. References

Brinson, A.A., and E. Thunberg. 2013. The Economic Performance of U.S. Catch Share Programs. U.S. Dept. of Commer., NOAA Technical Memorandum NMFS-F/SPO-133a, 159p.

National Marine Fisheries Service. 2017. Fisheries Economics of the United States, 2015. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-170, 247p.

A. APPENDIX A: SUPPLEMENTARY DATA TABLES

Table A.1: Quantities and value of groundfish exports originating from Alaska and Washington by species (group), destination country, and product type 2014 - 2018 (through July 2018) (1,000 metric tons product weight and million dollars).

			2014		2015		2016		2017		2018	
		Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Alaska Pollock	Japan	Fillet Frozen	0.28	$ 0.66	1.13	$ 3.26	0.98	$ 2.71	2.64	$ 7.94	1.52	$ 4.19
		Surimi	71.89	$ 156.83	81.83	$ 186.38	69.18	$ 155.64	74.55	$ 163.8	43.74	$ 108.8
		Roe Frozen	11.21	$ 67.72	10.46	$ 72.21	5.46	$ 40.4	8.43	$ 57.13	11.25	$ 82.66
		Meat Frozen	4.11	$ 9.39	0.92	$ 2.91	0.55	$ 1.56	0.64	$ 1.4	0.58	$ 1.96
	China	Fillet Frozen	4.53	$ 11.73	5.61	$ 12.73	9.02	$ 19.39	18.47	$ 38.56	6.8	$ 11.57
		Surimi	1.28	$ 2.77	2.01	$ 5.28	2.2	$ 5.28	3.28	$ 7.67	2.71	$ 7.44
		Roe Frozen	0.75	$ 5.05	0.5	$ 3.84	0.26	$ 1.79	0.15	$ 0.96	0.31	$ 2.64
		Meat Frozen	48.63	$ 103.81	36.94	$ 79.65	30.45	$ 63.71	35.23	$ 74.78	21.57	$ 39.47
	S.Korea	Fillet Frozen	0.84	$ 2.06	2.7	$ 4.88	5.83	$ 13.3	1.35	$ 4.02	1.67	$ 2.96
		Surimi	56.85	$ 143.61	60.41	$ 154.15	71.11	$ 177.87	71.57	$ 176.69	35.45	$ 90.05
		Roe Frozen	9.79	$ 79.91	9.28	$ 75.85	8.3	$ 68.37	9.26	$ 46.79	9.19	$ 52.19
		Meat Frozen	6.34	$ 11.53	10.03	$ 18.9	12.58	$ 27.1	7.9	$ 18.21	4.58	$ 8.21
	Germany	Fillet Frozen	81.38	$ 237.67	73.41	$ 204.67	67.4	$ 177.53	37.9	$ 100.21	15.27	$ 40
		Surimi	5.61	$ 11.28	4.76	$ 9.38	3.93	$ 8.74	2.78	$ 5.79	0.72	$ 1.68
		Roe Frozen	-	$ -	-	$ -	-	$ -	-	$ -	0.01	$ 0.03
		Meat Frozen	5.42	$ 13.8	2.15	$ 5.71	1.46	$ 3.08	2.44	$ 4.7	3.24	$ 8.18

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Table A.1: Continued

		Product	2014 Quantity	2014 Value	2015 Quantity	2015 Value	2016 Quantity	2016 Value	2017 Quantity	2017 Value	2018 Quantity	2018 Value
Alaska Pollock	Nether-lands	Fillet Frozen	24.69	$ 71.53	25.2	$ 76.7	32.43	$ 89.69	52.45	$ 137.73	31.13	$ 88.34
		Surimi	2.67	$ 6.5	3.26	$ 8.18	3.19	$ 8.42	4.92	$ 12.1	3.53	$ 9.46
		Roe Frozen	-	$ -	0	$ 0.01	-	$ -	0.6	$ 6.58	-	$ -
		Meat Frozen	1.75	$ 3.68	2.45	$ 7.59	1.72	$ 3.88	0.81	$ 1.82	0.2	$ 0.53
	Other	Fillet Frozen	18.73	$ 52.84	14.49	$ 35.29	10.8	$ 26.48	11.32	$ 29.53	6.6	$ 18.72
		Surimi	22.4	$ 49.18	19.16	$ 43.21	28.38	$ 63.74	27.65	$ 59.75	18.44	$ 46.13
		Roe Frozen	0.01	$ 0.11	-	$ -	0.03	$ 0.28	0.04	$ 0.23	0.07	$ 0.42
		Fresh	-	$ -	-	$ -	0.01	$ 0.03	-	$ -	-	$ -
		Meat Frozen	12.39	$ 30.44	7.64	$ 17.81	11.66	$ 24.13	15.64	$ 36.08	12.52	$ 25.73
Sablefish	Japan	Frozen	4.32	$ 50.92	4.14	$ 45.77	3.37	$ 44.52	3.79	$ 54.06	2.13	$ 26.74
		Fresh	0.15	$ 1.75	0.1	$ 1.32	-	$ -	-	$ -	-	$ -
	China	Frozen	0.47	$ 7.42	0.75	$ 12.9	0.92	$ 16.47	0.9	$ 15.49	0.52	$ 9.18
		Fresh	0.1	$ 0.8	0.07	$ 0.65	-	$ -	0.02	$ 0.16	-	$ -
	S.Korea	Frozen	0.04	$ 0.57	0.06	$ 0.95	0.1	$ 1.41	0.09	$ 1.17	0.2	$ 2.25
	Germany	Frozen	0.01	$ 0.18	0.02	$ 0.46	0	$ 0.02	0.02	$ 0.41	0.01	$ 0.27
		Fresh	0	$ 0.03	0.01	$ 0.01	-	$ -	-	$ -	0	$ 0.01
	Nether-lands	Frozen	0.07	$ 0.83	0.05	$ 0.73	0.07	$ 1.28	0.15	$ 2.83	0.04	$ 0.6
		Fresh	-	$ -	0.02	$ 0.18	-	$ -	-	$ -	-	$ -
	Other	Frozen	0.65	$ 10.11	0.85	$ 12.89	0.7	$ 12.1	0.49	$ 8.94	0.33	$ 5.31
		Fresh	0.13	$ 1.25	0.05	$ 0.42	-	$ -	-	$ -	0.05	$ 0.46

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Table A.1: Continued

			2014		2015		2016		2017		2018	
		Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Cod NSPF	Japan	Frozen	16.29	$ 47.42	14	$ 43.11	13.85	$ 44.85	13.87	$ 50.93	6.27	$ 24.38
		Fillet Frozen	0.05	$ 0.16	0.05	$ 0.12	0.02	$ 0.03	0.04	$ 0.09	-	$ -
		Fresh	0.05	$ 0.17	-	$ -	0.01	$ 0.06	0.05	$ 0.26	0.01	$ 0.04
		Salted | Dried	-	$ -	0.07	$ 0.18	-	$ -	-	$ -	-	$ -
		Minced Frozen	0.08	$ 0.12	-	$ -	0.21	$ 0.46	0.3	$ 0.61	0.16	$ 0.35
	China	Frozen	55.16	$ 154.05	56.72	$ 162.45	55.75	$ 154.7	46.6	$ 140.37	25.7	$ 87.07
		Fillet Frozen	0.76	$ 3.04	1.49	$ 4.2	1.02	$ 2.72	1.51	$ 4.69	1.42	$ 3.89
		Fresh	0.03	$ 0.08	0.02	$ 0.07	-	$ -	-	$ -	-	$ -
		Salted | Dried	1.33	$ 3.29	0.92	$ 2.48	0.59	$ 1.65	0	$ 0	-	$ -
		Minced Frozen	-	$ -	0.15	$ 0.24	-	$ -	0.11	$ 0.18	-	$ -
	S.Korea	Frozen	5.34	$ 12.26	8.92	$ 22.96	8.95	$ 25.37	7.4	$ 19.21	7.84	$ 22.06
		Fillet Frozen	0.07	$ 0.14	0.04	$ 0.1	0.06	$ 0.19	0.06	$ 0.2	0.09	$ 0.25
		Fresh	0.05	$ 0.08	0.02	$ 0.05	-	$ -	-	$ -	-	$ -
		Salted | Dried	0.04	$ 0.08	2.09	$ 5.8	-	$ -	-	$ -	-	$ -
		Minced Frozen	-	$ -	0.02	$ 0.07	-	$ -	-	$ -	0.1	$ 0.22
	Germany	Frozen	2.89	$ 10.19	2.75	$ 8.75	1.61	$ 4.72	1.26	$ 4.44	0.25	$ 0.95
		Fillet Frozen	-	$ -	0.01	$ 0.04	0.04	$ 0.13	-	$ -	0.02	$ 0.15
		Minced Frozen	-	$ -	0.12	$ 0.2	-	$ -	-	$ -	-	$ -

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Table A.1: Continued

		Product	2014 Quantity	2014 Value	2015 Quantity	2015 Value	2016 Quantity	2016 Value	2017 Quantity	2017 Value	2018 Quantity	2018 Value
Cod NSPF	Netherlands	Frozen	6.21	$ 20.96	5.71	$ 18.07	3.05	$ 9.13	1.39	$ 3.95	0.2	$ 0.7
		Fillet Frozen	0.22	$ 0.65	0.09	$ 0.36	0.03	$ 0.07	0.05	$ 0.14	-	$ -
	Other	Frozen	11.53	$ 37.28	13.78	$ 42.45	14.71	$ 46.37	15.32	$ 50.58	6.58	$ 23.99
		Fillet Frozen	1.04	$ 5.34	1.59	$ 7.42	1.24	$ 6.78	1.52	$ 7.33	0.76	$ 3.92
		Fresh	0.17	$ 0.58	0.25	$ 0.74	0	$ 0.01	0.16	$ 0.46	0.17	$ 0.59
		Salted | Dried	2.44	$ 6.58	0.61	$ 1.82	0.18	$ 0.33	0.02	$ 0.05	-	$ -
		Minced Frozen	-	$ -	0.22	$ 0.37	0.07	$ 0.13	0.06	$ 0.14	-	$ -
Yellowfin Sole	Japan	Frozen	0.02	$ 0.03	0.05	$ 0.08	-	$ -	-	$ -	0.02	$ 0.03
	China	Frozen	62.09	$ 86.25	52.68	$ 70.15	56.19	$ 79.8	50.98	$ 71.74	27.99	$ 40.44
	S.Korea	Frozen	10.02	$ 12.26	12.38	$ 15.35	11.24	$ 14.57	10.71	$ 14.06	6.73	$ 9.44
	Other	Frozen	0.01	$ 0.01	0.04	$ 0.06	0.21	$ 0.25	0.04	$ 0.06	0.1	$ 0.16
Flatfish NSPF	Japan	Frozen	5.27	$ 9.81	2.65	$ 4.67	3.6	$ 6.86	3.72	$ 7.15	1.19	$ 1.93
		Fillet Frozen	0	$ 0.02	0	$ 0.01	0	$ 0.01	-	$ -	-	$ -
		Fresh	0	$ 0.01	-	$ -	-	$ -	-	$ -	-	$ -
	China	Frozen	38.4	$ 64.56	34.57	$ 53.55	32.6	$ 54.49	36.53	$ 64.24	22.33	$ 35.78
		Fillet Frozen	0.04	$ 0.21	0.12	$ 0.59	0.11	$ 0.27	0.02	$ 0.06	0.02	$ 0.05
		Fresh	0.01	$ 0.07	0.02	$ 0.04	0	$ 0.04	-	$ -	0	$ 0
		Fillet Fresh	-	$ -	-	$ -	0	$ 0.01	-	$ -	-	$ -

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Table A.1: Continued

			2014		2015		2016		2017		2018	
		Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Flatfish NSPF	S.Korea	Frozen	0.96	$ 1.58	3.74	$ 6.86	2.3	$ 4.14	0.97	$ 2.07	1.28	$ 2.62
		Fillet Frozen	0.22	$ 0.65	-	$ -	0	$ 0.01	-	$ -	-	$ -
		Fresh	0.02	$ 0.05	-	$ -	-	$ -	-	$ -	-	$ -
	Nether-lands	Frozen	-	$ -	-	$ -	0.04	$ 0.09	-	$ -	-	$ -
	Other	Frozen	0.68	$ 1.47	0.36	$ 0.71	0.65	$ 0.99	0.6	$ 1.36	0.54	$ 0.98
		Fillet Frozen	0.04	$ 0.25	0	$ 0.01	0.03	$ 0.11	0.02	$ 0.08	0.01	$ 0.06
		Fresh	0.02	$ 0.12	0	$ 0.01	0	$ 0.02	0	$ 0.01	-	$ -
		Fillet Fresh	0.07	$ 0.55	0.06	$ 0.49	0.09	$ 0.72	0.06	$ 0.48	0.03	$ 0.28
Pac. Ocean Perch	Japan	Frozen	6.86	$ 24.54	9.62	$ 35.33	6.49	$ 23.53	8.11	$ 29.79	2.76	$ 10.18
	China	Frozen	15.57	$ 51.41	12.24	$ 40.24	17.16	$ 56.97	12.7	$ 41.94	7.51	$ 22.36
	S.Korea	Frozen	0.92	$ 2.7	0.85	$ 2.09	1.88	$ 4.05	1.51	$ 3.37	0.65	$ 1.25
	Other	Frozen	0.05	$ 0.13	0.03	$ 0.05	0.02	$ 0.06	0.37	$ 0.93	0.01	$ 0.02
Atka Mackerel	Japan	Frozen	12.63	$ 35.07	22.05	$ 61.46	22.3	$ 61.97	26.53	$ 74.15	12.9	$ 35.96
	China	Frozen	3.74	$ 10.4	6	$ 16.79	5.03	$ 13.96	6.53	$ 18.14	4.74	$ 13.09
	S.Korea	Frozen	2.81	$ 7.18	1.93	$ 5.69	2.8	$ 7.76	3.92	$ 10.98	3.03	$ 7.74
	Other	Frozen	0.33	$ 0.5	0.02	$ 0.03	-	$ -	-	$ -	-	$ -

Notes: Totals for China include Taipei and Hong Kong. Totals for ”FLATFISH NSPF” include species ”TURBOT GREENLAND”, ”PLAICE” and ”SOLE ROCK”

Source: NOAA Fisheries, Fisheries Statistics Division, Foreign Trade Division of the U.S. Census Bureau, http://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/index.

Table A.2: Monthly Employment of Seafood Processing Workers in Alaska (thousands), 2012 - 2017.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2012	7.7	9.8	10.3	8.9	8.2	13.6	19.5	16.8	11.4	7.7	5.7	3.7	10.3
2013	7.6	9.4	9.6	9.2	8.3	13.2	20.4	17.4	13.1	8.9	6.6	4	10.6
2014	8.7	10	10	10.2	8.2	14	20.9	17	11.5	6.3	4.6	3.1	10.4
2015	7.9	9.4	9.6	8.6	7.5	13	21.3	17.6	11.7	7.5	4.9	4	10.3
2016	7.7	9.7	10	8.7	6.7	12.4	21.1	16.7	9.8	7.1	4.6	3.6	9.8
2017	6.1	9.2	9.4	7.9	6.6	12.6	20	16.8	10.4	-	-	-	-

Notes: Series code: 32311700.

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, http://live.laborstats.alaska.gov/ces/ces.cfm?at=01&a=000000&adj=0.

Table A.3: Monthly Employment of Seafood Harvesting Workers in Alaska, 2012 - 2016.

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
All Species	2012	2923	3409	4609	5402	6163	19237	24761	16191	6988	5453	2274	853
	2013	2818	3001	4053	5285	5766	21809	25859	15835	7514	5118	2713	895
	2014	2628	3247	4970	5174	5866	20984	24916	16614	7990	5010	2808	1210
	2015	2599	3386	4793	4261	5738	20779	24805	16082	7762	4940	2682	1451
	2016	2798	3562	4991	4486	5500	18458	23825	15790	7533	4604	1871	870
Groundfish	2012	1774	2052	2626	2099	1954	1924	1580	1735	2230	1878	765	437
	2013	1717	1703	2217	2175	1719	1782	1348	1660	1748	1578	784	454
	2014	1963	2065	2865	2301	2037	1835	1568	1953	2380	1699	938	601
	2015	1694	1894	2459	2126	1938	1561	1175	1458	1998	1525	793	527
	2016	1761	2019	2453	2343	1675	1490	1241	1672	1894	1481	765	435
Halibut	2012	0	0	614	969	1694	1936	1530	1941	1464	1241	297	0
	2013	0	0	405	1180	1619	2058	1520	1666	1475	1119	386	0
	2014	0	0	739	1090	1637	1245	899	1639	1312	923	179	0
	2015	0	0	542	1147	1922	1301	874	1273	1457	906	223	0
	2016	0	0	617	1471	1763	1201	874	1510	1268	828	168	0
Salmon	2012	104	220	404	635	1575	14467	21130	12066	3103	528	266	121
	2013	166	204	396	642	1587	17275	22493	12107	4032	700	272	174
	2014	152	231	363	583	1441	17380	21838	12422	4143	580	260	209
	2015	236	378	480	82	1449	17375	22063	12902	4122	675	378	301
	2016	323	464	371	210	1757	15146	21047	12172	4164	529	214	165

Notes: See original data source for details. Groundfish in this table is the sum of sabelfish and groundfish which are reported separately by the AKDOL.

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, http://live.laborstats.alaska.gov/seafood/statewide/AKAvgMonthlySpec.pdf

B. APPENDIX B: ECONOMIC AND SOCIAL SCIENCE RESEARCH PROGRAM PRODUCTS

B.1. Research and Data Collection Project Summaries and Updates 2017 Groundfish SAFE Report

IIFET2018 Seattle: Hosting the biennial meeting of the International Institute of Fisheries Economics and Trade (IIFET)

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The Alaska Fisheries Science Center, the Northwest Fisheries Science Center, and the University of Washington hosted the biennial meeting of the International Institute of Fisheries Economics and Trade (IIFET) on the University of Washington campus from July 16-20th, 2018. The theme of the conference was Adapting to a Changing World: Challenges and Opportunities. There were industry and policy day sessions as well as a wide range of plenary and parallel session that will cover a wide range of fishery economics topics. The conference was targeted towards interest to economists, social scientists, marine resource managers, and members of the fishing industry.

Reference

Conference Website: *www.iifet2018.org.*

Markets and Trade

Developing Better Understanding of Fisheries Markets

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Despite collecting a relatively broad set of information regarding the catch, products produced, and the prices received at both the ex-vessel and first-wholesale levels, our understanding of fishery and product markets and the factors driving those markets in the North Pacific is relatively incomplete. The primary goal of this project is to improve our understanding and characterization of the status and trends of seafood markets for a broad range of products and species. AFSC economists continue to meet with seafood industry members along the supply chain, from fish harvesters to those who process the final products available at local retailer stores and restaurants. This project provides information obtained seafood markets supply and demand and the factors affecting prices in the Alaska seafood industry. The report referenced below includes figures, tables, and text illustrating the current and historical status of seafood markets relevant to the North Pacific. The scope of the analysis includes global, international, regional, and domestic wholesale markets to the extent they are relevant for a given product. To the extent practicable for a given product, the analysis addresses product value (revenues), quantities, prices, market share, supply chain, import/export markets, major participants in the markets, product demand, end-use, current/recent issues (e.g., certification), current/recent news, and future prospects. An extract of the market profiles was included in *Status Report for the Groundfish Fisheries Off Alaska, 2017*. A standalone dossier titled *Alaska Fisheries Wholesale Market Profiles* contains the complete detailed set of market profiles (*Wholesale_Market_Profiles_for_Alaskan_Groundfish_and_Crab_Fisheries.pdf*). An updated version of the *Alaska Fisheries Wholesale Market Profiles* report is forthcoming with an expected publication date of June 2019.

Alaska Groundfish Ex-vessel and Wholesale Price Projections

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For a significant portion of the year there is a temporal lag in officially reported ex-vessel and first-wholesale prices. This is lag occurs because the prices are derived from the Commercial Operators Annual Report which is not available until after data processing and validation of the data, in August of each year. The result is a data lag that grows to roughly a year and a half (e.g. prior to August 2018 the most recent available official prices were from 2016). To provide information on the current state of fisheries markets, nowcasting is used to estimate 2018 ex-vessel and first-wholesale prices using related data that is reported at a higher frequency and provides more contemporaneous information on the likely state of prices for 2018. Ex-vessel prices estimates are based on unadjusted prices on fish ticket through the month of Sept. 2018. First-wholesale price estimates are based on export prices through the month of Aug. 2018, estimated global catch, and exchanges rates for 2018. Nowcasting provided fairly accurate predictions and displayed rather modest prediction error with most of the confidence bounds within 5-10% of the price. In addition, time series models are used to project first-wholesale prices for the following 2 years 2019 - 2020. Resampling methods are used estimate a prediction density of potential future prices. Confidence bounds are calculated from the prediction density to give the probability that the prices will fall within a certain range. Prediction densities also provide information on the expected volatility of prices. As prices are projected past the current year the confidence bounds grow reflecting increasing uncertainty further out in the future. The results of this project are available in the *Status Report for the Groundfish Fisheries Off Alaska, 2016*. A technical report, Fissel (2015), details the basic methods used for creating the price projections.

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Data Collection and Synthesis

Economic Data Reporting in Groundfish Catch Share Programs

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The 2006 reauthorization of the Magnuson-Stevens Fishery Management and Conservation Act (MSA) includes heightened requirements for the analysis of socioeconomic impacts and the collection of economic and social data. These changes eliminate the previous restrictions on collecting economic data, clarify and expand the economic and social information that is required, and make explicit that NOAA Fisheries has both the authority and responsibility to collect the economic and social information necessary to meet requirements of the MSA. Beginning in 2005 with the BSAI Crab Rationalization (CR) Program, NMFS has implemented detailed annual mandatory economic data reporting requirements for selected catch share fisheries in Alaska, under the guidance of the NPFMC, and overseen by AFSC economists. In 2008, the Amendment 80 (A80) Non-AFA Catcher-Processor Economic Data Report (EDR) program was implemented concurrent with the A80 program, and in 2012 the Amendment 91 (A91) EDR collection went into effect for vessels and quota share holding entities in the American Fisheries Act (AFA) pollock fishery. In advance of bycatch management measures in the Gulf of Alaska (GOA) trawl groundfish fishery under consideration by the NPFMC, EDR data collection began in 2016 to gather baseline data on costs, earnings, and employment for vessels and processors participating in GOA groundfish fisheries.

Amendment 91 EDR

The A91 EDR program was developed by the NPFMC with the specific objective of assessing the effectiveness of Chinook salmon prohibited species catch (PSC) avoidance incentive measures implemented under A91, including sector-level Incentive Plan Agreements (IPAs), prohibited species catch (PSC) hard caps, and the performance standard. The data are intended to support this assessment over seasonal variation in salmon PSC incidence and with respect to how timing, location, and other aspects of pollock fishing and salmon PSC occur. The EDR is a mandatory reporting requirement for all entities participating in the AFA pollock trawl fishery, including vessel masters and businesses that operate one or more AFA-permitted vessels active in fishing or processing BSAI pollock, CDQ groups receiving allocations of BSAI pollock, and representatives of sector entities receiving allocations of Chinook salmon PSC from NMFS. The EDR is comprised of three separate survey forms: the Chinook salmon PSC Allocation Compensated Transfer Report (CTR), the Vessel Fuel Survey, and the Vessel Master Survey. In addition to the EDR program, the data collection measures developed by the Council also specified modification of the Daily Fishing Logbook (DFL) for BSAI pollock trawl CVs and CPs to add a ”checkbox” to the tow-level logbook record to indicate relocation of vessels to alternate fishing grounds for the purpose of Chinook PSC avoidance.

AFSC economists presented a report to the NPFMC in February 2014 on the first year of A91 EDR data collection (conducted in 2013 for 2012 calendar year operations) and preliminary analysis of the data. The goal of the report was to identify potential problems in the design or implementation of the data collections and opportunities for improvements that could make more efficient use of reporting burden and may ultimately produce data that would be more effective for informing Council decision making.

Notable findings in the report were that the Vessel Fuel Survey and Vessel Master Survey have been successfully implemented to collect data from all active AFA vessels and have yielded substantial new information that will be useful for analysis of Amendment 91. Quantitative fuel use and cost data have been used in statistical analyses of fishing behavior, and qualitative information reported by vessel masters regarding observed fishing and PSC conditions during A and B pollock seasons and perceptions regarding management measures and bycatch avoidance incentives has been useful to analysts for interpretation of related fishery data.

No compensated transfers (i.e., arms-length market transactions) of Chinook PSC have been reported to date (for 2012-2016), however, and it remains uncertain whether an in-season market for Chinook PSC as envisioned by the CTR survey will arise in the instance of high-Chinook PSC incidence or if the CTR survey as designed will be effective in capturing the nature of trades. A more detailed discussion of the A91 Chinook EDR is presented elsewhere in this document.

GOA Trawl and Amendment 80 EDR

During 2014, AFSC economists collaborated with NPFMC and Alaska Region staff and industry members to develop draft data collection instruments and a preliminary rule following NPFMC recommendations for implementing EDR data collection in the GOA trawl groundfish fishery. New EDR forms for GOA groundfish trawl catcher vessels and catcher/processors were developed, evaluated, and revised in workshop meetings and individual interviews with members of industry, and modifications to the existing A80 Trawl CP EDR form have been made to accommodate Council recommendations to extend the A80 data collection to incorporate A80 CPs GOA activity and capture data from non-A80 CPs in the GOA. The draft data collection forms and proposed rule were reviewed and approved by the Council at their April, 2014 meeting, and the proposed rule was published August 11, 2014 (79 FR 46758; see *http://alaskafisheries.noaa.gov/sustainablefisheries/trawl/edr.htm* for more information). The final rule was published in December 2014, authorizing mandatory data collection to begin with reporting of 2015 calendar year data (submitted in 2016). AFSC has been working with industry to test and refine the draft EDR forms to ensure data to be collected will meet appropriate data quality standards, including modifications to reduce the reporting burden in the A80 EDR program and improve the utility of data collected from CP vessels in non-AFA groundfish fisheries in the BSAI as well as in the GOA. The first years of data are currently under quality assurance and quality control review.

Recreational Fisheries and Non-Market Valuation

Alaska Recreational Charter Boat Operator Research

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To assess the effect of current or potential regulatory restrictions on Alaska charter boat fishing operator behavior and welfare, it is necessary to obtain a better general understanding of the charter vessel industry. Some information useful for this purpose is already collected from existing sources, such as from the Alaska Department of Fish and Game (ADFG) charter logbook program. However, information on vessel and crew characteristics, services offered to clients, and costs and earnings information are generally not available from existing data sources and thus must be collected directly from the industry through voluntary surveys. In order to address the identified data gaps, AFSC researchers conducted a survey of Alaska charter business owners in 2012, 2013, 2014, 2016, and 2018.

The survey instrument collects annual costs and earnings information about charter businesses and the general business characteristics of Alaska charter boat operations. Some specific information collected includes equipment and supplies purchased by charter businesses, services offered to clients and associated sales revenues, and crew employment and pay.

Initial scoping and design of the survey was based on consultation with NMFS Alaska Region, ADFG, North Pacific Fishery Management Council, and International Pacific Halibut Commission staff members regarding analytical needs and associated data gaps, and experience with collecting data from the target population. To refine the survey questions, AFSC researchers conducted focus groups with charter business owners in Homer and Seward in September 2011 and conducted numerous interviews in 2012 with additional Alaska charter business owners. In addition, the study was endorsed by the Alaska Charter Association, the Deep Creek Charterboat Association, the Southeast Alaska Guides Organization, and Homer Charter Association.

Following OMB approval under the Paperwork Reduction Act, the survey was fielded with the help of the Pacific States Marine Fisheries Commission during the spring of 2012 to collect data for the 2011 season, during the spring of 2013 to collect data for the 2012 season, and during the spring of 2014 to collect data for 2013. After data validation, the data were summarized and analyzed. Due to the high rates of unit and item non-response, data imputation and sample weighting methods were used to adjust the data to be more representative of the population. The specific methods used were described in Lew, Himes-Cornell, and Lee (2015). This process led to population-level estimates being generated and compiled into a report (Lew et al. 2015). An additional analysis is currently underway to determine fishing community-level estimates, and other analyses are planned, including a regional economic analysis using IMPLAN data and the employment, cost, and earnings data from the survey that can be used to examine the contribution or impacts of the charter boat sector on the regional economy.

In addition, AFSC received OMB approval under the Paperwork Reduction Act during 2015 to conduct the survey again. Subsequently in 2016, the survey was implemented and collected data for the 2015 fishing season. The 2016 survey data have been cleaned, validated, and analyzed. A report summarizing the results has been completed (Lew and Lee 2018). In 2018, the survey was implemented to collect data for the 2017 fishing season. The data for this most recent survey are being cleaned and validated at present.

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Cook Inlet Beluga Whale Economic Valuation Survey

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The purpose of this project is to develop, test, and implement a survey that collects data to understand the public's preferences for protecting the Cook Inlet beluga whale (CIBW), a distinct population segment (stock) of beluga whale that resides solely in the Cook Inlet, Alaska. It is the smallest of the five U.S. beluga whale stocks. In October 2008, the CIBW was listed as an endangered species (73 FR 62919). It is believed that the population has declined from as many as 1,300 to about 312 animals (see *http://www.fakr.noaa.gov/protectedresources/whales/beluga/management.htm#esa* for more details). The public benefits associated with protection actions for the Cook Inlet beluga whale are substantially the result of the non-consumptive value people attribute to such protection. This includes active use values associated with being able to view beluga whales and passive use, or "existence," values unrelated to direct human use. No empirical estimates of these values for Cook Inlet beluga whales are currently available, but this information is needed for decision makers to more fully understand the trade-offs involved in evaluating population recovery planning alternatives and to complement other information available about the costs, benefits, and impacts of alternative plans (including public input).

Considerable effort was invested in developing and testing the survey instrument. Qualitative pretesting of survey materials is generally recognized as a key step in developing any high quality survey (e.g., Dillman, Smyth, Christian [2009]). Pretesting survey materials using focus groups and cognitive interviews is important for improving questions, information, and graphics presented in the survey instruments so they can be better understood and more consistently interpreted by respondents to maximize the likelihood of eliciting the desired information accurately. During 2009 and 2010, focus groups and cognitive interviews were undertaken to evaluate and refine the survey materials of a stated preference survey of the public's preferences for CIBW recovery. As a result of the input received from these qualitative testing activities, the survey materials were revised and then integrated into a Paperwork Reduction Act (PRA) clearance request package that was prepared and submitted to the Office of Management and Budget (OMB) for the pilot survey implementation, which precedes implementing the full survey. The pilot survey was administered during 2011. PRA clearance for the full survey implementation was obtained in spring 2013, and the full survey was fielded in late 2013. The data were cleaned and validated before delivery at the end of the year. Several models have been developed to analyze the data and preliminary estimates of willingness to pay generated. During 2016, preliminary results were presented at multiple conferences and seminars. Two papers summarizing the analytic results were prepared, with one published at *Resource and Energy Economics* (Lew 2018) and the other currently under review (Lew 2017).

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Temporal Stability of Economic Values of Endangered Marine Species Protection

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A common way of incorporating non-market economic values associated with ecosystem services and goods is through benefits transfer, which involves transferring economic value information from existing studies to new applications. Often, benefits transfer is turned to due to time, money, or other constraints that preclude conducting a de novo study to generate economic value information for the policy analysis in question. Since benefit transfer methods rely on past models and results, it is important to know whether economic values are stable over time or are subject to change, either because of the reliability of the methodology or due to actual preference changes. The temporal stability of willingness to pay (WTP) has been tested extensively for contingent valuation, but rarely for stated preference choice experiments (CE). In Lew and Wallmo (2017), data from two identical CE surveys on different samples from the same population that occurred 17 months apart (Spring 2009 and Fall 2010) are used to estimate and compare mean WTP and preference parameters associated with threatened and endangered marine species protection. The models account for both preference and scale heterogeneity, and the results suggest both types of heterogeneity matter. Tests of preference stability suggest stable preferences between 2009 and 2010. Furthermore, WTP values estimated from both surveys are not statistically different. This provides evidence that economic values estimated using CE methods are temporally stable.

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Demand for Saltwater Sport Fishing Trips in Alaska

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The primary goal of this study is to estimate the demand for, and economic value of, saltwater sport fishing trips in Alaska using data collected from economic surveys of Alaska anglers. Given that fishing regulations, fish stock conditions, and angler preferences may change over time, these surveys are conducted periodically to update the data used to generate estimates of economic value and demand for saltwater fishing opportunities in Alaska.

In the first survey conducted for this project, the survey instrument collected basic trip information on fishing trips taken during 2006 by both resident and non-resident anglers and uses a stated preference choice experiment framework to identify anglers' preferences for fish size, catch, and harvest regulations related to halibut, king (Chinook) salmon and silver (Coho) salmon. The survey also included questions that provide detailed information on time and money constraints and characteristics of the most recent fishing trip, including detailed trip expenditures. Details on this survey implementation and data collected are provided in Lew, Lee, and Larson (2010).

Together, these data were used to estimate the demand for Alaska saltwater sport fishing and to understand how attributes such as fish size and number caught and harvest regulations affect participation rates and the value of fishing experiences. Several papers describing models that estimate the net economic value of saltwater sport fishing trips by Southeast Alaska anglers using these data were completed. The first paper (Lew and Larson, 2011) describes a model of fishing behavior that accounts for two decisions, participation and site choice, which is estimated using a repeated discrete choice modeling approach. The paper presents the results from estimating this model and the economic values suggested by the model results with a primary emphasis on Chinook and Coho salmon trip values. The second paper (Larson and Larson, 2013) analyzes the role of targeting behavior and the use of different sources of harvest rate information on saltwater sportfishing demand in Southeast Alaska. The third paper (Larson and Lew, 2014) is primarily methodological, as it assesses different ways of estimating the opportunity cost of travel time in the recreational fishing demand model. In the latter two papers, economic values for saltwater species are presented, but the emphasis of the papers are on addressing other issues.

During 2010 and early 2011, the 2007 survey was updated and qualitatively tested with resident and non-resident anglers. The new survey aimed to collect much of the same information collected by the 2007 survey, but also collected additional information needed to facilitate the data's application in a wider range of models and for a wider range of policies. During 2012, the updated survey was fielded following OMB clearance. Several analyses were completed using these data, with Lew and Larson (2015) reporting estimates of economic values of Alaska marine charter boat sport fishing associated with non-Alaska anglers and Lew and Larson (2017) presenting economic values of Alaska saltwater sport fishing by Alaska resident anglers.

In 2015 and 2016, the survey was updated again to better reflect changes that had occurred since the previous survey. The revised survey was tested with resident and non-resident anglers. After OMB approval under the Paperwork Reduction Act was received, it was implemented during 2017. Data were then cleaned and validated. In 2018, a preliminary analysis of the data was done and the results were presented at the 2018 International Institute for Fisheries Economics and Trade (IIFET) biennial forum.

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Estimating Economic Values for Saltwater Sport Fishing in Alaska Using Stated Preference Data

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Knowing how anglers value their fishing opportunities is a fundamental building block of sound marine policy, especially for stocks for which there is conflict over allocation between different uses (e.g., allocation between recreational and commercial uses). This study reports on the results from an analysis of stated preference choice experiment data related to how recreational saltwater anglers value their catches and the regulations governing Pacific halibut *Hippoglossus stenolepis*, Chinook salmon *Oncorhynchus tshawytscha*, and coho salmon *O. kisutch* off the coast of Alaska.

The data used in the analysis are from a national mail survey conducted during 2007 of people who purchased sport fishing licenses in Alaska in 2006. The survey was developed with input collected through several focus groups and cognitive interviews with Alaska anglers, as well as from fishery managers. Each survey included several stated preference choice experiment questions, which ask respondents to choose between not fishing and two hypothetical fishing trip options that differ in the species targeted, length of the trip, fishing location, trip cost, and catch-related characteristics (including the expected catch and harvest restrictions). Responses to these questions are analyzed using random utility maximization-based econometric models. The model results are then used to estimate the economic value, or willingness to pay, non-resident and Alaska resident anglers place on saltwater boat fishing trips in Alaska and assess their response to changes in characteristics of fishing trips.

The results show that Alaska resident anglers had mean trip values ranging from $246 to $444, while non-residents had much higher values ($2,007 to $2,639), likely reflecting that their trips are both less common and considerably more expensive to take. Non-residents generally had significant positive values for increases in number of fish caught, bag limit, and fish size, while Alaska residents valued size and bag limit changes but not catch increases. The economic values are also discussed in the context of allocation issues, particularly as they relate to the sport fishing and commercial fishing sectors for Pacific halibut. A comparison of the marginal value estimates of Pacific halibut in the two sectors suggests that the current allocation is not economically efficient, as the marginal value in the sport sector is higher than in the directed halibut fishery in the commercial sector. Importantly, the results are not able to provide an estimate of how much allocation in each sector would result in the most efficient allocation, which requires additional data and analysis to fully estimate the supply and demand for Pacific halibut in each sector. The results from this study have been published in the *North American Journal of Fisheries Management*.

Since the data support a model specification that differentiates between values for fish that are caught and kept, caught and released (due to a bag limit restriction), and only potentially caught (fish in excess of the number caught but within the bag limit), additional work has been conducted to derive the value of these types of fishing trips. The estimated models indicate these different catch variables are important and anglers view them distinctly, generally valuing the fish they keep the highest and those they are required to release, or potentially catch, less. The marginal values anglers place on catch and release fish and potential fish were generally positive. And as a result, among resident anglers at least, this contributed to mean trip values for salmon catch-and-release fishing trips being larger than trips where the anglers catch their limits, suggesting that trips where anglers do not catch their limits are valuable. Alaska residents were willing to pay more for catch and keep halibut trips. Importantly, however, the mean trip values associated with catch-and-release only trips and trips where anglers harvested fish were not statistically different in any comparison. In addition, as illustrated above, differentiating between different types of fishing and estimating separate values for each type can influence the calculations of the marginal value of a fish often desired in policy evaluation. The paper (Lew and Larson 2014) summarizing these results have been published in *Fisheries Research*.

In addition, analyses are proceeding using data from the Alaska saltwater sport fishing survey conducted during 2012 that collected information on fishing behavior and preferences from people who purchased sport fishing licenses in Alaska in 2011. The stated preference choice experiment questions in that survey capture angler preferences for regulatory tools that were not in place when the previous survey was conducted (e.g., maximum size limits on Pacific halibut). Some results from the analysis of these data were presented at the 2013 North American Association of Fisheries Economists Biennial Forum and at the NMFS Recreational Fisheries Data and Model Needs Workshop, and were published in *Marine Policy* (Lew and Larson 2015). That paper focused on economic fishing trip values associated with non-resident anglers. A separate analysis was done to estimate the fishing trip values associated with Alaska resident anglers and is published in *Marine Fisheries Review* (Lew and Larson 2017). Additionally, a preliminary analysis of the stated preference data collected in the 2017 survey was presented at the 2018 International Institute for Fisheries Economics and Trade (IIFET) biennial forum.

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Geospatial Aspects of Non-Market Values for Threatened and Endangered Marine Species Protection

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An issue that arises in applying non-market values in policy settings is defining the extent of the economic jurisdiction – the area that includes all people who hold values – for a good or service. In this research, we estimate non-market values for recovering several threatened and endangered marine species in the U.S. and assess the geospatial distribution across the U.S. In two papers (Wallmo and Lew 2015, 2016), we compare estimates for households in the nine Census regions, as well as for the entire nation. We statistically compare species values between the regional samples to help determine the extent of and variation in the economic jurisdiction for endangered species recovery.

In related work, we more closely examine spatial distribution of individual willingness to pay values using tools from geographical analysis (Johnston et al. 2015). The paper demonstrates a suite of analytic methods that may be used to characterize otherwise undetectable spatial heterogeneity in stated preference willingness to pay (WTP). We emphasize flexible methods applicable to large scale analysis with diffuse policy impacts and uncertainty regarding the appropriate scales over which spatial patterns should be evaluated. Illustrated methods include spatial interpolation and multi-scale analysis of hot/cold spots using local indicators of spatial association. An application to threatened and endangered marine species illustrates the empirical findings that emerge. Relevant findings include previously unobserved, large scale clustering of non-use WTP estimates that appears at multiple scales of analysis.

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Models of Fisher and Fishery Response to Changes in Management, Markets, and the Environment

Identifying the Potential for Cross-Fishery Spillovers: A Network Analysis of Alaskan Permitting Patterns

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Many fishermen own a portfolio of permits across multiple fisheries, creating an opportunity for fishing effort to adjust across fisheries and enabling impacts from a policy change in one fishery to spill over into other fisheries. In regions with a large and diverse number of permits and fisheries, joint-permitting can result in a complex system, making it difficult to understand the potential for cross-fishery substitution. In this study, we construct a network representation of permit ownership to characterize interconnectedness between Alaska commercial fisheries due to cross-fishery permitting. The Alaska fisheries network is highly connected, suggesting that most fisheries are vulnerable to cross-fishery spillovers from network shocks, such as changes to policies or fish stocks. We find that fisheries with similar geographic proximity are more likely to be a part of a highly connected cluster of susceptible fisheries. We use a case study to show that preexisting network statistics can be useful for identifying the potential scope of policy-induced spillovers. Our results demonstrate that network analysis can improve our understanding of the potential for policy-induced cross-fishery spillovers.

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Networks and Policy-Induced Spillovers: Defining the Scope for Ecosystem-Based Fishery Management

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The emergence of ecosystem-based fisheries management (EBFM) has broadened the policy scope of fisheries management by accounting for the biological and ecological connectivity of fisheries. Less attention, however, has been given to the economic connectivity of fisheries. If fishers consider multiple fisheries when deciding where, when, and how much to fish, then management changes in one fishery can generate spillover impacts in other fisheries. Catch share

programs are a popular fisheries management framework that may be particularly prone to generating spillovers given that decreasing over-capitalization is often a primary objective. We use data from Alaska fisheries to examine spillovers from each of the main catch share programs in Alaska. We evaluate changes in participation—a traditional indicator in fisheries economics—in both the catch share and non-catch share fisheries. Using network analysis, we also investigate whether catch-share programs change the economic connectivity of fisheries, which can have implications for the socioeconomic resilience and robustness of the ecosystem, and empirically identify the set of fisheries impacted by each Alaska catch share program. We find that cross-fishery participation spillovers and changes in economic connectivity coincide with some, but not all, catch share programs. Our findings suggest that economic connectivity

and the potential for cross-fishery spillovers deserves serious consideration, especially when designing and evaluating EBFM policies.

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Kroetz, K., M.N. Reimer, J.N. Sanchirico, D.K. Lew, and J. Huetteman. "Networks and Policy-induced Spillovers: Defining the Scope for Ecosystem-Based Management." Under review.

Empirical Models of Fisheries Production: Conflating Technology with Incentives?

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Conventional empirical models of fisheries production inadequately capture the primary margins of behavior along which fishermen act, rendering them ineffective for ex ante policy evaluation. We estimate a conventional production model for a fishery undergoing a transition to rights-based management and show that ex ante production data alone arrives at misleading conclusions regarding post-rationalization production possibilities— even though the technologies available to fishermen before and after rationalization were effectively unchanged. Our results emphasize the difficulty of

assessing the potential impacts of a policy change on the basis of ex ante data alone. Since such data are generated under a different incentive structure than the prospective system, a purely empirical approach imposed upon a flexible functional form is likely to reflect far more about the incentives under status-quo management than the actual technological possibilities under a new policy regime.

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FishSET: a Spatial Economics Toolbox to better Incorporate Fisher Behavior into Fisheries Management

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Since the 1980s, fisheries economists have modeled the factors that influence fishers' spatial and participation choices in order to understand the trade-offs of fishing in different locations. This knowledge can improve predictions of how fishers will respond to area closures, changes in market conditions, or to management actions such as the implementation of catch share programs.

NOAA Fisheries and partners are developing the Spatial Economics Toolbox for Fisheries (FishSET). The aim of FishSET is to join the best scientific data and tools to evaluate the trade-offs that are central to fisheries management. FishSET will improve the information available for NOAA Fisheries' core initiatives such as coastal and marine spatial planning and integrated ecosystem assessments and allow research from this well-developed field of fisheries economics to be incorporated directly into the fisheries management process.

One element of the project is the development of best practices and tools to improve data organization. A second core component is the development of estimation routines that enable comparisons of state-of-the-art fisher location choice models. FishSET enables new models to be more easily and robustly tested and applied when the advances lead to improved predictions of fisher behavior. Pilot projects that utilize FishSET are in different stages of development in different regions in the United States, which will ensure that the data challenges that confront modelers in different regions are confronted at the onset of the project. Implementing projects in different regions will also provide insight into how economic and fisheries data requirements for effective management may vary across different types of fisheries. In Alaska, FishSET is currently being utilized in pilot projects involving the Amendment 80 and AFA pollock fisheries, but in the future models will be developed for many additional fishing fleets.

Strong connections, loose coupling: the influence of the Bering Sea ecosystem on commercial fisheries and subsistence harvests in Alaska

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Human-environment connections are the subject of much study, and the details of those connections are crucial factors in effective environmental management. In a large, interdisciplinary study of the eastern Bering Sea ecosystem involving disciplines from physical oceanography to anthropology, one of the research teams examined commercial fisheries and another looked at subsistence harvests by Alaska Natives. Commercial fisheries and subsistence harvests are extensive, demonstrating strong connections between the ecosystem and the humans who use it. At the same time, however, both research teams concluded that the influence of ecosystem conditions on the outcomes of human activities was weaker than anticipated. Likely explanations of this apparently loose coupling include the ability of fishers and hunters to adjust to variable conditions, and the role of social systems and management in moderating the direct effects of changes in the ecosystem. We propose a new conceptual model for future studies that incorporates a greater range of social factors and their dynamics, in addition to similarly detailed examinations of the ecosystem itself.

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Implications of halibut bycatch management in the North Pacific: A prospective model of fleet behavior in the groundfish trawl fisheries

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There is a pressing need for conducting prospective analyses of fishing effort changes in response to management changes, including those designed to reduce bycatch. In June

2015, the North Pacific Fisheries Management Council (NPFMC) took action to reduce the prohibited species catch (PSC) limits for halibut in the Bering Sea and Aleutian

Islands (BSAI) groundfish fisheries, and is currently exploring ways for tying future PSC limits to measures of halibut abundance. Understanding the behavior of the groundfish fleet in response to such limits is a key ingredient for measuring potential socioeconomic and biological impacts, and yet current models are insufficient for predicting the behavioral response of the fishing industry under the current quota-based management structure of most BSAI groundfish fisheries.

We are developing an empirical modeling approach for predicting the economic and ecological consequences of alternative halibut PSC management policies. Our model focuses on the dynamic decision making of vessels as they manage tradable quotas for target and bycatch species within a fishing season, and provides predictions of changes in the spatial and temporal distribution of fishing effort in response to management changes, including changes in catch limits and time/area closures. These predictions are then combined with estimated space/time distributions of species to predict the cumulative consequences for catch and quota balances, gross and net revenues, and the ecosystem resulting from alternative halibut PSC management measures.

Preliminary results suggest that the groundfish fleet is flexible in adjusting their fishing practices to reduce halibut bycatch to some degree; however, halibut bycatch reductions are costly, in terms of foregone groundfish revenue and operating costs, particularly at low levels of halibut PSC limits. Moreover, our results highlight behavioral margins that would not otherwise be predicted using models that do not account for the within-season dynamics of quota-based fisheries. While the application we pursue is specific to halibut PSC management in the BSAI groundfish fisheries, our methodological approach is capable of being applied to policy impacts in other quota-based multispecies fisheries.

Economic and Management Evaluation Components of the Alaska Climate Integrated Modeling (ACLIM) Project: How do we prepare Bering Sea Fisheries Management for Success in a Changing Environment?

By Alan C. Haynie*, Amanda Faig, Kirstin K. Holsman, Stephen Kasperski, and Anne B. Hollowed

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The Alaska Climate Integrated Modeling (ACLIM) project is a multidisciplinary effort to examine how different climate scenarios are likely to impact the Bering Sea ecosystem – and to ensure that our management system is ready for these potential changes. ACLIM integrates climate scenarios with a suite of biological models which include different levels of ecosystem complexity and sources of uncertainty.

One important element of the project focuses on coupling the project's bio-physical models with models of fisher behavior and management. The complexity of the economic models varies to match the scale of the biological models with which they are coupled. We identify the economic and management factors that are the core drivers of fisher behavior. For management, there are many possible future policy choices, such as changes in target and bycatch species allocations or expanded spatial protective measures. Building on common socioeconomic pathways, we define the primary measures that have been shown to impact past fisher behavior and define a range of potential economic changes and policy interactions under which we predict future integrated modeling outcomes. We demonstrate how different policy tools can have a large impact on our ability to adapt to environmental change.

Another important component of ACLIM is understanding how managers are likely to respond to the changes in abundance of different species. In the U.S. Bering Sea and Aleutian Islands, an ecosystem cap constrains the aggregate total allowable catch (TAC) across all species in the fishery management plan to be less than 2 million metric tons. After the allowable biological catch (ABC) is proposed for each species by stock assessment scientists and reviewed by scientific peer review panels, the North Pacific Fishery Management Council (Council) then decides how to allocate the cap among all managed species, constrained by both the ABC of each species and the 2 million ton aggregate limit. For most years, the sum of single-species ABCs is considerably greater than 2 million tons, requiring the Council to reduce the TAC below the ABC for most species. Next, catch rarely is equal to the original TAC due to a variety of reasons including the joint nature of catch between certain species and other fishery regulations. For conducting ACLIM management strategy evaluations, being able to predict TAC and catch from the ABC is essential. Assuming ABC, TAC, and catch are equal is not realistic and would produce extremely misleading predictions and understate the role of management in the future.

We examine and model the historical relationships among species and fleets under the ecosystem cap. This enables us to predict both the TAC and catch of each species in future scenarios, including in the Alaska Climate Integrated Modeling (ACLIM) project. This work also allows us to identify the factors that have led the Council to reduce the TAC of different species, how the TAC setting process has evolved over time to enable the fleet to approach the 2 million ton limit, and what further refinements to the process may be available to the Council.

An empirical examination of size-targeting in the Bering Sea pollock catcher processor fishery

By Y. Allen Chen and Alan Haynie*

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Weight-based harvest quota regulations do not restrict the size of individual fish that fill that quota, although fish of different sizes may present varying fishery profit opportunities and have different impacts on the stock's growth potential. This paper empirically links revenue per unit of quota and fish size by investigating the catcher-processor fleet of the U.S. Bering Sea pollock fishery, where larger fish can be made into higher-value fillets, instead of surimi that is lower value on average. We then use a dynamic age-structured model to illustrate how some harvesters target smaller fish to decrease their own harvesting costs, which imposes a stock externality on the fleet. This is a working paper that is being revised for submission to a peer-reviewed journal. We estimate the potential increase in profit if a manager hypothetically controls for the size of fish caught in the pollock fishery. Fishers benefit due to higher prices coming from higher-value products, and greater catches because of a larger biomass.

Benefits and risks of diversification for individual fishers

By Sean C. Anderson, E. J. Ward, A. O. Shelton, M. D. Adkison, A. H. Beaudreau, R. E. Brenner, Alan C. Haynie*, J. C. Shriver, J. T. Watson and B. C. Williams.

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Individuals relying on natural resource extraction for their livelihood face high income variability driven by a mix of environmental, biological, management, and economic factors. Key to managing these industries is identifying how regulatory actions and individual behavior affect income variability, financial risk, and, by extension, the economic stability and the sustainable use of natural resources. In commercial fisheries, communities and vessels fishing a greater diversity of species have less revenue variability than those fishing fewer species. However, it is unclear whether these benefits extend to the actions of individual fishers and how year-to-year changes in diversification affect revenue and revenue variability. Here, we evaluate two axes by which fishers in Alaska can diversify fishing activities. We show that, despite increasing specialization over the last 30 years, fishing a set of permits with higher species diversity reduces individual revenue variability, and fishing an additional permit is associated with higher revenue and lower variability. However, increasing species diversity within the constraints of existing permits has a fishery-dependent effect on revenue and is usually (87% probability) associated with increased revenue uncertainty the following year. Our results demonstrate that the most effective option for individuals to decrease revenue variability is to participate in additional or more diverse fisheries. However, this option is expensive, often limited by regulations such as catch share programs, and consequently unavailable to many individuals.

With increasing climatic variability, it will be particularly important that individuals relying on natural resources for their livelihood have effective strategies to reduce financial risk.

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Constructing catch expectations in fisheries discrete choice modeling

By Y. Allen Chen, Alan Haynie*, and Chris Anderson

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A core element of the FishSET project is the development of models that better capture how fishers trade off expected revenue and costs. In order to compare expectations of catch at different locations in discrete choice models of fisher behavior, researchers typically construct proxies using fishery-dependent data. However, economic principles from a standard random utility model (RUM) suggest that catch data observed by the researcher and chosen by the fisher are non-randomly sampled. In this paper we illustrate how expectations of fishery-dependent catch data are biased and how this results in incorrect econometric inference. By using a flexible correction function approach (Dahl 2002), we can test if bias exists and correct for selection. We find that full information maximum likelihood estimation can completely correct the bias in the discrete choice parameters, where catches are overestimated and welfare impacts from spatial closures are underestimated when selection is ignored.

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Effects of increased specialization on revenue of Alaskan salmon fishers over four decades

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Theory and previous studies have shown that commercial fishers with a diversified catch across multiple species may experience benefits such as increased revenue and reduced variability in revenue. However, fishers can only increase the species diversity of their catch if they own fishing permits that allow multiple species to be targeted, or if they own multiple single-species permits. Individuals holding a single permit can only increase catch diversity within the confines of their permit (e.g., by fishing longer or over a broader spatial area). Using a large dataset of individual salmon fishers in Alaska, we build a Bayesian variance-function regression model to understand how diversification impacts revenue and revenue variability, and how these effects have evolved since the 1970s. Applying these models to six salmon fisheries that encompass a broad geographic range and a variety of harvesting methods and species, we find that the majority of these fisheries have experienced reduced catch diversity through time and increasing benefits of specialization on mean individual revenues, opposite of what theory predicts. One factor that has been hypothesized to reduce catch diversity in salmon fisheries is large-scale hatchery production. While our results suggest negative correlations between hatchery returns and catch diversity for some fisheries, we find little evidence for a change in variability of annual catches associated with increased hatchery production.

We find that individuals participating in Alaska salmon fisheries do not always benefit from targeting a diverse catch portfolio. Fishers have some control over their own distribution of effort in space and time, but are also affected by a number of external factors including demand, prices offered by processors, and fluctuations in fish abundance. Life history variation of the species targeted may also play a role. Individuals participating in Alaskan fisheries with high contributions of pink salmon --- which have the shortest life cycles of all Pacific salmon --- also have the highest variability in year-to-year revenue.

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Lessons from the First Generation of Marine Ecological Forecast Products

By Payne MR, Hobday AJ, MacKenzie BR, Tommasi D, Dempsey DP, Fässler SMM, Haynie AC*, Ji R, Liu G, Lynch PD, Matei D, Miesner AK, Mills KE, Strand KO and Villarino E.

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Recent years have seen a rapid expansion in the ability of earth system models to describe and predict the physical state of the ocean. Skilful forecasts ranging from seasonal (3 months) to decadal (5–10 years) time scales are now a reality. With the advance of these forecasts of ocean physics, the first generation of marine ecological forecasts has started to emerge. Such forecasts are potentially of great value in the management of living marine resources and for all of those who are dependent on the ocean for both nutrition and their livelihood; however, this is still a field in its infancy. We review the state of the art in this emerging field and identify the lessons that can be learnt and carried forward from these pioneering efforts. The majority of this first wave of products are forecasts of spatial distributions, possibly reflecting the inherent suitability of this response variable to the task of forecasting. Promising developments are also seen in forecasting fish-stock recruitment where, despite well-recognized challenges in understanding and predicting this response, new process knowledge and model approaches that could form a basis for forecasting are becoming available. Forecasts of phenology and coral-bleaching events are also being applied to monitoring and industry decisions. Moving marine ecological forecasting forward will require striking a balance between what is feasible and what is useful. We propose here a set of criteria to quickly identify "low-hanging fruit" that can potentially be predicted; however, ensuring the usefulness of forecast products also requires close collaboration with actively engaged end-users. Realizing the full potential of marine ecological forecasting will require bridging the gaps between marine ecology and climatology on the one-hand, and between science and end-users on the other. Nevertheless, the successes seen thus far and the potential to develop further products suggest that the field of marine ecological forecasting can be expected to flourish in the coming years.

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Climate Change and Location Choice in the Pacific Cod Longline Fishery

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Pacific cod is an economically important groundfish that is targeted by trawl, pot, and longline gear in waters off Alaska. An important sector of the fishery is the "freezer longliner" segment of the Bering Sea which in 2008 accounted for $220 million of the Pacific cod first wholesale value of $435 million. These vessels are catcher/processors, meaning that fish caught are processed and frozen in a factory onboard the ship.

A dramatic shift in the timing and location of winter season fishing has occurred in the fishery since 2000. This shift is related to the extent of seasonal sea ice, as well as the timing of its descent and retreat. The presence of winter ice cover restricts access to a portion of the fishing grounds. Sea ice also affects relative spatial catch per unit effort by causing a cold pool (water less than 2°C that persists into the summer) that Pacific cod avoid. The cold pool is larger in years characterized by a large and persistent sea ice extent. Finally, climate conditions and sea ice may have lagged effects on harvesters' revenue through their effect on recruitment, survival, total biomass, and the distribution of size and age classes. Different sizes of cod are processed into products destined for district markets. The availability and location of different size classes of cod, as well as the demand for these products, affects expected revenue and harvesters' decisions about where to fish.

Understanding the relationship between fishing location and climate variables is essential in predicting the effects of future warming on the Pacific cod fishery. Seasonal sea ice is projected to decrease by 40% by 2050, which will have implications for the location and timing of fishing in the Bering Sea Pacific cod longline fishery. Our research indicates that warmer years have resulted in lower catch rates and greater travel costs, a pattern which we anticipate will continue in future warmer years. This manuscript is being revised and will be submitted to a scientific journal.

Using vessel monitoring data to evaluate fisheries management actions in the Gulf of Mexico

By Larry Perruso, Alan Haynie*, Jordan Watson, Jim Sanchirico, Steve Murawski, Patrick J. Sullivan, Franz J. Mueter, Shay O'Farrell, Andrew Strelcheck, I. Chollett, M.Cockrell

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In the Gulf of Mexico reef fish fisheries, management impacts behavior on a fine spatial scale. Until recently, there has been a very limited amount of fine-scale information available. The spatial economics toolbox for fisheries (FishSET) has made this a national priority, working to integrate economic data with vessels monitoring system (VMS) data to enable the evaluation of a variety of management actions on reef fish fisheries. Part of the project has focused on modeling the VMS data to determine where and when fishing is occurring for the vast majority of fishing trips which are unobserved. Another component is utilizing these data to understand where vessels most concentrate their fishing effort, how this is impacted by management actions such as catch shares and bycatch closures and environmental events (e.g., oil spills and hurricanes). Collaboration is also ongoing with stock assessment scientists to integrate these information into stock assessments.

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Assessing the Economic Impacts of 2011 Steller Sea Lion Protective Measures in the Aleutian Islands

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One of the primary challenges to fisheries management in Alaska continues to be protecting the endangered Western stock of Steller sea lions. For more than 20 years, regulations have restricted fishing effort in the Aleutian Islands, Bering Sea, and Gulf of Alaska. In 2011, additional measures were implemented that further restricted fishing in the Aleutians because of concern that fishing there is harming the SSL population. This research is an assessment of the costs the recent 2011 protection measures in the Aleutians generated in affected fisheries. The project is underway and will be completed in early 2015 and a manuscript will be submitted to a scientific journal.

Because regulations have been sequentially implemented over more than two decades, the reference point is not the native state of the fishery, but rather the years prior to 2011. In 2008 Amendment 80 (A80) created cooperatives that granted catch shares to vessels based on individual catch history. Comparing this fishery in the period after the implementation of A80 and before the 2011 SSL measures, with the period since the implementation of the 2011 measures is likely to give the best assessment of impacts on this fishery. Spatial data will be utilized for earlier periods to inform analysts of the value of fishing in different areas that were closed by earlier actions.

For several reasons, the impacts on A80 vessels are expected to be most comprehensively calculable relative to other fishing fleets. First, economic data reports (EDR) and 100-percent observer coverage are available for the fishery since 2008. Second, considerable spatial analysis of the A80 fishery has been conducted in previous research (Abbott, Haynie, and Reimer 2014).

Using a variety of statistical and econometric techniques, fishing behavior, production, and revenue will be examined for the years prior to, and following, the implementation of the SSL protective measures. The actual alternative fishing actions of the vessels affected by the SSL actions will be carefully assessed so that a net cost rather than gross impact of the management action is estimated. Additionally, the amount of effort that is re-allocated to the Bering Sea and Gulf of Alaska as a result of the 2011 actions will be estimated. This information will provide insight into whether this shift in effort is likely to have adversely impacted the vessels that have historically fished primarily or only in the Bering Sea. A manuscript is under peer review at a journal.

Using Vessel Monitoring System (VMS) Data to Identify and Characterize Trips made by Bering Sea Fishing Vessels

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Catch per unit effort (CPUE) is among the most common metrics for describing commercial fisheries. However, CPUE is a relatively fish-centric unit that fails to convey the actual effort expended by fishers to capture their prey. By resolving characteristics of entire fishing trips, in addition to their CPUE, a broader picture of fishers' actual effort can be exposed. Furthermore, in the case of unobserved fishing, trip start and end times may be required in order to estimate CPUE from effort models and landings data. In this project, we utilize vessel monitoring system (VMS) data to reconstruct individual trips made by catcher vessels in the Eastern Bering Sea fishery for walleye pollock (Gadus chalcogrammus) from 2003 – 2013. Our algorithm implements a series of speed, spatial and temporal filters to determine when vessels leave and return to port. We then employ another set of spatial filters and a probabilistic model to characterize vessel trips as fishing versus non-fishing. Once trips are identified and characterized, we summarize the durations of trips and the distances traveled - metrics that can be subsequently used to characterize changes in fleet behaviors over time. This approach establishes a baseline of trip behaviors and will provide an improved understanding of how fisheries are impacted by management actions, changing economics, and environmental change. A publication on trip-identification algorithm was published in *PLOS ONE* in 2016 and an additional manuscript is being revised for resubmission to a peer-reviewed journal.

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Using Vessel Monitoring System Data to Estimate Spatial Effort in Bering Sea Fisheries for Unobserved Trips

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A primary challenge of marine resource management is monitoring where and when fishing occurs. This is important for both the protection and efficient harvest of targeted fisheries. Vessel monitoring system (VMS) technology records the time, location, bearing, and speed for vessels. VMS equipment has been employed on vessels in many fisheries around the world and VMS data has been used in enforcement, but a limited amount of work has been done utilizing VMS data to improve estimates of fishing activity. This paper utilizes VMS and an unusually large volume of government observer-reported data from the United States Eastern Bering Sea pollock fishery to predict the times and locations at which fishing occurs on trips without observers onboard. We employ a variety of techniques and specifications to improve model performance and out-of-sample prediction and find a generalized additive model that includes speed and change in bearing to be the best formulation for predicting fishing. We assess spatial correlation in the residuals of the chosen model, but find no correlation after taking into account other VMS predictors. We compare fishing effort to predictions for vessels with full observer coverage for 2003-2010 and compare predicted and observer-reported activity for observed trips. In this project, we have worked to address challenges that result from missing observations in the VMS data, which occur frequently and present modeling complications. We conclude with a discussion of policy considerations. Results of this work will be published in a scientific journal. We are also working with the NMFS Alaska Regional Office to attempt to improve the Region's spatial effort database and we will extend the model to other fisheries.

Forecast Effects of Ocean Acidification on Alaska Crab and Groundfish Fisheries

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Coastal regions around Alaska are experiencing the most rapid and extensive onset of ocean acidification (OA) compared to anywhere else in the United States (Mathis et al. 2015). Assessing future effects of OA is inherently a multi-disciplinary problem that requires models to combine methods from oceanography and fisheries science with the necessary linkages to assess socio-economic impacts. NOAA's Alaska Fisheries Science Center (AFSC) and Pacific Marine Environmental Laboratory (PMEL) collaborate to form the Alaska Ocean Acidification Enterprise. This collaboration combines the scientific disciplines of chemical and biological oceanography, fish and crab physiology, and population and bioeconomic modeling. By integrating observational data with species response studies, OA forecast models, and human impact assessments, it has been determined that Alaska coastal communities and the vast fisheries that support them have varying degrees of vulnerability to OA, ranging from moderate to severe. By linking multistage population dynamics and bioeconomic models, Punt et al. (2014) made a significant contribution to the multi-disciplinary approach for OA models. According to Cooley et al. (2015): "detailed policy-relevant information about the relative effects of ocean acidification, rising temperatures, fishing pressure, and socioeconomic factors on specific species has yet to be developed for most species, with a few notable exceptions" and noted Punt et al. (2014) "linked population and bioeconomic models to project ocean acidification impacts on the Alaskan king crab fishery, providing both management insight and rationale for future studies." Moreover, results in Punt et al. (2014) were extended to consider the cumulative effects of projected changes in the Bristol Bay red king crab fishery on Alaska's economy (Seung et al. 2015).

The AFSC ocean acidification research plan for 2018-20 is currently available (Sigler et al. 2017). The AFSC workplan for 2018-20 includes a project that will reconfigure, and link, existing crab bioeconomic models for Bristol Bay red king crab (*Paralithodes camtschaticus*), and Eastern Bering Sea snow (*Chionoecetes bairdi*) and Tanner (*Chionoecetes opilio*) crabs (Punt et al. 2016), by developing a new multispecies bioeconomic model to simultaneously evaluate the combined cumulative impacts of OA on the crab fisheries off the coast of Alaska. This project will follow the approach of Cooley et al. (2015) by utilizing a one-way linkage for the ocean model component, and by applying current climate scenarios. In addition, a new single-species bioeconomic model with population dynamics for northern rock sole (*Lepidopsetta polyxystraa*) in the eastern Bering Sea and Gulf of Alaska will be developed based on the experimental results in Hurst et al. (2016).

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Catch Shares Programs and Quota Markets

What Lessons Do Non-Fisheries Tradable Permit Programs Have for the Alaska Halibut Catch Sharing Plan?

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To address long-standing allocation conflicts between the Pacific halibut commercial fishing sector and recreational charter (for-hire) sector in Alaska, an Alaska halibut catch sharing plan (CSP) was implemented in 2014 that has a provision allowing the leasing of commercial individual fishing quota to recreational charter businesses. This one-way inter-sectoral trading allows for the charter sector to increase its share of the total allowable catch while compensating commercial fishermen. In this work, we examine the literature on non-fisheries tradable permit programs (TPPs) that have similarities to the Alaska halibut CSP program. Several successful TPPs are discussed, including ones from emissions trading programs, water quality trading programs, water markets, and transferable development rights programs. They are then evaluated in terms of their similarities and differences to the Alaska CSP program. Characteristics not part of the current CSP that other TPPs have used and that may increase the likelihood for the CSP to be effective in achieving its primary goals (if they are implemented) are identified, such as allowing more flexible transfers (e.g., internal transfers), intertemporal banking, cooperative structures, and multi-year leasing. The paper (Call and Lew 2015) has been published in *Marine Policy.*

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Understanding Charter Halibut Permit Holders’ Preferences, Attitudes, and Behavior Under the Alaska Halibut Catch Sharing Plan

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The Alaska charter boat sector has undergone significant change in recent years due, at least in part, to regulatory changes in the management of the Pacific halibut sport fishery. To control growth of the charter sector in the primary recreational charter boat fishing areas off Alaska, a limited entry program was implemented in 2011 (75 Federal Register 554). In addition, in the past several years, charter vessel operators in Southeast Alaska (International Pacific Halibut Commission [IPHC] Area 2C) and Southcentral Alaska (Area 3A) have been subject to harvest controls that impose both size and bag limits on the catch of Pacific halibut on guided fishing trips, with these limits being more restrictive than the regulations for non-guided trips (e.g., 78 Federal Register 16425). Most recently, a Halibut Catch Sharing Plan (CSP) was implemented during 2014 that formalizes the process (a) of allocating catch between the commercial and charter sector and (b) for evaluating changes to harvest restrictions (78 FR 75843). Importantly, the CSP allows leasing of commercial halibut individual fishing quota (IFQ) by eligible charter businesses. Leased halibut IFQ (called guided angler fish, or GAF) could then be used by charter businesses to relax harvest restrictions for their angler clients, since GAF fish would not be subject to the charter sector-specific size and bag limits that may be imposed—though the non-charter sector size and bag limit restrictions (currently two fish of any size per day) would still apply to charter anglers individually.

Under the initial rules for the IFQ leasing program, henceforth the GAF leasing program, several restrictions are placed on the use of GAF, including the following:

1. **Single-season use**. GAF must be used before the end of the season for which it is leased, with automatic returns if the GAF is unused by a certain date (15 days before the end of the commercial fishing season).

2. **No transfers.** GAF can't be transferred between CHP holders during the season.

The restrictions listed above are features that are sometimes relaxed in other IFQ (or, more generally, tradable permit) programs to increase flexibility for participants. Recent research has shown that the restrictions imposed on transfers within IFQ markets can have significant effects on economic efficiency and other goals (e.g., Kroetz et al. 2015).

To inform decision makers about the likely impacts of relaxing program features such as those above, as well as other programs that may be considered by the North Pacific Fishery Management Council (Council), AFSC developed and implemented a survey that collects data from eligible participants in the IFQ leasing market to determine their attitudes towards, and behavior in, the lease market and attitudes and preferences towards alternative programs. The survey was developed during 2013 and 2014 with input from staff from the Council, NMFS Alaska Region, and ADF&G, and was qualitatively pretested with members from the target population (Alaska charter halibut permit holders). It was implemented in 2015, and the data are summarized in a NOAA Technical Memorandum (Lew et al. 2016).

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The Impact of Access Restrictions on Fishery Income Diversification of US West Coast Fishermen

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Access to most fisheries on the US West Coast was essentially open prior to the mid-1970s when state licenses were first limited for salmon fisheries. Subsequently, licenses to most fisheries on the West Coast have been limited, and the numbers of licenses in many fisheries have been reduced with buyback programs. More recently, catch share programs, which dedicate exclusive shares of catch to individuals or cooperatives, have been introduced in several sectors of the federally managed Pacific groundfish fishery. As access to fisheries has become more restricted, revenue diversification of West Coast fishing vessels has generally declined. This is a source of concern, since diversification has been shown to reduce year-to-year variation in revenue and thus financial risk (Kasperski and Holland, 2013). However, catch share programs may create more security and stability in vessels' landings which may offset effects of less diversification.

Our results show that vessels that entered West Coast fisheries later are, on average, less diversified than those which entered earlier, but diversification declined even for the fleet of vessels active since 1981. Diversification declined further following implementation of catch share programs on the West Coast. However, year-to-year variation in revenue decreased post-catch share for the majority of vessels, including those who exited the catch share fisheries, and in most of the catch share fisheries, a majority of vessels received increases in average revenues in the years following the catch share implementation. Overall, our results suggest that there may be a tradeoff between the efficiency gains enabled by restricting access and the risk reduction benefits associated with greater diversification. A manuscript describing this project was published in 2016 in *Coastal Management* (Holland and Kasperski, 2016).

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Impact of catch shares on diversification of fishers' income and risk

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Many fishers diversify their income by participating in multiple fisheries which has been shown to significantly reduce year-to-year variation in income (Kasperski and Holland, 2013). The ability of fishers to diversify has become increasingly constrained in the last few decades, and catch share programs could further reduce diversification as a result of consolidation (Holland and Kasperski, 2016). This could increase income variation and thus financial risk. However, catch shares can also offer fishers opportunities to enter or increase participation in catch share fisheries by purchasing or leasing quota. Thus the net effect on diversification is uncertain.

In this study, we test whether diversification and variation in fishing revenues changed after implementation of catch shares for 6,782 vessels in 13 U.S. catch share fisheries that account for 20% of US landings revenue. For each fishery in our study, we identify all vessels that were active in the fishery in the years leading up to implementation of the catch share program and identify subgroups of vessels that (a) continued to be active in the catch share fishery, or (b) exited the catch share fishery but participated in at least one other fishery. For each fishery subgroup, we evaluate whether vessel-level diversification changed after catch shares and whether that change can be distinguished from pre-existing trends. We find that diversification for both groups was nearly always reduced. However, in most cases we found no significant change in inter-annual variation of revenues and, where changes were significant, variation decreased nearly as often as it increased.

For Alaska, we observed statistically significant decreases in diversification for all vessel groups in our catch share fisheries with the exception of Central GOA Rockfish Program active catcher vessels, active catcher/processors, and catcher/processors that have exited that fishery, which did not have a statistically significant change. The results for tests of significant changes in annual revenue variation (as measured by the coefficient of variation in revenues), was mixed. American Fisheries Act (AFA) pollock catcher vessels and catcher/processors both experienced a statistically significant decline in annual revenue variation post-AFA, while the Amendment 80 fishery has experienced a statistically significant increase in revenue variability since program implementation. Bering Sea and Aleutian Islands crab rationalization vessels experienced an increase in revenue variability by one measure (paired t-test) but not another (Wilcoxon signed rank test). All other vessel groups did not have a statistically significant change in annual revenue variability pre/post catch shares in the study.

A manuscript describing this project was published in 2017 in the *Proceedings of the National Academies of Science* (Holland et al., 2017).

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Understanding the factors underlying the movement of quota shares in the halibut and sablefish IFQ fisheries

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The North Pacific Fishery Management Council recently finalized the first comprehensive review of the Pacific Halibut and Sablefish IFQ Program (NPFMC/NMFS 2016). The review showed that QS holdings have moved between rural Alaska communities based on access to transportation, which is key to moving product to the increasingly fresh market for halibut. Based on findings from the review and subsequent discussion, the Council proposed that its IFQ Committee consider several specific issues with respect to the IFQ Program, including:

- Impacts of quota share loss on Alaska's rural communities and further exploration of the geographic distribution of quota ownership. Additionally, define rural communities by several population sizes (such as 1,500, 2,500 and 7,500) to better understand how population dynamics have resulted in different outcomes for rural community IFQ participation. This could also include examining the impacts on Alaska communities by region.

- Geographical distribution of new entrant quota ownership.

This study directly examines these issues by assessing the factors that underlie participants' decisions to both buy and sell quota shares in the Pacific halibut and sablefish IFQ fisheries. We are examining the probability of buying and selling quota shares as a factor of the characteristics of the participant, including attributes of their community of residence such as population (utilizing the rural designation cutoffs highlighted by the Council), access to transportation, and availability of local halibut/sablefish buyers, as well as attributes of the quota shares (vessel class, area, blocked/unblocked). This research updates and extends a study that was conducted by researchers after the first five years of the IFQ Program, which showed that even when controlling for age effects of the individual and population effects of their community of residence there were still differences between buyers and sellers attributable to residency in small, medium, and large rural fishing communities in Alaska (Carothers, Lew, and Sepez 2010).

In addition, this study applies social network analysis to examine any trends in how participants buy and sell quota shares over time. Utilizing social network analysis, we assess the density of quota share networks and changes to their structure over time, whether there is any evidence of homophily (sellers and buyers being alike in terms of some characteristic that may result in the exclusion of those who are different), and how new buyers enter the fishery.

This study is currently in progress and will contribute to managers' understanding of how quota share sales and access to the IFQ fisheries have changed over time.

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Models with Interactions Across Species

Linking ecosystem processes to communities of practice through commercially fished species in the Gulf of Alaska

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Marine ecosystems are complex, and there is increasing recognition that environmental, ecological and human systems are linked inextricably in coastal regions. The purpose of this study was to integrate environmental, ecological and human dimensions information important for fisheries management into a common analytical framework. We used qualitative network modeling as the framework and then used it to examine the linkages between these traditionally separate subject areas. We focused on synthesis of linkages between the Gulf of Alaska marine ecosystem and human communities of practice, defined as different fisheries sectors. Our specific objective was to document the individual directional linkages among environmental, ecological, and human dimensions variables in conceptual models, then build qualitative network models to perform simulation analyses to test how bottom-up and top-down perturbations might propagate through these linkages.

We found that it is both possible and beneficial to integrate environmental, ecological, and human dimensions information important for fisheries into a common framework. First, the conceptual models allowed us to synthesize information across a broad array of data types, representing disciplines such as ecology and economics that are more commonly investigated separately, often with distinct methods. Second, the qualitative network analysis demonstrated how ecological signals can propagate to human communities, and how fishery management measures may influence the system. Third, we found that incorporating multi-species interactions changed outcomes because the merged model reversed some of the ecological and human outcomes compared to single species analyses. Overall, we demonstrated the value of linking information from the natural and social sciences to better understand complex social-ecological systems, and the value of incorporating ecosystem-level processes into a traditionally single species management framework. We advocate for conceptual and qualitative network modelling as efficient foundational steps to inform ecosystem-based fisheries management.

A manuscript summarizing the results of this study was recently published in the ICES Journal of Marine Science (Zador et al. 2017).

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Economic Analysis of Ecosystem Tradeoffs

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Principle 4 in the NOAA Fisheries Ecosystem Based Fisheries Management (EBFM) Roadmap is to explore and address tradeoffs within an ecosystem. This project analyzes ecosystem tradeoffs that are represented by bioeconomic reference points. Maximum sustainable yield (MSY) is the most important biological reference point in single-species fisheries management. However, tradeoffs exist in achieving MSY with predator-prey relationships and other ecological factors. In this project, the definition of multi-species MSY is based on the production possibility frontier (PPF) in economics which is the classical graphical representation of tradeoffs between two (or more) goods because these show how production of one good can be increased only by diverting resources from and foregoing some of the other good. This project will derive PPFs based on predator-prey relationships in the Aleutian Islands from a bioenergetic food web model (Tschirhart 2000), and from the classical Lotka-Volterra model (Larkin 1966) applied to a 3-species system with Pacific cod, arrowtooth flounder, and walleye pollock in the Bering Sea (Kasperski 2015). Results from this project will be available for consideration as part of the Bering Sea Fishery Ecosystem Plan process.

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Regional Economic Modeling

Collecting Borough and Census Area Level Data for Regional Economic Modeling of Alaska Fisheries

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Using the data collected via a survey, we have generated nine social accounting matrices (SAMs) for nine regions including six Southwest Alaska boroughs and census areas (BCAs, including Aleutians West Census Area, Aleutians East Borough, Lake and Peninsula Borough, Bristol Bay Borough, Dillingham Census Area, and Kodiak Island Borough), the rest of Alaska, West Coast, and the rest of US. Based on these nine SAMs, a preliminary version of nine-region multiregional social accounting matrix (MRSAM) was constructed. This MRSAM is in industry (vessel sectors) by commodity (species) format. Another version of the MRSAM, where species-specific productions functions are specified, is also under construction. In addition, because these two versions of MRSAM lack information about the activities of the at-sea sector (catcher processors and motherships), we will assemble the data for the sector, and add the sector as a separate region in the MRSAMs, making the resulting the MRSAMs ten-region MRSAMs. Construction of the MRSAMs with at-sea sector will be completed by June, 2019. A tech memo describing the procedures to construct the MRSAMs will be also written. Development of regional economic models based on these MRSAMs will follow.

Assessing alternative management strategies for eastern Bering Sea walleye pollock Fishery with climate change

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Recent studies indicate that rising sea surface temperature (SST) may have negative impacts on eastern Bering Sea walleye pollock stock productivity. A previous study (Ianelli et al. 2011) developed projections of the pollock stock and alternative harvest policies for the species, and examined how the alternative policies perform for the pollock stock with a changing environment. The study, however, failed to evaluate quantitative economic impacts. The present study showcases how quantitative evaluations of the regional economic impacts can be applied with results evaluating harvest policy trade-offs; an important component of management strategy evaluations. In this case, we couple alternative harvest policy simulations (with and without climate change) with a regional dynamic computable general equilibrium (CGE) model for Alaska. In this example we found (i) that the status quo policy performed less well than the alternatives (from the perspective of economic benefit), (ii) more conservative policies had smaller regional output and economic welfare impacts (with and without considering climate change), and (iii) a policy allowing harvests to be less constrained performed worse in terms of impacts on total regional output, economic welfare, and real gross regional product (RGRP), and in terms of variability of the pollock industry output. The results of this project are summarized in Seung and Ianelli (2017), which is currently under review / revision at a peer-reviewed journal.

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Optimal Growth of Alaska's Groundfish Economy and Optimum Yield Limits in the Bering Sea and Gulf of Alaska

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This project is joining the Ramsey optimal growth model from macroeconomics, calibrated to data from the Alaska Social Accounting Matrix (AKSAM), with harvest production functions and stock dynamics of the Schaefer model, based on Mueter and Megrey's (2006) multi-species surplus production models for groundfish complexes in the Bering Sea and Gulf of Alaska. Optimal growth represents an extension of benefits of fish consumption to the whole economy, compared to maximum economic yield (MEY), in the traditional Gordon-Schaefer bioeconomic model, which is based solely on fish sector profits and is not a true welfare measure. Since MEY ignores costs and benefits in the macroeconomy, optimal growth is generally superior to MEY in terms of social welfare. The new economic growth model currently estimates steady state optimal growth of Alaska's economy is achieved with an optimum yield limit of 1.8 million metric tons in the Bering Sea/Aleutian Islands, and 294 thousand metric tons in the Gulf of Alaska. Mueter and Megrey's estimates for effects on surplus production of the Pacific Decadal Oscillation (PDO) in the Bering Sea/Aleutian Islands, and sea bottom temperatures at the oceanographic station GAK1 in the Gulf of Alaska, are included to measure impacts of Pacific climate variability on Alaska's economy.

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Measuring the Economic Contribution of the Marine Recreational Charter Fishing Sector Using a Resampling Approach

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Policy makers and stakeholders often desire information on the economic impact of fishing, which is frequently measured through its contribution to the economy using regional economic impact models. The variance of fishery-related economic contribution estimates is seldom calculated but can improve the quality of policy information. In this study, we illustrate a resampling-based approach for calculating standard errors of contribution estimates within a social accounting matrix (SAM) model with inputs calculated from survey data with missing data. We estimate the contribution of the saltwater recreational charter fishing industry in Alaska to the economy for 2011-2013 and 2015. Statistical tests are then conducted to assess differences between estimates across the years. Of the years studied, the total output (sales) from the Alaska saltwater charter fishing industry in Alaska was found to be (statistically) largest in 2011 ($269 million in 2013 dollars) and lowest in the next year, 2012 (about $175 million in 2013 dollars). Subsequently, the total output increased in 2013 and again in 2015.

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Socioeconomic, Cultural and Community Analyses

The Regional and Community Size Distribution of Fishing Revenues in the North Pacific

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The North Pacific fisheries generate over $4 billion in first wholesale revenues annually. However, the analysis supporting management plans focuses on describing the flow of these monies through each fishery (e.g., NOAA AFSC 2016), rather than across the individual cities and states in which harvesters live and spend their fishing returns. In the last two decades North Pacific fisheries have undergone a series of management changes aimed at ensuring healthy and sustainable profits for those participating in harvesting and processing, and healthy fish stocks. The formation of effective cooperatives and rationalization programs that have been designed by harvesters and processors support an economically successful industry. However, a variety of narratives have emerged about the distributional effects of these management changes, and in particular their effects on the participation of people in coastal communities in the North Pacific.

Previous work has adopted a variety of perspectives to establish the effects of a changing fishing industry in the North Pacific. Carothers (2008) focuses on individual communities in the Aleutian islands and argues that shifts in the processing industry, away from small canneries in strongly place-identified communities, are exacerbated by rationalization that monetizes historical fishing access and draws fishing activity out of small communities when fishermen fall under duress. Carothers et al. (2010) adopts a state-wide perspective on a single fishery, and finds that small fishing communities as a category were more likely to divest of halibut IFQ in the years immediately following the creation of the program. Sethi et al. (2014) propose a suite of rapid assessment community-level indicators that integrate across fisheries, and identify that Alaskan communities are affected by trends of reduced fishery participation and dependence, characterized by fewer fishermen who participate in fewer fisheries and growth in other sectors of the economy during 1980-2010. However, they also observe that this effect is primarily distributional, as total fishing revenues within communities are stable and increasing.

This study contributes by providing a regional overview of the benefits from North Pacific fishing, looking beyond the changes in any particular community or any particular fishery. It seeks to describe the regions to which revenues from North Pacific fisheries are accruing, whether that distribution has changed significantly over the last decade, and how any changes might be caused or affected by management. This is important because managers or stakeholders may have preferences over the distribution of benefits within their jurisdiction, and while the movement of fishing activity out of communities is frequently the focus of academic and policy research, research focusing on single communities often does not follow where those benefits go. Of particular interest is whether movement of North Pacific fishery revenues is dominated by movement within coastal Alaska, or primarily shifts away from coastal communities to other regions outside of Alaska. A manuscript describing this project is currently under AFSC review.

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Tools to Explore Alaska Fishing Communities

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Community profiles have been produced for fishing communities throughout the state of Alaska in order to meet the requirements of National Standard 8 of the Magnuson-Stevens Act and provide a necessary component of the social impact assessment process for fisheries management actions. These profiles provide detailed information on elements of each fishing community, including location, demographics, history, infrastructure, governance, facilities, and involvement in state and federal fisheries targeting commercial, recreational and subsistence resources. A total of 196 communities from around Alaska were profiled as part of this effort.

However, these profiles are static and require manual updates as more recent data become available. In order to address this in a more effective way, social scientists in the AFSC Economic and Social Science Research Program have developed two web-based tools to provide the public with information on communities in Alaska: fisheries data maps and community snapshots. There are three distinct fisheries data maps providing a time series on community participation in commercial, recreational, and subsistence fishing. The community snapshots take the pulse of Alaskan fishing communities using information about their fishing involvement and demographic characteristics. Each snapshot provides information on:

- What commercial species are landed and processed in the community;
- The number of crew licenses held by residents;
- The characteristics of fishing vessels based in the community;
- Processing capacity
- Participation in recreational fishing (including both charter businesses and individual anglers);
- Subsistence harvesting dependence;
- Demographic attributes of the community (including educational attainment, occupations by industry, unemployment, median household income, poverty, median age, sex by age, ethnicity and race, and language and marginalization);
- Social vulnerability indices (These indices represent social factors that can shape either an individual or community's ability to adapt to change. These factors exist within all communities regardless of the importance of fishing. The indices include: Poverty, Population Composition, Personal Disruption, and Housing Disruption.); and
- Fishing engagement and reliance indices (These indices portray the importance or level of dependence of commercial or recreational fishing to coastal communities. The indices include: Commercial Engagement, Commercial Reliance, Recreational Engagement and Recreational Reliance

These web-based tools are updated as new data become available and currently include the years in parentheses below.

To access the community profiles; go to: *http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/CPU.php*

To access the community snapshots (available for years 2000-2015); go to: *http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communitysnapshots/main.php*

To access the commercial fisheries data maps (available for years 2000-2014); go to: *http://www.afsc.noaa.gov/maps/ESSR/commercial/default.htm*

To access the recreational fisheries data maps (available for years 1998-2014); go to: *http://www.afsc.noaa.gov/maps/ESSR/recreation/default.htm*

To access the subsistence fisheries data maps (available for years 2000-2008); go to: *http://www.afsc.noaa.gov/maps/ESSR/subsistence/default.htm*

Developing Comparable Socio-economic Indices of Fishing Community Vulnerability and Resilience for the Contiguous US and Alaska

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The ability to understand the vulnerability of fishing communities is critical to understanding how regulatory change will be absorbed into multifaceted communities that exist within a larger coastal economy. Creating social indices of vulnerability for fishing communities provides a pragmatic approach toward standardizing data and analysis to assess some of the long term effects of management actions. Over the past several years, social scientists working in NOAA Fisheries' Regional Offices and Science Centers have been engaged in the development of indices for evaluating aspects of fishing community vulnerability and resilience to be used in the assessment of the social impacts of proposed fishery management plans and actions (Colburn and Jepson, 2012; Himes-Cornell and Kasperski, 2015). These indices are standardized across geographies, and quantify conditions which contribute to, or detract from, the ability of a community to react positively towards change. National-level indicators for all U.S. coastal communities can be found using the "Explore the Indicator Map" link from the main NMFS social indicators webpage here: *http://www.st.nmfs.noaa.gov/humandimensions/social-indicators/*.

The Alaska Fisheries Science Center (AFSC) has compiled socio-economic and fisheries data for over 300 communities in Alaska and developed developed indices specific to Alaska communities (Himes-Cornell and Kasperski, 2016) using the same methodology as Jepson and Colburn (2013). To the extent feasible, the same sources of data are being used in order to allow comparability between regions. However, comparisons indicated that resource, structural and infrastructural differences between the NE and SE and Alaska require modifications of each of the indices to make them strictly comparable. The analysis used for Alaska was modified to reflect these changes. The data are being analyzed using principal components factor analysis (PCFA), which allows us to separate out the most important socio-economic and fisheries related factors associated with community vulnerability and resilience in Alaska within a statistical framework.

These indices are intended to improve the analytical rigor of fisheries Social Impact Assessments, through adherence to National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act, and Executive Order 12898 on Environmental Justice in components of Environmental Impact Statements. Given the often short time frame in which such analyses are conducted, an advantage to this approach is that the majority of the data used to construct these indices are readily accessible secondary data and can be compiled quickly to create measures of social vulnerability and to update community profiles.

Although the indices are useful in providing an inexpensive, quick, and reliable way of assessing potential vulnerabilities, they often lack external reliability. Establishing validity on a community level is required to ensure indices are grounded in reality and not merely products of the data used to create them. However, achieving this requires an unrealistic amount of ethnographic fieldwork once time and budget constraints are considered. To address this, a rapid and streamlined groundtruthing methodology was developed to confirm external validity from a set of 13 sample communities selected based on shared characteristics and logistic feasibility (Himes Cornell, et al. 2016). This qualitative data was used to test the construct validity of the quantitative well-being indices. Specifically, this methodology used a test of convergent validity: in theory, the quantitative indices should be highly correlated with the qualitative measure. This comparison helps us understand how well the estimated well-being indices represent real-world conditions observed by researchers. Study findings suggest that some index components exhibit a high degree of construct validity based on high correlations between the quantitative and qualitative measures, while other components will require refinement prior to their application in fisheries decision-making. Further, the results provides substantial evidence for the importance of groundtruthing quantitative indices so they may be better calibrated to reflect the communities they seek to measure.

In a further attempt to groundtruth the social indicators, we utilized ethnographic data collected from 13 representative communities and a capital assets framework to groundtruth the indicators, in which qualitative ranks of vulnerability were compared against quantitative indices (Levoie et al. 2017). The majority (71.5%) of ranks were in complete or moderate agreement and the results indicate that most of the indices are reliable; yet some variables utilized to create the indices could be modified to better reflect realities in Alaska. Indices of commercial fishery engagement and reliance appeared to be more reliable than socio-economic indicators, particularly for smaller fishing communities. Utilization of the capital assets framework also confirmed the indices do not capture social, political, or ecological factors that affect levels of community vulnerability. Cost of living, lack of employment opportunities, reliance on subsistence resources, loss of fishery permits, and out-migration are central concerns across Alaska fishing communities affecting their well-being. We conclude that quantitative indices of community vulnerability are useful rapid assessment tools; however, they should be validated, and complemented with ethnographic data prior to their implementation as policy making and management tools.

Groundtruthing the results using this type of methodology will facilitate use of the indices by the AFSC, NOAA's Alaska Regional Office, and the North Pacific Fishery Management Council staff to analyze the comparative vulnerability of fishing communities across Alaska to proposed fisheries management regulations, in accordance with NS8. This research will provide policymakers with an objective and data driven approach to support effective management of North Pacific fisheries.

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Fishing family dynamics and gender in Alaska fisheries

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National Standard 8 (NS8) of the Magnuson-Stevens Act requires that the design and evaluation of management policies take into account the impact of management changes on fishing communities. Although fishing family dynamics are an important component of understanding how fishing communities are affected by changing regulations, this dimension of fishing community impacts has received relatively minimal study. Similarly, NMFS guidelines for social impact assessments (SIAs) emphasize the necessity of examining impact equity of potential management changes on vulnerable and under-represented groups based on, for example, gender; yet distributional impacts of fisheries management on women are poorly understood and often unrecognized altogether (Calhoun, Conway, and Russell, 2016; Harper et al. 2013). Furthermore, these impacts may be incremental, synergistic, or occur over a time horizon that is more aligned with long-term research than with SIAs. This study combines considerations of impacts on fishing families and women by examining fishing family dynamics, gender labor divisions, and gendered impacts of management programs in Alaska, addressing critical knowledge gaps and both NS8 and SIA requirements.

This study builds on current efforts at the AFSC to examine these issues, including focus group workshops that have been hosted with fisheries stakeholders and preliminary analysis of female quota shareholders in the halibut/sablefish IFQ fisheries. This study is also a collaborative partnership with Sarah Marrinan, a NPFMC economist, who is cohosting the workshops and contributing to this research. The first two of these workshops were held at the June 2017 NPFMC meeting in Juneau, Alaska and on September 1, 2017 in Homer, Alaska.

The intersection of social gender norms and commercial fisheries often occurs within fishing families. Participants of the June 2017 workshop noted that gender norms are evolving in Alaska's fisheries, with women increasingly participating in "non-traditional" roles as vessel owners and skippers, but that these roles are often dictated by the presence of children in the family, which affects whether and how women can participate in fisheries. This is aligned with worldwide fisheries research that shows women are often primarily engaged in land-based activities like fish processing and marketing while men do the harvesting (Britton 2012; Williams 2014).

Workshop participants also discussed the impacts of catch share programs on fishing family dynamics. Researchers have shown that catch share programs can be associated with prolonged fishing seasons, increased entry costs, and changes in employment conditions (Abbott, Garber-Yonts, Wilen 2010; Carothers, 2015). The impacts of prolonged fishing seasons may vary depending on participants' autonomy over the fishing schedule and gendered family responsibilities. For example, some workshop participants noted that perceived safety improvements from the Pacific halibut and sablefish IFQ Program allowed them to bring their children onboard their vessels, while others who participated strictly as crewmembers remarked that the resulting prolonged fishing season conflicted with maternal responsibilities and ultimately led to their exit from these fisheries (Szymkowiak, Marrinan, and Kasperski, 2016).

This is an ongoing study that will ultimately apply several different methods including a continuation of the focus group workshops on fishing family dynamics and gender roles, statistical analyses of gender differences in fisheries participation and impacts from catch share programs, and a survey of IFQ quota shareholders about gender norms, their evolution, and gendered impacts of the IFQ Program and its provisions.

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