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, 2018

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:
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Time series and plots of data presented in this report are available at:
https://psesv.psmfc.org/PSESV2.html

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1. EXECUTIVE SUMMARY

This Economic SAFE report contains detailed information about economic aspects of the groundfish fisheries, including figures and tables, economic performance indices, current year product price and ex-vessel price projections, an Amendment 80 fishery economic data report (EDR) summary, an Amendment 91 fishery economic data report (EDR), 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. The report also include a new Gulf Trawl EDR summary, but will exclude the previous community participation summaries and the catch share fishery indicators, which will be moved into a separate report due to a time lag in data availability. Data tables are organized into four relatively distinct sections: (1) All Alaska, (2) BSAI, (3) GOA, and (4) Pacific halibut. 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 on at-sea processors. Generally, the data presented in this report cover 2014-2018, 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 will be available online at: https://reports.psmfc.org/akfin and https://psesv.psmfc.org/PSESV-2/.

The commercial FMP groundfish fisheries off Alaska had a total catch of 2.2 million metric tons (mt) in 2018 (including catch in federal and state waters) (Fig. 3.1 and Table 1), a decrease of 3% from 2017. Groundfish accounted for 88% of Alaska's 2018 total catch (Table 4). Total catch in 2018 increased for sablefish, Atka mackerel, and rockfish. Total catch decreased or was stable for Alaska pollock, Pacific cod, flatfish and rockfish.

The aggregate ex-vessel value of the FMP groundfish fisheries off Alaska was $996 million, which was 54% of the ex-vessel value of all commercial fisheries off Alaska in 2018 (Table 4).[1] After adjustment for inflation, the real ex-vessel value of FMP groundfish increased $29 million in 2018, largely due to an aggregate real ex-vessel price increase of 6.2% to $0.21 per pound (Table 4). The increase in the aggregate ex-vessel price was attributable to a rise in ex-vessel prices for most species. Notable price increases were observed for Pacific cod (25%), pollock (17%), flatfish (12%), and rockfish (2%). Pollock ex-vessel prices increased 14% to $0.15 per pound in the Bering Sea and Aleutian Islands (BSAI), and 42% to $0.12 per pound in the Gulf of Alaska (GOA) (Tables 12 and 28). Among the other species that are the focus of the shoreside ex-vessel fisheries: The GOA flatfish ex-vessel price rose 7%, GOA rockfish prices rose 6%, GOA Pacific cod prices rose 35%, BSAI Pacific cod prices rose 25%, and GOA sablefish prices fell 27%. For Alaska FMP groundfish in aggregate the change in catch was smaller than the change in price, and price was the larger factor in determining the

[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.

increase in ex-vessel value (Tables 5.6 and 5.10). For other fisheries in Alaska, halibut ex-vessel revenues increased, while salmon, herring, and shellfish revenue decreased (Table 4).

The gross value of the 2018 groundfish catch after primary processing (first-wholesale) was $2.54 billion (Table 5), a decrease of 1.2% in real terms from 2017. This change was combined effect of a 1% increase in the real aggregate 2018 first-wholesale price to $1.2 per pound while aggregate production volumes decreased 2.5% to 936.7 to thousand mt (Table 5). In the BSAI, aggregate first-wholesale value increased 4.4% and value was increasing for major species with the exception of sablefish where price decreased significantly (Table 16 and 17). In the GOA aggregate first-wholesale value decreased (19%) with significant decreases in value for sablefish, Pacific cod, and arrowtooth (Table 32). First-wholesale value in the GOA was increasing for pollock, rockfish and other flatfish species. The decrease in GOA cod value was the result of decreased production volume from reduced total allowable catch. The increase in the value of GOA pollock was the result of an increase in the average price of products.

The first-wholesale value of Alaska's FMP groundfish fisheries accounted for 57% of Alaska's total first-wholesale value from commercial fisheries (Table 5). First-wholesale value of Alaska's fisheries products other than FMP groundfish fisheries totaled $1.94 billion, most of which ($1.6 billion) came from Pacific salmon. Pacific salmon value decreased 19%, in part, because of the typical cycle in salmon returns and production, though year-over-year prices were up. Pacific halibut fisheries, which are concentrated in the Gulf of Alaska, saw a decrease 21% in value in 2018 to $110 million in 2018.

The groundfish fisheries off Alaska are an important segment of the U.S. fishing industry. In 2017, it accounted for 49% of the weight of total U.S. domestic landings and 18% of the ex-vessel value of total U.S. domestic landings (Fisheries of the United States, 2017). Alaska fisheries as a whole (including salmon, halibut, herring, and shellfish) accounted for 60% of the weight of total U.S. domestic landings and 38% 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 2018 crew weeks for both sectors totaled 152,050 with the majority of them (122,266) occurring in the BSAI groundfish fishery (Tables 24, 40, 25, and 41). 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 2017, annual crew weeks in Alaska decreased slightly in 2018 by 1.7%.

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.

[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.

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 2018.

Alaska pollock

Alaska pollock, the dominant species in terms of catch, accounted for 71% 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 near the highest level seen in recent history. Retained catch of pollock for all Alaska decreased 0.74% to 1.5 million mt in 2018 (Table 2). This was the combined effect of a 1.3% increase in the BSAI retained catch and a 15% decrease in the GOA. The ex-vessel value of the BSAI pollock fishery increased 16% to $408 million with the increase in retained catch as ex-vessel prices rose 14% to $0.14 per pound (Tables 13 and 12). The ex-vessel value of the GOA pollock fishery increased 20% to $42 million despite the decrease in retained catch as well as ex-vessel prices rose 41% to $0.12 per pound (Tables 29 and 28). The increase in ex-vessel prices coincides with the increase in the average first-wholesale price. The increase in ex-vessel prices brings prices back to a level that is more consistent with historical norms after a number of years of low prices.

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 decreased 3.4% to $1.38 billion as the average at-sea first-wholesale price fell 4.5% to $1.27 and with decreasing prices for surimi and roe (Tables 16 and 17). The average shoreside price rose 11% to $1.07 with increasing price of fillets (Tables 17 and 18). In the GOA first-wholesale value increased 8.5% to $104.9 million as the average first-wholesale price rose 23% to $0.69 with increased price for fillets and head and gut products (Tables 32 and 33). 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 combined share of pollock total first-wholesale value was 85.8% in the BSAI and 61% in the GOA (GOA processors produce a greater share of H&G products). In the BSAI at-sea sector prices were decreasing for roe and surimi which made up a combined 50% of the value share and increasing for fillets. In the BSAI shoreside sector prices were increasing for fillets and surimi which made up a combined 70% of the sectors first-wholesale value. Similarly, in the GOA prices were increasing for fillets and H&G which made up a combined 67% of the regions first-wholesale value. Reductions in global whitefish supplies coupled with low inventories and strong demand in 2018 put upward pressure on pollock fillet and H&G prices. Although, prices for these products have increased they remain below levels throughout much of the last decade. While at-sea surimi prices decreased in 2018, they have been increasing for years and remain high and prices could rebound in 2019 with a reduction in surimi global supply. 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 232 thousand mt in 2018, a decrease of 22% from 2017 (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 70% to 14 thousand mt as conservation reductions in the TAC have resulted in substantially reduced catch levels. The GOA Pacific cod TAC for 2019 was similar as level of the stock remains low following adverse environmental conditions and poor recruitment. In the BSAI catch levels of Pacific cod decreased 13% to 218 thousand mt, however catches remained within normal levels relative to the last decade.

In the BSAI ex-vessel value of the Pacific cod fishery increased 10% to $196 million as ex-vessel prices rose 26% to $0.41 per pound (Tables 12 and 13). In the GOA, the decrease in catch resulted in a 59% decrease in ex-vessel value to $14 million despite an ex-vessel price rise of 35% to $0.45 per pound (Tables 28 and 29). The increase in ex-vessel prices in 2018 mirrored similar increases the first-wholesale prices as global supplies of cod have contracted.

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. Pacific cod first-wholesale value in the BSAI increased 5.5% to $458.8 million with value decreasing 4% in the at-sea and increasing 28% in the shoreside sectors (Table 16). While aggregate production rose in the BSAI, production decreased in at-sea and increased for the shoreside sectors. Prices were increasing for fillet and H&G products (Table 17) with the average at-sea first-wholesale price rising 14% to $1.78 and the average shoreside price rising 21% to $2.29. Pacific cod first-wholesale value in the GOA decreased 57.7% to $31.9 million (Table 32). Prices were increasing for fillet and H&G products with the average first-wholesale price rising 31% to $2.59 (Table 33). Since 2016 reductions in global supply have put upward pressure on prices resulting in year-over-year price increases in 2017 and 2018. Export prices through June 2019 prices indicate that prices may be leveling off as reflected in the highly exported H&G product type which fell 2%.

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 and 2018 the TACs increased as a result of a strong 2014 year class, though younger, smaller, less valuable fish are comprising a larger share of the catch. In 2018 sablefish retained catch increased 6.7% to 12.3 thousand mt (Table 2). The retention rate, typically above 90%, dropped to 80% in 2018. This is in part related to the incidental catch of juvenile sablefish by Bering Sea trawlers targeting other species.

In the GOA retained catch increased 4.5% to 11 thousand mt. Sablefish ex-vessel value in the GOA decreased 24% to $88 million despite a decrease in the ex-vessel price which fell 27% to $3.8/lb (Tables 28 and 29). Ex-vessel value in the BSAI increased as the increase in retained catch offset the fall in prices (Tables 12 and 13). The 2018 price decrease is the result of smaller average fish size as the abundant 2014 year class has not fully grown to a higher marketable price.

Sablefish first-wholesale value in the GOA decreased 19.2% to $89.9 million as the average first-wholesale price fell 26% to $6.65 (Tables 32 and 33). In the BSAI first-wholesale value decreased 20% to $10 million with similar decrease in prices (Tables 16 and 17). 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. The increased abundance and supply of smaller fish puts downward pressure on the price of small fish, increases the price margin between small and large fish, and lowers the average price. Export prices through June 2019 (which are typically a strong indicator of first-wholesale prices) show a 10% decrease.

Flatfish species complex

The flatfish complex is comprised of a number of different species, and the species targeted vary 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 were stable decreasing 1%, to 197.4 thousand mt. Decreased catch occurred for yellowfin sole (1%), rock sole (20%), Kamchatka flounder (31%), and Greenland turbot (36%) while catch increased for arrowtooth (6%), flathead sole (26%), and other flatfish (44%). Catches in 2018 were comparable to the average catch level since 2003. Decreases in the BSAI flatfish catch since 2015 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 decreased 23%. This change was primarily the result of a 35% decrease in arrowtooth catch. Arrowtooth, the largest flatfish fishery in the GOA, can show considerable year-over-year catch variability, and the decrease in 2018 comes after a similar increase in 2017. The year-over-year variability is in part because of regulatory changes.[3] Catch levels in 2018 catches were within the range of typical catches over the last decade.

Flatfish are primarily processed into the H&G and whole fish product forms and changes in production volumes largely reflect changes in catch. Processed products are primarily exported to China and South Korea, and 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 10% with a 12% increase in price.[4] Yellowfin sole value rose 23% with a 24% increase in price. Prices increased for other species in the BSAI flatfish fisheries with the exception

[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.

of arrowtooth where prices reverted following a substantial increase in 2017. First-wholesale value in the GOA flatfish fisheries decreased 27% with a 33% decrease in price. Arrowtooth value in 2018 fell 66% with a 42% decrease in price following a similar increase in 2017. The strong demand and low inventories put upward pressure on flatfish prices. Tariffs between the U.S. and China and the associated uncertainty with trade policy has the potential to inhibit value growth in flatfish markets, both as a direct market for flatfish exports and because of China's significance as a re-processor of flatfish products. Industry lacks immediate alternative reprocessing options to China. Export quantities of yellowfin and rock sole decreased 12% in 2018 from the levels in 2014-2017, though they were above levels seen earlier in the decade, and average export prices continue to be strong.

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 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 80% 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 9% to 38.8 thousand mt with all species showing increases in catch (Table 10). Rockfish retained catch in the GOA rose 16% to 28.1 thousand mt with all species showing increases in catch (Table 26). GOA ex-vessel prices increased 6% and ex-vessel value rose 23% (Tables 28 and 29).

First-wholesale value in the BSAI increased 5% to $43.3 million despite a 5% decrease in prices as production volumes increased. These changes were largely the result of a 6% price decreases for Pacific ocean perch. First-wholesale value in the GOA increased 16% to 45$ million despite a 6% decrease in prices as production volumes rose correspondingly with the increase in catch. The majority of rockfish produced are exported, primarily to China, some of which is re-processed (e.g., as fillets) and re-exported to domestic and international markets. Tariffs between the U.S. and China and the associated uncertainty with trade policy has the potential to inhibit value growth in rockfish markets, both as a direct market for rockfish exports and because of China's significance as a re-processor of rockfish products. Industry lacks immediate alternative reprocessing options to China. Export quantities of Pacific ocean perch increased in 2018 from the levels in 2014-2017 and the share of exports to China remained stable, however, export prices have continued to decline through June of 2019.

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 2018 increased 9.6% to 72 thousand t. This level of catch is the highest since 2009 after significant reductions in the TAC in 2013 and 2014. The lower catch in 2013-2014 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.

[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.

First-wholesale value in 2018 increased 2% to $131 million despite a 4% decrease in prices as production volumes increased with the corresponding increase in catch. Approximately 90% 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 in recent years.

1.1. Report Card Metrics for the Alaska Commercial Groundfish Fisheries off Alaska 1993-2018

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 1993-2018 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 2018 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 2018 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 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.

[6] Metrics 1, 2, and 7 are adjusted for inflation using the GDP chain-type price index. For Metric 6 ex-vessel revenues are deflated using the Personal Consumption Expenditures chain-type price index. See the the Overview Section 2.2.7 for references.

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

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

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.

9) Share of shoreside all Alaska fisheries ex-vessel value for the top 5 ports, which is not limited to just FMP groundfish to provide a more comprehensive account of community revenues. This metric measures the degree of concentration of landings across Alaska communities.

Real First wholesale value remains relatively high due to catch and increases in production per-unit-catch (panels 1 and 3). In 2017 and 2018 catch and production levels have been strong for pollock, Atka mackerel, and rockfish, while sablefish production has improved. Flatfish and cod production levels have tapered in recent years due to reductions in particular regions and/or species, though levels remain good in aggregate relative to historic levels. While real prices remain low they improved in 2017 and 2018 and are now within one standard deviation of the historical mean (panel 2). Decreased global cod production in 2018 contribtued to increased prices. Pollock prices improved somewhat in 2018 but remain relatively low. Strong prices for Pacific cod, Atka mackerel, and flatfish helped bouy the price index in 2018. The low aggregate price level is largely due to pollock prices which is heavily weighted in the index due to its substantial volume and value relative to other species and where prices of fillets and H&G have struggled since 2013, in part due to high global pollock and cod production and exchange rates (panels 4 and 5). Globally, Alaska has a significant effective share of pollock and cod at approximately 40%, which has remained stable since 2014. The effective real exchange rate index peaked in 2015, and has remained high through 2018. The strength of the dollar has put downward pressure on Alaska fish product export 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 and 2018 with stronger ex-vessel prices as wholesale prices for pollock and cod have improved (panel 6). Revenue per-unit-effort (measured by fishing weeks) increased 2018 as catcher-vessel weeks were reduced, particularly in GOA as a result of reduced opportunities for cod (panel 7). The 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 but dropped to 41% in 2018; sablefish, which increased from 53% in 2003-2008 to approximately 65% in 2018; and pollock which increased from 5% in 2003-2008 to 10% in 2018. Roughly 55% of the shoreside revenues are concentrated in a the top 5 key ports which in 2018 were Akutan, Sitak, Dutch Harbor, Kodiak, and Naknek (panel 9). This is up from 2010 when reductions in the pollock and cod TACs reduced revenues in a couple high value ports, which focus on catches of these species.

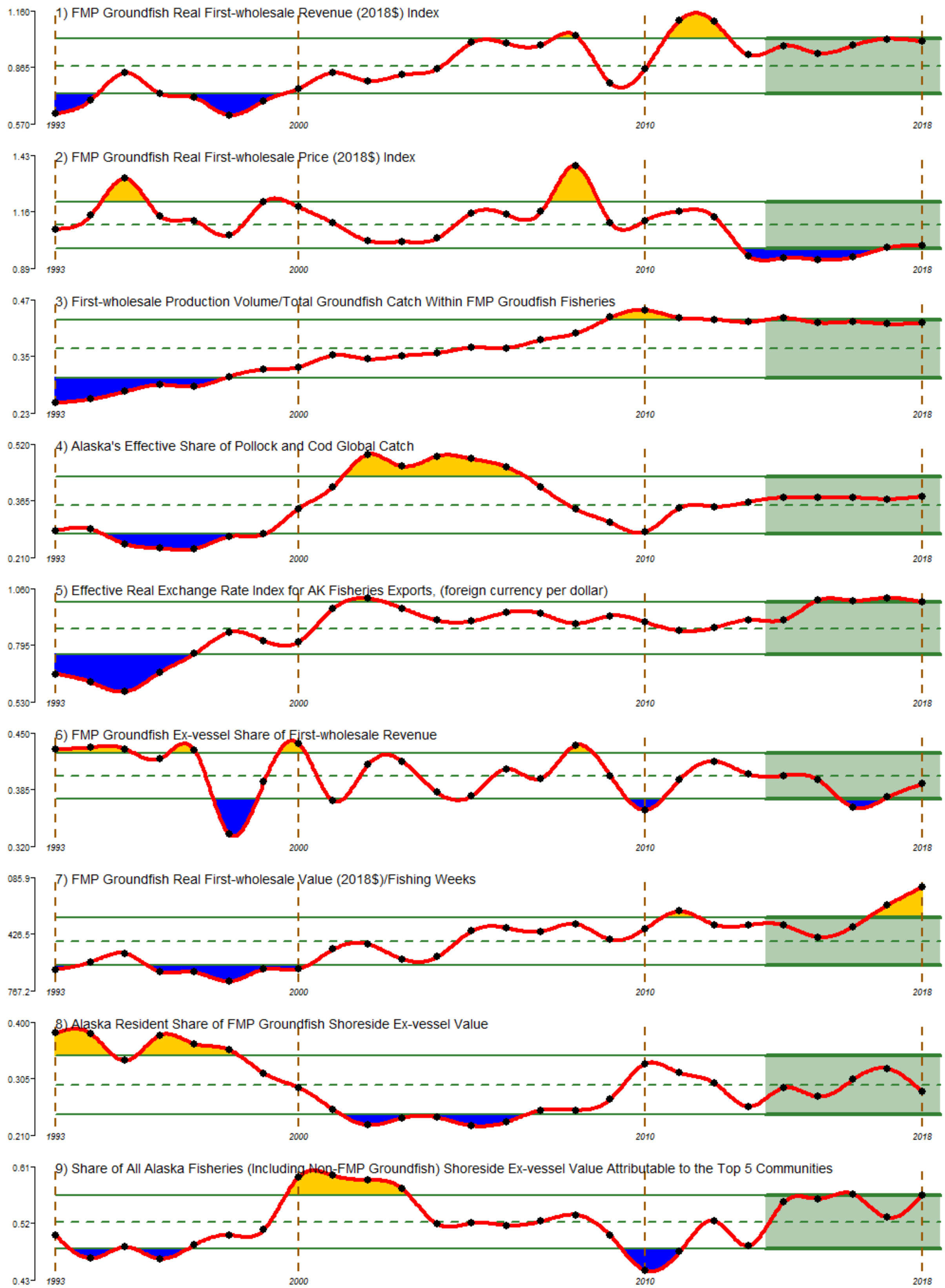


Figure 1.1: Economic report card metrics.

1.1.1 Economic Summary of the BSAI commercial groundfish fisheries in 2017-18

These following summaries were prepared for the Groundfish Plan Team Meeting (Nov. 2019). The information below are excerpts from the introductions in the BSAI and GOA Groundfish Plan Team reports.

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, decreased from $ 2,039 million in 2017 to $1,834 million in 2018. The first wholesale value of 2018 groundfish catch after primary processing was $ 2,543 million. The 2018 total groundfish catch decreased by 2.5%, and the total first-wholesale value of groundfish catch decreased by 1%, relative to 2017.

The groundfish fisheries accounted for the largest share (54%) of the ex-vessel value of all commercial fisheries off Alaska, while the Pacific salmon (*Oncorhynchus spp.*) fishery was second with $551 million or 30% of the total Alaska ex-vessel value. The value of the shellfish fishery amounted to $182 million or 10% of the total for Alaska and exceeded the value of Pacific halibut (*Hippoglossus stenolepis*) with $88 million or 5% of the total for Alaska.

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

According to data reported in the 2019 Economic SAFE report, the total ex-vessel value of BSAI groundfish increased 12 percent from $738 million in 2017 to $827 million in 2018 (Figure 1.2), and first-wholesale revenues from the processing and production of groundfish in the Bering Sea and Aleutian Islands (BSAI) increased by 2% between 2017 ($2,199 million) and 2018 ($2,246 million) (Figure 1.3). At the same time, the total quantity of groundfish products from the BSAI remained essentially constant, decreasing by 0.1% from 824 thousand metric tons to 823 thousand metric tons. These changes in the BSAI differed from those in the GOA where wholesale revenue decreased by 21 percent; there was a 1% year-to-year decrease in first-wholesale revenues from Alaska groundfish fisheries overall.

Decomposition of the change in first-wholesale revenues from 2017-18 in the BSAI

The following brief analysis summarizes the overall *nominal* revenue changes that occurred between 2017-18 in the quantity produced and revenue generated from BSAI groundfish and how revenues 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, small positive price effects and larger positive quantity effects resulted in a positive net effect of about $45 million for pollock. For Pacific cod, a large positive price effect combined with a smaller but still substantial negative quantity effect, resulting in a $24 million net increase in first-wholesale revenues for Pacific cod from the BSAI for 2017-18 (Figure 1.4). There was a small negative price effect and larger positive quantity effect for rockfish, resulting in a net positive effect of $3 million. Atka mackerel had a small negative price effect and a larger positive quantity effect, combining for a net positive effect of $3 million. Flatfish had a large positive price effect combined with a smaller negative quantity effect resulting in a net positive revenue increase of $20 million. Sablefish had a negative price effect of $4 million and a positive quantity effect of $1 million, combining for a net positive effect of $2.5 million. “Other” experienced a net revenue increase of $4 million.

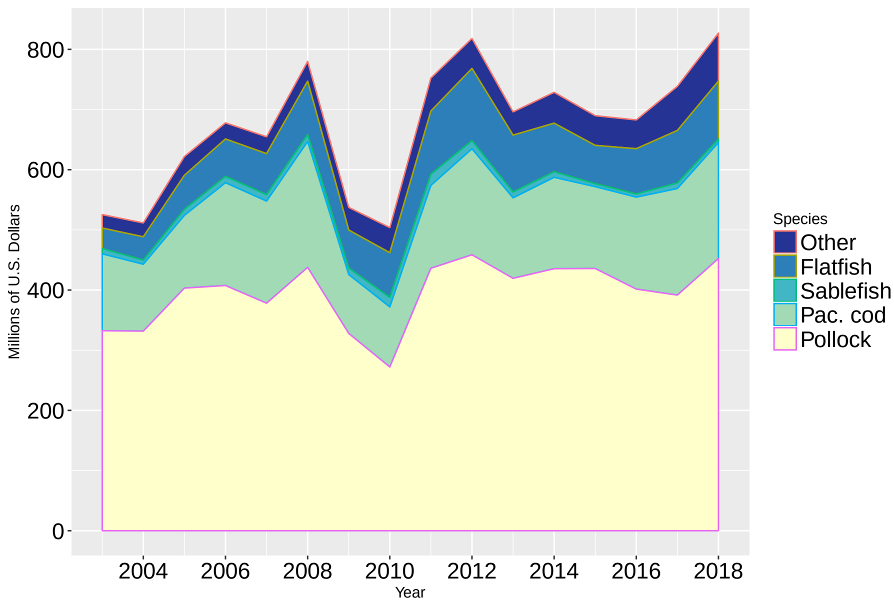


Figure 1.2: Real ex-vessel value of the groundfish catch in the domestic commercial fisheries in the BSAI area by species, 2003-2018 (base year = 2018).

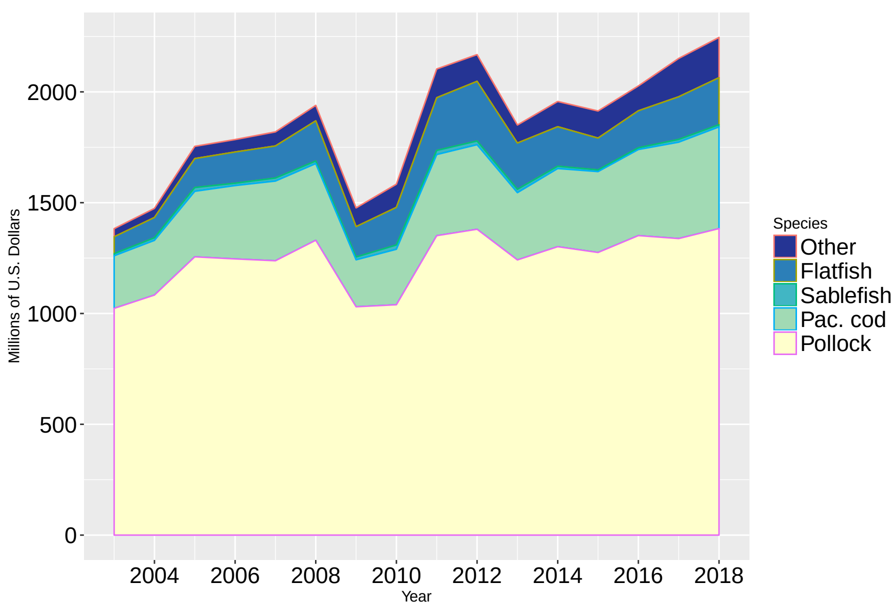
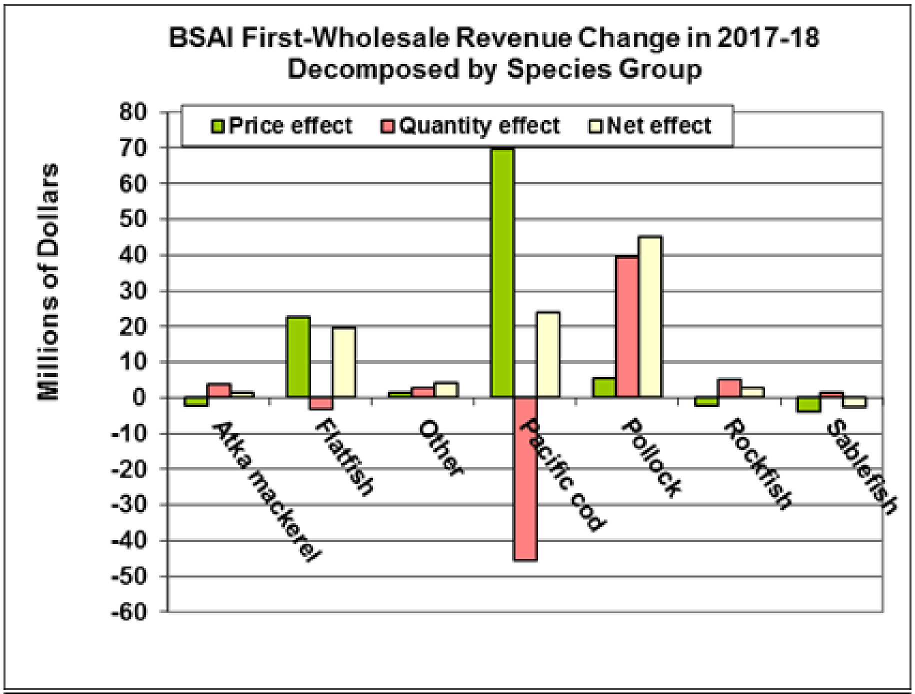


Figure 1.3: Real gross product value of the groundfish catch in the BSAI area by species, 2003-2018 (base year = 2018).

By product group, large positive price effects coupled with similar positive quantity effects in the fillets category resulted in a positive net effect of $72 million in the BSAI first-wholesale revenue decomposition for 2017-18. For surimi, large negative price effects coupled with very small negative quantity effects resulted in a negative net effect of $27 million. For roe, as in the previous year, small positive price effects coupled with larger positive quantity effects to result in a positive net effect of $21 million. For whole fish and head & gut, a large positive price effect combined with a smaller but still large negative quantity effect combined to produce a net positive effect of $26



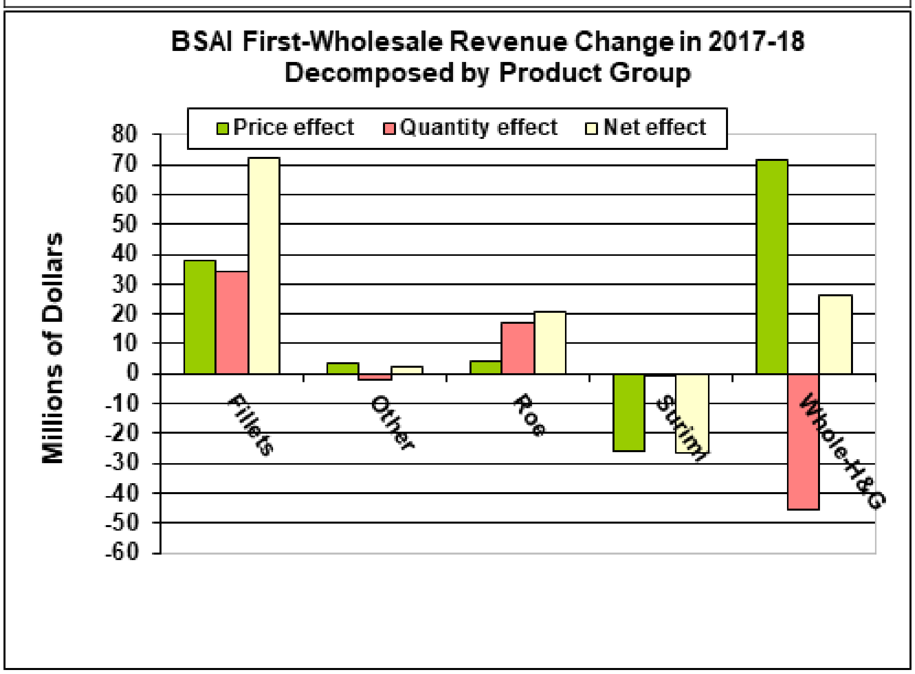


Figure 1.4: Decomposition of the change in first-wholesale revenues from 2017-18 in the BSAI area. **Notes:** The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due to the 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).

million while for 'other' products a positive price effect combined with a smaller negative quantity effect for a net positive effect of $2 million.

In summary, the changes in first-wholesale revenues from the BSAI groundfish fisheries increased from 2017-18 due in large part to positive price effects for flatfish and Pacific cod, and positive quantity effects for pollock. In comparison, first-wholesale revenues decreased from 2017-18 in the GOA. The main drivers of this GOA decline was a negative net revenue effect for flatfish, Pacific cod, and sablefish only being partially offset by positive net effects for pollock, Atka mackerel, and rockfish.

Decomposition of the change in first-wholesale revenues from 2017-18 in the GOA

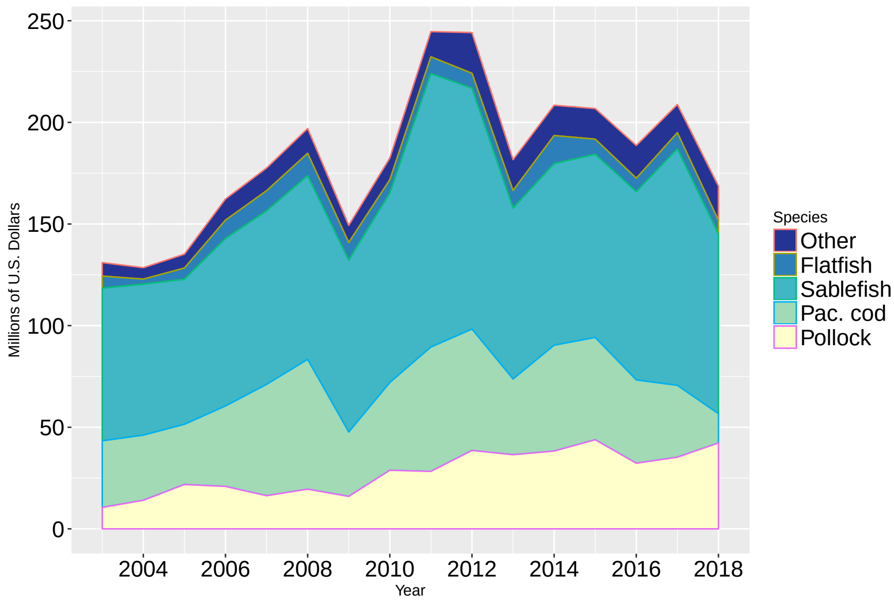


Figure 1.5: Real ex-vessel value of the groundfish catch in the domestic commercial fisheries in the GOA area by species, 2003-2018 (base year = 2018).

The following brief analysis summarizes the overall changes that occurred between 2017-18 in the quantity produced and revenue generated from GOA groundfish. According to data reported elsewhere in the Economic SAFE report, the ex-vessel value of GOA groundfish decreased from $213 million in 2017 to $169 million in 2018 (values adjusted to 2018 dollars) (Figure 1.5), and first-wholesale revenues from the processing and production of groundfish in the Gulf of Alaska (GOA) decreased between 2017 ($375 million) and 2018 ($297 million) (Figure 1.6). At the same time, the total quantity of groundfish products from the GOA decreased from 137 thousand metric tons to 114 thousand metric tons, a 17% decrease. The changes in first-wholesale revenues from processing and production in the GOA differ from those in the BSAI, which saw a 0.06% year-to-year decrease in groundfish products and 2% increase in first-wholesale value.

By species group, despite positive price effects the decrease in catch resulted in a 59% decrease in ex-vessel value to $14.5 million for Pacific cod from the GOA for 2017-18 (Figure 1.7). For GOA Pollock, despite the decrease in retained catch the ex-vessel value increased by 20% to $42.25 million due to ex-vessel prices increases of 41% to $0.12 per pound. Despite a 4.5% increase in retained catch for sablefish in GOA, ex-vessel values decreased by 24% to $87.9 million due to a 27% decrease in ex-vessel prices due to the smaller average size of fish landed. In the GOA, retained catch for all flatfish species decreased 23%, driven by a 35% decrease in arrowtooth catch. For rockfish, a positive price and quantity effect provided for a 23% increase in ex-vessel values.

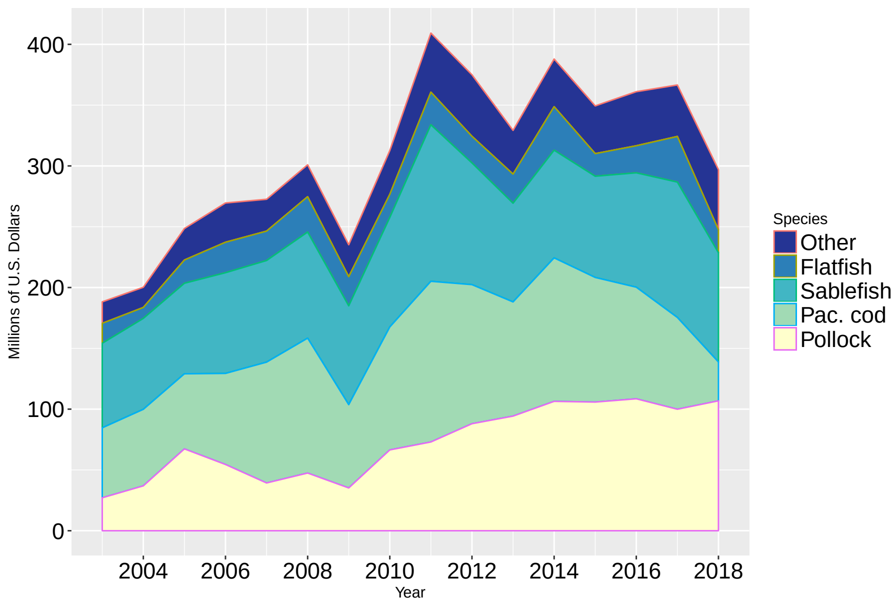


Figure 1.6: Real gross product value of the groundfish catch in the GOA area by species, 2003-2018 (base year = 2018).

By product group, negative price and quantity effects in the whole and head and gut (whole-H&G) category resulted in a negative net effect of $41.8 million in the GOA first-wholesale revenue decomposition for 2017-18, while positive price effects were not enough to offset negative quantity effects in the fillet category with a negative net value effect of $25.9 million. A positive price effect offset a negative quantity effect in surimi, with a net effect of $3 million.

In summary, first-wholesale revenues from the GOA groundfish fisheries decreased by about $78 million from 2017-18. The main drivers of this were negative net revenue effects for sablefish and Pacific cod. In comparison, first-wholesale revenues increased by $47.1 million from 2017-18 in the BSAI due in large part to positive price and quantity effects for pollock and a strong positive price effect for Pacific cod.

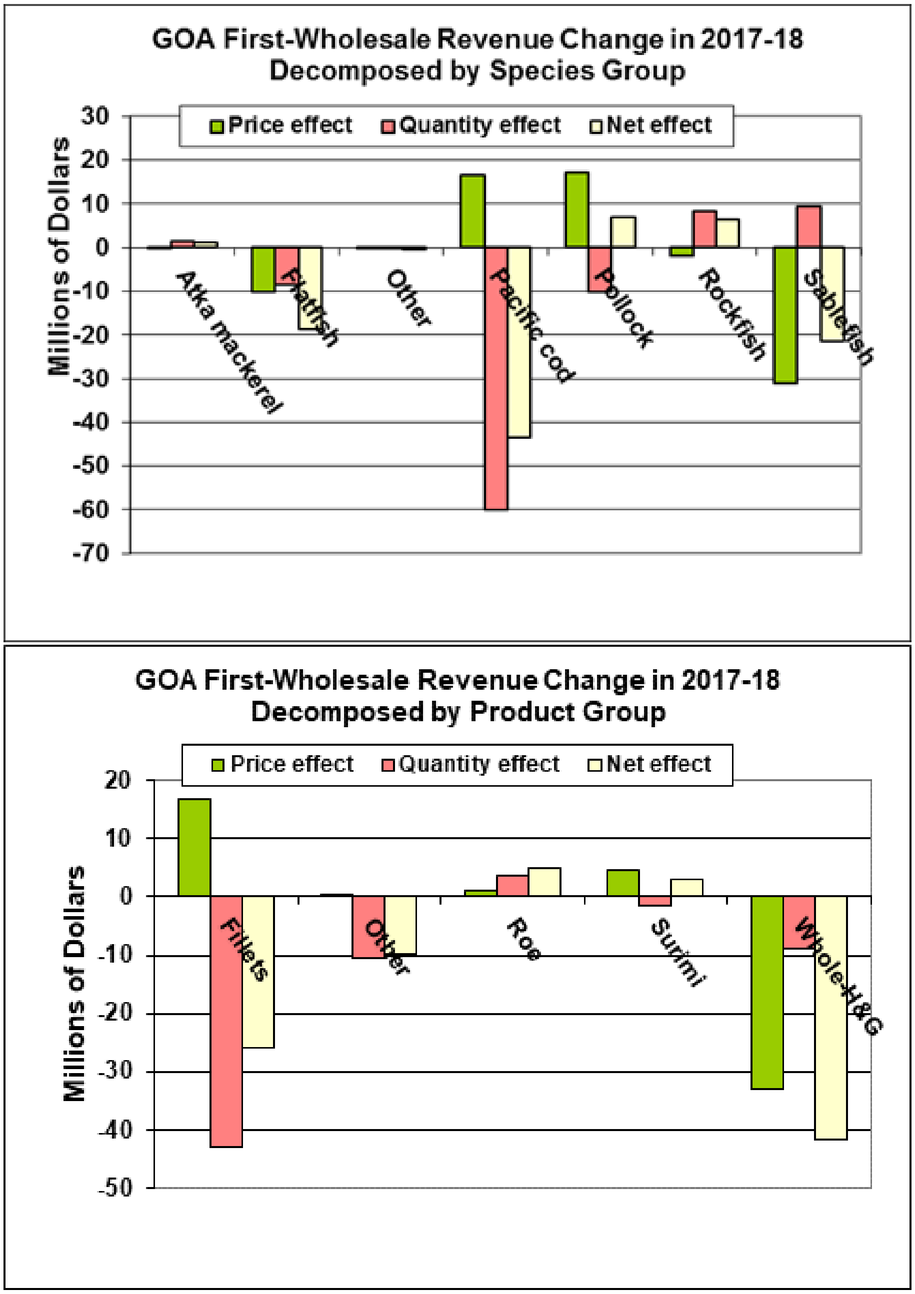


Figure 1.7: Decomposition of the change in first-wholesale revenues from 2017-18 in the GOA area. **Notes:** The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due to the 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, 2018

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.* 2018) 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 4 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 10 and 26 provide additional information for the BSAI and GOA, respectively, with aggregation of gear types and species specific catch data for flatfish and rockfish. Tables 11 and 27 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 6 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 2014-2018.

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 2014-2018 are summarized by area and gear in Table 7.

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 4 contains data on the real ex-vessel catch of groundfish and non-groundfish species in Alaska, adjusted to 2018 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 8 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, 76% of the 2018 ex-vessel value was accounted for by vessels with primary owners who indicated that they were not residents of Alaska.

Tables 12 and 28 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 13 and 29 for the BSAI and GOA, respectively. Table 14 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 14 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 5 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 15 for the BSAI and Table 31 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 16 and 32 for the BSAI and GOA, respectively. Product price-per-pound estimates are presented in Tables 17 and 33, and estimates of total first wholesale product value per round metric ton of retained catch are reported in Table 18 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 19 and 35 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 9. 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 20 and 36.

Tables 22 and 38 provide estimates of vessel weeks for catcher vessels in the BSAI and GOA, respectively, stratified by length class, area, gear, and target fishery. Tables 23 and 39 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 24 and 40, in the BSAI and GOA, respectively. At-sea production reports provide these information for motherships and catcher/processors shown in Tables 25 and 41 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 halibut was the 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 5: "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).
- Tables 11, 27: "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 7: "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.
- Tables 15, 16, 17, 31, 32, 33: "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).
- Tables 18, 34: "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 12, 13, 15, 17, 28, 29, 31, and 33. 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 4. 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 5. 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 most recent FUS is available at: https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states.

- 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

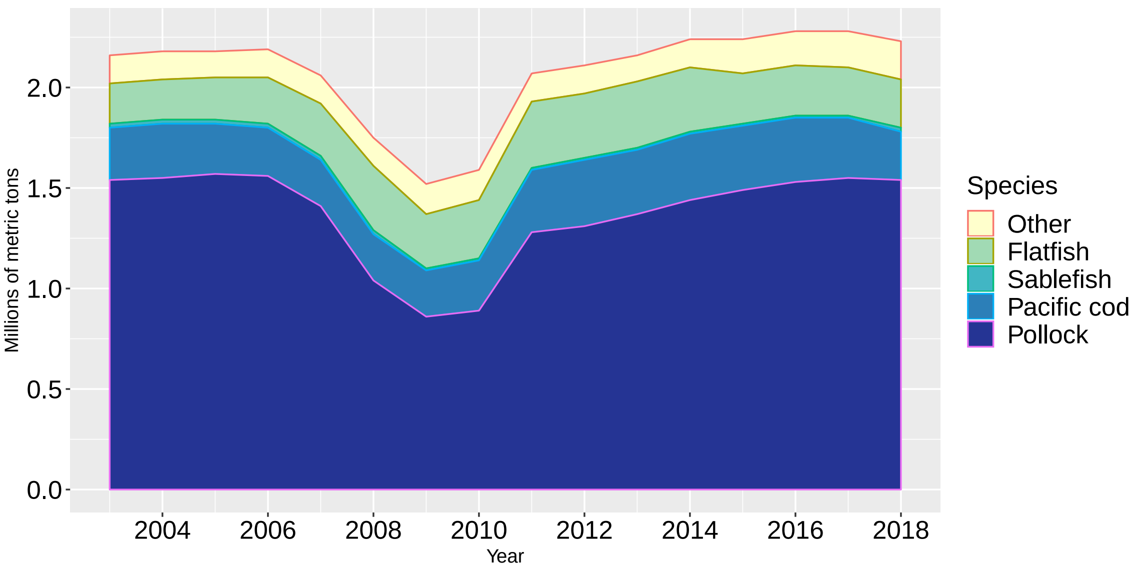

Figure 3.1: Groundfish catch in the commercial fisheries off Alaska by species, 2003-2018.

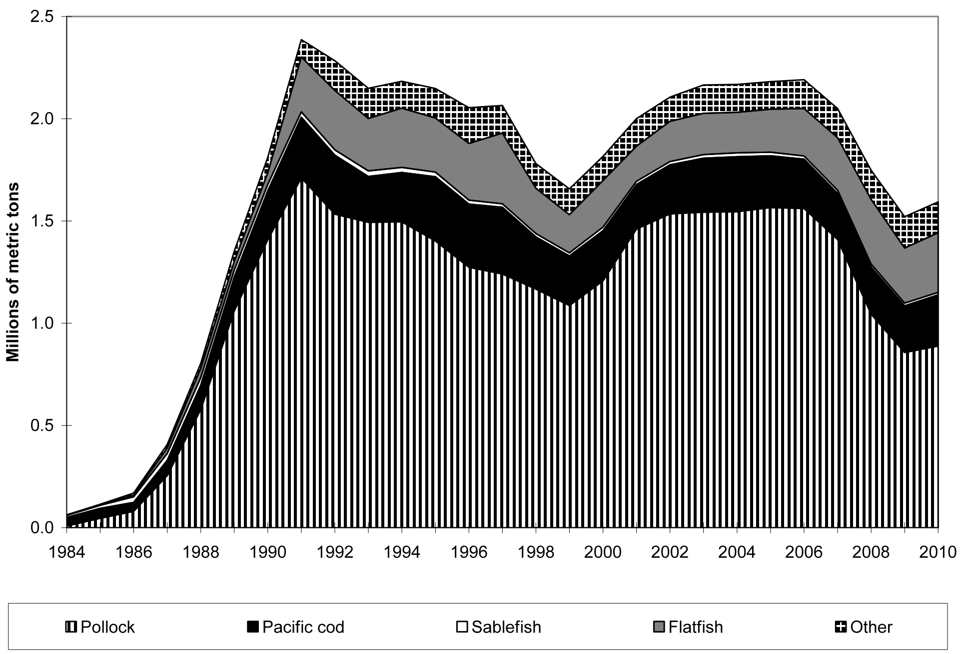

Figure 3.2: Groundfish catch in the commercial fisheries off Alaska by species, (1984-2010).
Notes: Catch for 2011 and onward are displayed in Figure 3.1.

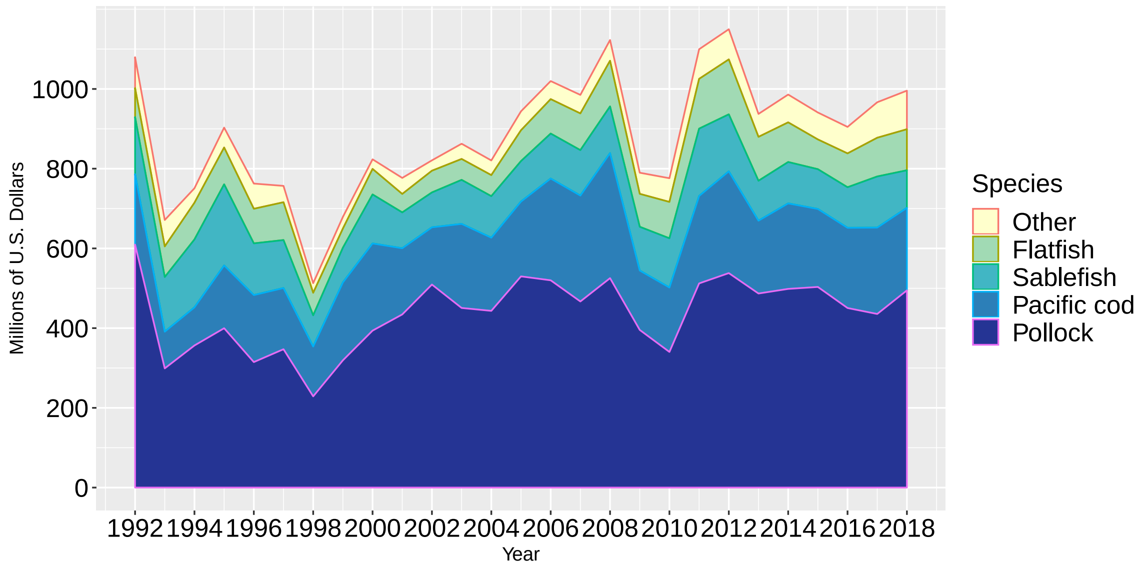

Figure 3.3: Real ex-vessel value of the groundfish catch in the commercial fisheries off Alaska by species, 1992-2018 (base year = 2018).

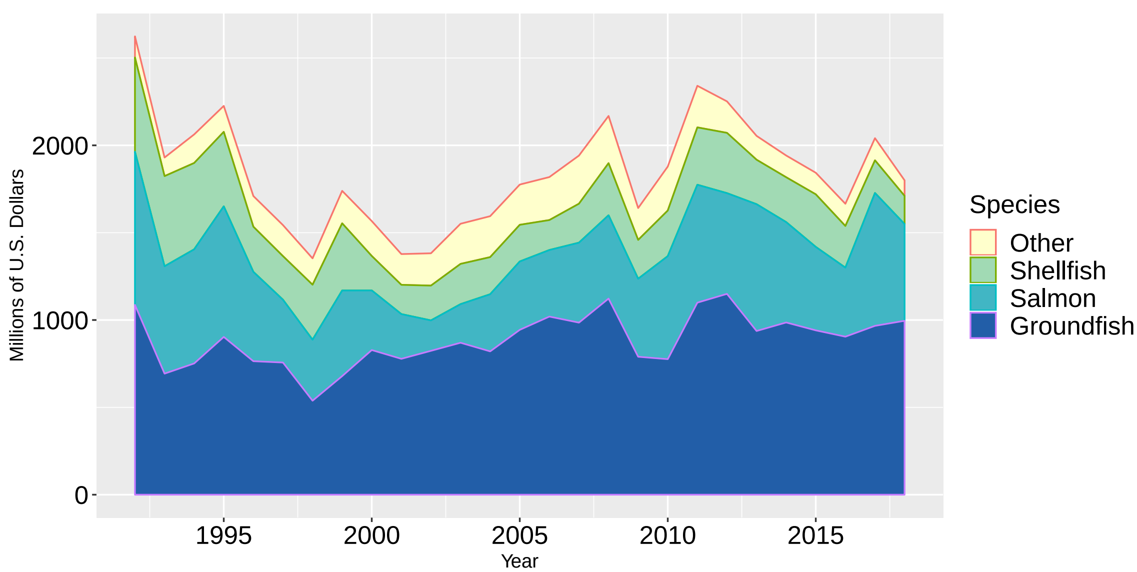

Figure 3.4: Real ex-vessel value of the domestic fish and shellfish catch off Alaska by species group, 1992-2018 (base year = 2018).

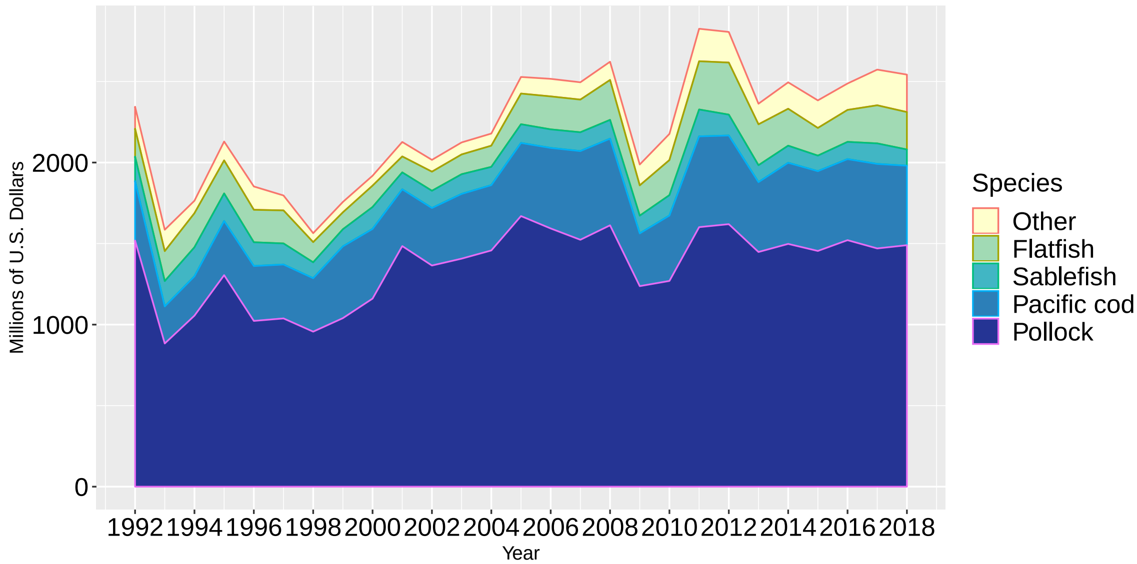

Figure 3.5: Real gross product value of the groundfish catch off Alaska by species, 1992-2018 (base year = 2018).

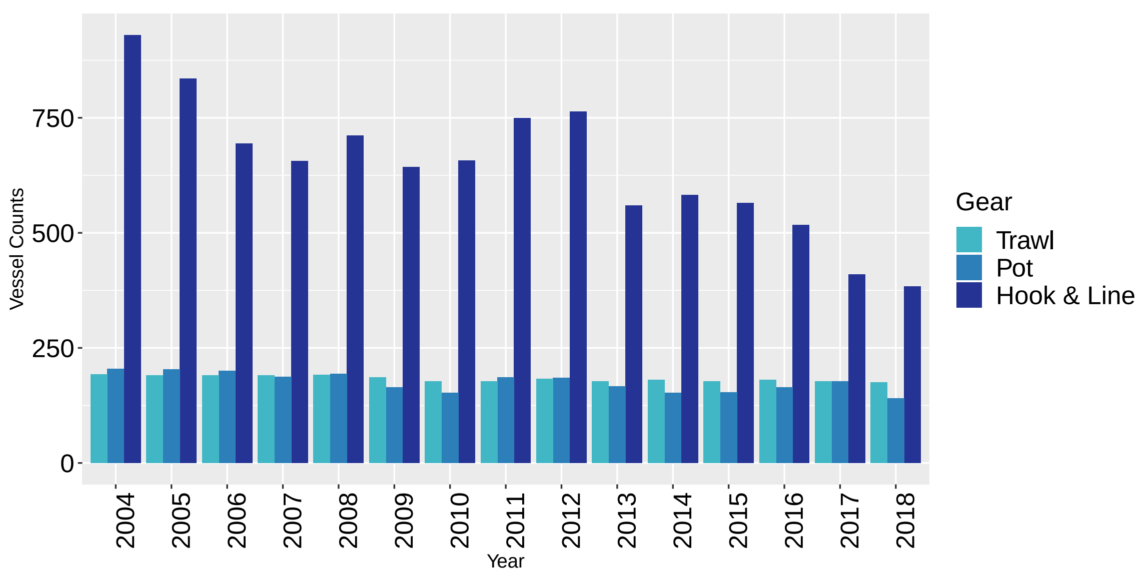

Figure 3.6: Number of vessels in the domestic fishery off Alaska by gear type, 2004-2018.

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, 2009-2018 (1,000 metric tons, round weight).

	Year	Pollock	Sablefish	Pacific Cod	Flatfish	Rockfish	Atka Mackerel	Total
Bering Sea and Aleutian Islands	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	1,354.5
	2011	1,200.4	1.7	220.1	285.9	28.2	51.8	1,818.5
	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	1,969.4
	2017	1,361.0	1.7	253.1	211.1	38.4	64.4	1,969.4
	2018	1,381.2	2.3	220.3	212.2	42.0	70.4	1,966.7
Gulf of Alaska	2009	44.2	12.0	53.2	42.3	22.8	2.2	185.6
	2010	76.7	11.0	78.4	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	29.5	27.4	1.2	258.9
	2013	96.4	12.8	68.6	33.9	24.9	1.3	250.2
	2014	142.6	11.1	84.9	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	324.4
	2017	186.2	11.3	48.7	33.3	31.8	1.1	321.1
	2018	158.1	13.0	15.2	25.8	34.2	1.4	255.8
All Alaska	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	1,593.4
	2011	1,281.9	13.8	305.5	327.0	51.3	53.4	2,070.6
	2012	1,310.2	14.7	328.9	320.7	55.5	49.0	2,116.8
	2013	1,370.2	14.5	318.9	331.1	59.9	24.5	2,164.8
	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
	2018	1,539.3	15.3	235.5	237.9	76.2	71.8	2,222.5

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. As such, totals may be slightly larger than retained catch estimates provided in later tables.

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, 2014-2018 (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	2014	668.50	616.20	1,284.71	139.60	1.52	141.12	808.11	617.72	1,425.83
	2015	687.15	626.45	1,313.60	165.10	1.08	166.18	852.25	627.53	1,479.77
	2016	703.95	641.77	1,345.72	175.50	0.57	176.07	879.45	642.33	1,521.78
	2017	710.38	642.24	1,352.62	183.26	1.07	184.33	893.65	643.31	1,536.96
	2018	718.33	651.42	1,369.75	155.28	0.60	155.88	873.61	652.02	1,525.64
Sablefish	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	9.24	0.94	10.18	9.72	1.08	10.80
	2016	0.40	0.39	0.80	8.28	0.78	9.06	8.69	1.17	9.86
	2017	0.70	0.76	1.46	9.05	1.02	10.08	9.76	1.79	11.54
	2018	0.83	0.95	1.78	9.51	1.02	10.53	10.34	1.97	12.31
Pacific Cod	2014	79.08	165.39	244.47	72.33	7.15	79.48	151.40	172.54	323.95
	2015	68.44	170.58	239.01	71.09	6.36	77.45	139.53	176.93	316.46
	2016	86.05	171.64	257.69	57.89	5.20	63.10	143.94	176.84	320.78
	2017	87.97	162.10	250.07	41.87	6.10	47.97	129.84	168.20	298.04
	2018	82.48	135.53	218.01	12.65	1.75	14.39	95.12	137.27	232.40
Flatfish	2014	3.25	247.78	251.02	17.79	22.89	40.68	21.03	270.67	291.70
	2015	11.80	195.96	207.75	11.06	10.51	21.57	22.85	206.47	229.32
	2016	14.68	196.76	211.44	17.76	5.85	23.61	32.44	202.61	235.05
	2017	21.15	177.44	198.60	14.52	14.79	29.30	35.67	192.23	227.90
	2018	16.56	180.84	197.40	17.69	4.91	22.60	34.25	185.75	220.00

Continued on next page.

Table 2: 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	2014	0.48	31.85	32.33	11.83	13.99	25.83	12.31	45.85	58.16
	2015	3.12	34.40	37.52	12.28	14.41	26.69	15.40	48.82	64.22
	2016	2.54	32.79	35.34	15.19	15.64	30.83	17.73	48.43	66.17
	2017	2.53	32.97	35.49	11.31	15.61	26.93	13.84	48.58	62.42
	2018	3.51	35.29	38.80	14.70	16.71	31.41	18.21	52.00	70.20
Atka Mackerel	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	0.04	0.84	0.87	3.25	50.10	53.35
	2016	3.68	50.38	54.06	0.37	0.39	0.76	4.05	50.77	54.82
	2017	4.57	59.48	64.05	0.13	0.52	0.65	4.70	60.00	64.71
	2018	5.65	63.86	69.51	0.19	1.10	1.28	5.84	64.96	70.79
All Groundfish	2014	753.51	1,097.43	1,850.94	253.05	47.66	300.71	1,006.56	1,145.09	2,151.65
	2015	776.46	1,084.56	1,861.02	270.74	34.36	305.10	1,047.20	1,118.92	2,166.12
	2016	811.84	1,100.54	1,912.38	276.47	28.64	305.10	1,088.31	1,129.17	2,217.48
	2017	828.42	1,084.37	1,912.79	261.14	39.40	300.54	1,089.56	1,123.77	2,213.33
	2018	829.18	1,079.90	1,909.08	210.94	26.19	237.12	1,040.12	1,106.08	2,146.20

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: Groundfish ex-vessel value off Alaska by area, sector, and species, 2014-2018 ($ millions).

	Year	Bering Sea and Aleutian Islands Catcher Vessels	Bering Sea and Aleutian Islands Catcher Processors	Bering Sea and Aleutian Islands Total	Gulf of Alaska Catcher Vessels	Gulf of Alaska Catcher Processors	Gulf of Alaska Total	All Alaska Catcher Vessels	All Alaska Catcher Processors	All Alaska Total
Pollock	2014	226.8	208.4	435.1	37.8	0.4	38.2	264.6	208.8	473.3
	2015	227.8	207.9	435.7	43.5	0.3	43.8	271.3	208.2	479.5
	2016	210.1	191.5	401.5	32.2	0.1	32.3	242.2	191.6	433.8
	2017	206.5	185.1	391.6	35.0	0.2	35.2	241.5	185.3	426.8
	2018	237.3	215.1	452.4	42.0	0.2	42.2	279.3	215.3	494.6
Sablefish	2014	7.4	1.9	9.3	81.6	7.4	89.0	89.0	9.3	98.3
	2015	3.9	1.0	4.9	82.5	7.5	90.0	86.4	8.5	94.9
	2016	3.5	1.8	5.3	85.6	7.0	92.6	89.1	8.7	97.8
	2017	5.8	3.3	9.1	105.8	10.4	116.2	111.7	13.7	125.3
	2018	3.1	2.7	5.8	81.4	7.0	88.4	84.4	9.7	94.1
Pacific Cod	2014	47.9	103.3	151.2	47.2	4.7	52.0	95.1	108.0	203.2
	2015	37.6	98.4	136.0	45.9	4.2	50.1	83.6	102.6	186.2
	2016	49.7	103.1	152.8	37.5	3.4	40.9	87.2	106.5	193.7
	2017	60.7	116.4	177.0	30.8	4.5	35.3	91.5	120.9	212.3
	2018	72.0	120.7	192.7	12.5	1.7	14.2	84.5	122.5	206.9
Flatfish	2014	1.0	77.6	78.6	5.7	7.3	13.0	6.7	84.9	91.6
	2015	3.6	60.0	63.7	3.4	3.3	6.7	7.1	63.3	70.4
	2016	5.2	70.0	75.2	4.5	1.5	6.0	9.8	71.4	81.2
	2017	9.3	77.9	87.2	3.8	3.9	7.6	13.1	81.7	94.8
	2018	8.1	88.2	96.3	4.9	1.4	6.3	13.0	89.6	102.6

Continued on next page.

Table 3: Continued

	Year	Bering Sea and Aleutian Islands			Gulf of Alaska			All Alaska		
		Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total
Rockfish	2014	0.3	16.8	17.1	6.1	5.8	11.9	6.4	22.6	29.0
	2015	1.4	15.1	16.5	6.2	6.0	12.2	7.6	21.1	28.8
	2016	1.0	12.9	13.9	7.4	6.4	13.8	8.4	19.3	27.7
	2017	1.2	15.6	16.8	5.7	6.3	12.0	6.9	21.9	28.8
	2018	1.7	16.5	18.2	7.6	7.1	14.7	9.3	23.6	32.9
Atka Mackerel	2014	0.1	21.6	21.7	0.0	0.8	0.8	0.1	22.3	22.4
	2015	1.8	27.9	29.7	0.0	0.6	0.6	1.8	28.4	30.3
	2016	2.1	28.1	30.1	0.2	0.3	0.5	2.3	28.3	30.6
	2017	3.6	46.7	50.2	0.1	0.4	0.6	3.7	47.1	50.8
	2018	4.3	48.9	53.3	0.1	0.9	1.0	4.5	49.8	54.3
All Groundfish	2014	284.0	438.2	722.2	180.3	26.7	207.0	464.3	464.9	929.2
	2015	276.7	412.9	689.6	183.6	22.0	205.6	460.3	434.9	895.2
	2016	271.8	410.9	682.7	168.8	18.9	187.7	440.6	429.8	870.4
	2017	287.6	450.6	738.2	182.3	26.0	208.2	469.8	476.6	946.4
	2018	327.1	499.8	826.9	149.5	18.4	167.9	476.6	518.2	994.8

Notes: Ex-vessel value is calculated by multiplying ex-vessel prices by the retained round weight catch. 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 4: Catch and real ex-vessel value of the commercial fisheries off Alaska by species group and area, 2014-2018; calculations based on COAR (1,000 metric tons and $ millions, base year = 2018).

		Bering Sea and Aleutian Islands		Gulf of Alaska		All Alaska	
	Species.group	Quantity	Value	Quantity	Value	Quantity	Value
2014	Groundfish	1,864.9	$ 766.6	304.0	$ 219.3	2,168.9	$ 986.0
	Salmon	88.2	$ 257.6	219.4	$ 355.1	307.6	$ 612.7
	Halibut	1.3	$ 16.6	6.5	$ 94.2	7.9	$ 110.8
	Herring	24.7	$ 1.9	18.4	$ 10.0	43.1	$ 11.9
	Shellfish	36.5	$ 257.6	4.3	$ 36.5	40.8	$ 294.0
	Other	-	$ -	1.1	$ 5.9	1.1	$ 5.9
	All Species	2,015.6	$ 1,300.3	553.8	$ 720.9	2,569.4	$ 2,021.2
2015	Groundfish	1,861.1	$ 723.9	308.1	$ 217.1	2,169.3	$ 941.0
	Salmon	102.8	$ 149.6	368.1	$ 327.0	470.9	$ 476.6
	Halibut	1.4	$ 18.6	6.8	$ 99.0	8.2	$ 117.6
	Herring	21.3	$ 2.0	9.4	$ 5.3	30.7	$ 7.3
	Shellfish	41.6	$ 275.1	3.6	$ 25.9	45.2	$ 301.1
	Other	-	$ -	1.3	$ 7.0	1.3	$ 7.0
	All Species	2,028.2	$ 1,169.2	697.4	$ 681.3	2,725.6	$ 1,850.5
2016	Groundfish	1,912.5	$ 708.9	307.7	$ 195.9	2,220.3	$ 904.8
	Salmon	110.1	$ 227.0	134.7	$ 238.5	244.8	$ 465.5
	Halibut	1.5	$ 20.3	6.9	$ 103.2	8.4	$ 123.5
	Herring	13.8	$ 1.8	9.6	$ 4.9	23.3	$ 6.7
	Shellfish	29.2	$ 255.7	3.0	$ 22.0	32.2	$ 277.6
	Other	-	$ -	1.2	$ 7.2	1.2	$ 7.2
	All Species	2,067.1	$ 1,213.8	463.0	$ 571.6	2,530.1	$ 1,785.4
2017	Groundfish	1,913.2	$ 753.6	301.9	$ 213.1	2,215.2	$ 966.6
	Salmon	115.4	$ 314.7	330.0	$ 444.0	445.4	$ 758.7
	Halibut	1.6	$ 19.6	7.0	$ 91.1	8.7	$ 110.7
	Herring	17.6	$ 2.4	13.3	$ 5.7	30.9	$ 8.1
	Shellfish	16.0	$ 164.6	2.7	$ 22.3	18.8	$ 186.9
	Other	-	$ -	1.0	$ 8.3	1.0	$ 8.3
	All Species	2,063.9	$ 1,255.0	656.0	$ 784.5	2,719.9	$ 2,039.4
2018	Groundfish	1,909.4	$ 827.1	238.9	$ 168.6	2,148.2	$ 995.7
	Salmon	116.2	$ 301.4	133.7	$ 249.3	249.8	$ 550.7
	Halibut	1.6	$ 14.7	6.8	$ 73.3	8.4	$ 88.0
	Herring	16.8	$ 2.3	3.7	$ 4.3	20.5	$ 6.6
	Shellfish	14.6	$ 149.6	4.6	$ 32.1	19.2	$ 181.7
	Other	-	$ -	1.4	$ 11.2	1.4	$ 11.2
	All Species	2,058.6	$ 1,295.1	389.0	$ 538.8	2,447.6	$ 1,833.9

Notes: These estimates include the value of catch from both federal and state of Alaska fisheries. The data have been adjusted to 2018 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 5: Production and real gross value of groundfish and non-groundfish products in the commercial fisheries off Alaska by species group and area of processing, 2014-2018 (1,000 metric tons product weight and $ millions, base year = 2018).

		Bering Sea and Aleutian Islands		Gulf of Alaska		All Alaska	
	Species	Quantity	Value	Quantity	Value	Quantity	Value
2014	Groundfish	843.8	$ 2,082.1	131.1	$ 412.8	974.9	$ 2,494.9
	Salmon	58.1	$ 478.8	176.8	$ 1,018.8	234.9	$ 1,497.5
	Halibut	0.6	$ 9.4	5.5	$ 107.6	6.2	$ 117.0
	Herring	19.5	$ 17.9	20.4	$ 25.9	39.9	$ 43.8
	Shellfish	23.2	$ 344.4	3.8	$ 62.0	27.0	$ 406.4
	Other	0	$ 0.5	1.2	$ 20.1	1.2	$ 20.7
	All Species	945.2	$ 2,933.1	338.9	$ 1,647.2	1,284.1	$ 4,580.2
2015	Groundfish	819.0	$ 2,015.6	126.0	$ 368.0	945.0	$ 2,383.5
	Salmon	70.9	$ 441.9	270.8	$ 1,090.9	341.7	$ 1,532.9
	Halibut	3.4	$ 22.7	6.1	$ 118.2	9.5	$ 140.9
	Herring	17.7	$ 19.5	10.1	$ 12.5	27.8	$ 32.0
	Shellfish	25.4	$ 338.7	3.9	$ 59.5	29.4	$ 398.2
	Other	0	$ 0.6	1.0	$ 18.5	1.0	$ 19.0
	All Species	936.5	$ 2,839.0	418.0	$ 1,667.6	1,354.4	$ 4,506.5
2016	Groundfish	838.2	$ 2,111.6	134.9	$ 376.2	973.1	$ 2,487.8
	Salmon	73.6	$ 542.9	130.3	$ 774.1	204.0	$ 1,317.1
	Halibut	2.4	$ 32.4	5.8	$ 112.4	8.2	$ 144.7
	Herring	10.2	$ 16.0	10.7	$ 13.6	20.9	$ 29.6
	Shellfish	18.0	$ 313.4	3.9	$ 64.4	22.0	$ 377.8
	Other	0	$ 0.3	1.1	$ 21.2	1.1	$ 21.5
	All Species	942.5	$ 3,016.6	286.7	$ 1,361.9	1,229.2	$ 4,378.5
2017	Groundfish	823.7	$ 2,198.8	136.8	$ 374.7	960.5	$ 2,573.5
	Salmon	74.6	$ 622.2	258.0	$ 1,311.4	332.7	$ 1,933.6
	Halibut	1.2	$ 23.0	6.3	$ 116.6	7.5	$ 139.7
	Herring	16.9	$ 14.9	14.2	$ 13.7	31.1	$ 28.6
	Shellfish	11.4	$ 227.9	1.7	$ 29.9	13.2	$ 257.8
	Other	*	$ *	2.1	$ 33.0	2.1	$ 33.0
	All Species	927.8	$ 3,086.9	419.1	$ 1,879.3	1,347.0	$ 4,966.2
2018	Groundfish	823.2	$ 2,245.9	113.5	$ 296.9	936.7	$ 2,542.8
	Salmon	79.8	$ 743.4	133.1	$ 821.1	212.9	$ 1,564.5
	Halibut	0.9	$ 15.4	5.6	$ 95.1	6.5	$ 110.5
	Herring	12.7	$ 10.6	3.7	$ 8.4	16.4	$ 19.0
	Shellfish	9.6	$ 173.4	2.7	$ 52.8	12.2	$ 226.2
	Other	*	$ *	1.5	$ 18.7	1.5	$ 18.7
	All Species	926.1	$ 3,188.8	260.2	$ 1,293.0	1,186.3	$ 4,481.8

Notes: These estimates include production resulting from catch in both federal and state of Alaska fisheries. The data have been adjusted to 2018 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 6: Discards and discard rates for groundfish catch off Alaska by gear, and species, 2014-2018 (1,000 metric tons, round weight).

		Fixed		Trawl		All Gear	
	Year	Total Discards	Discard Rate	Total Discards	Discard Rate	Total Discards	Discard Rate
Pollock	2014	0.7	11	15.1	1	15.9	1
	2015	0.8	10	10.1	1	10.9	1
	2016	0.8	12	9.4	1	10.2	1
	2017	0.8	11	9.3	1	10.1	1
	2018	0.6	10	12.8	1	13.5	1
Sablefish	2014	0.5	5	0.1	8	0.6	5
	2015	0.7	6	0.2	16	0.9	7
	2016	0.9	9	0.2	14	1.0	10
	2017	0.8	7	0.6	27	1.4	11
	2018	1.0	8	2.0	52	2.9	19
Pacific Cod	2014	4.9	2	4.1	4	9.0	3
	2015	3.5	2	1.2	1	4.8	1
	2016	3.5	2	0.5	1	4.1	1
	2017	2.8	1	0.9	1	3.7	1
	2018	2.3	1	0.7	1	3.0	1
Flatfish	2014	3.9	82	18.5	6	22.4	7
	2015	3.8	76	10.3	4	14.1	6
	2016	3.1	76	12.9	5	16.0	6
	2017	2.9	70	12.1	5	15.1	6
	2018	3.1	83	13.6	6	16.7	7
Rockfish	2014	1.0	46	3.4	5	4.4	7
	2015	0.9	42	3.4	5	4.3	6
	2016	0.8	42	3.7	5	4.6	6
	2017	0.9	46	6.7	10	7.6	11
	2018	1.1	50	4.8	7	6.0	8
Atka Mackerel	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
	2018	0	79	0.7	1	0.7	1
All Groundfish	2014	35.8	13	50.0	3	85.8	4
	2015	36.1	13	33.4	2	69.5	3
	2016	38.5	14	34.9	2	73.4	3
	2017	36.5	13	38.6	2	75.2	3
	2018	32.1	15	42.1	2	74.2	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 7: Prohibited species catch (PSC) by species, area and gear, 2014-2018 (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	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
		2018	133	0	0	0	339	48	271	67
	Trawl	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
		2018	1,016	542	17	309	31	16	184	1,583
	All Gear	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
		2018	1,148	542	17	309	370	64	455	1,650
Gulf of Alaska	Fixed	2014	10	-	-	-	-	0	133	0
		2015	22	-	-	-	0	0	128	-
		2016	44	-	-	-	0	0	63	0
		2017	15	-	-	-	-	0	4	0
		2018	1	-	-	-	0	0	18	-
	Trawl	2014	1,397	6	16	2	-	0	64	-
		2015	1,412	80	19	1	-	0	76	-
		2016	1,334	148	22	3	-	1	92	0
		2017	1,216	6	25	6	-	0	125	-
		2018	1,108	43	17	9	-	0	242	-
	All Gear	2014	1,407	6	16	2	-	0	198	0
		2015	1,435	80	19	1	0	0	204	-
		2016	1,378	148	22	3	0	1	155	0
		2017	1,231	6	25	6	-	0	129	0
		2018	1,109	43	17	9	0	0	260	-

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 8: Percentage of ex-vessel value of the groundfish catch off Alaska by area, residency, and species, 2014-2018; calculations based on COAR.

		Bering Sea and Aleutian Islands		Gulf of Alaska		All Alaska	
	Year	Alaska	Other	Alaska	Other	Alaska	Other
Pollock	2014	18 %	82 %	42 %	58 %	20 %	80 %
	2015	18 %	82 %	41 %	59 %	20 %	80 %
	2016	18 %	82 %	45 %	55 %	20 %	80 %
	2017	14 %	86 %	49 %	51 %	17 %	83 %
	2018	14 %	86 %	48 %	52 %	17 %	83 %
Sablefish	2014	31 %	69 %	56 %	44 %	54 %	46 %
	2015	36 %	64 %	56 %	44 %	55 %	45 %
	2016	32 %	68 %	59 %	41 %	58 %	42 %
	2017	38 %	62 %	61 %	39 %	59 %	41 %
	2018	27 %	73 %	62 %	38 %	61 %	39 %
Pacific Cod	2014	25 %	75 %	73 %	27 %	37 %	63 %
	2015	29 %	71 %	81 %	19 %	43 %	57 %
	2016	30 %	70 %	80 %	20 %	41 %	59 %
	2017	29 %	71 %	73 %	27 %	37 %	63 %
	2018	28 %	72 %	70 %	30 %	30 %	70 %
Flatfish	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 %
	2018	12 %	88 %	60 %	40 %	15 %	85 %
Rockfish	2014	3 %	97 %	27 %	73 %	13 %	87 %
	2015	3 %	97 %	26 %	74 %	13 %	87 %
	2016	1 %	99 %	28 %	72 %	14 %	86 %
	2017	6 %	94 %	41 %	59 %	20 %	80 %
	2018	12 %	88 %	39 %	61 %	24 %	76 %
Atka Mackerel	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 %
	2018	11 %	89 %	17 %	83 %	11 %	89 %
All Groundfish	2014	18 %	82 %	54 %	46 %	26 %	74 %
	2015	18 %	82 %	56 %	44 %	27 %	73 %
	2016	19 %	81 %	59 %	41 %	27 %	73 %
	2017	17 %	83 %	59 %	41 %	27 %	73 %
	2018	17 %	83 %	57 %	43 %	24 %	76 %

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 9: Number of vessels that caught groundfish off Alaska by area, vessel category, gear, and target, 2014-2018.

		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
Pollock	2014	87	34	121	70	2	72	138	34	172
	2015	87	33	120	64	1	65	131	33	164
	2016	89	33	122	70	-	70	138	33	171
	2017	87	31	118	65	-	65	133	31	164
	2018	85	27	112	69	2	71	133	28	161
Sablefish	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	268	5	273	275	9	284
	2018	16	8	24	269	6	275	278	12	290
Pacific Cod	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	238	9	247	329	45	374
	2018	141	49	190	147	3	150	260	50	310
Flatfish	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	8	26	34	19	4	23	27	27	54
	2018	9	26	35	33	4	37	41	27	68

Continued on next page.

Table 9: 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	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	3	16	19	127	11	138	130	19	149
	2018	3	21	24	112	9	121	115	24	139
Atka Mackerel	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
	2018	4	14	18	1	2	3	5	16	21
All Targets	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	643	70	713
	2018	191	66	257	466	16	482	587	68	655

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 10: Bering Sea & Aleutian Islands groundfish retained catch by vessel type, gear and species, 2014-2018 (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	2014	-	-	668.5	668.5	-	-	610.8	616.2	-	-	1,279.3	1,284.7
	2015	-	-	687.1	687.2	-	-	620.1	626.4	-	-	1,307.2	1,313.6
	2016	-	-	703.9	704.0	-	-	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
	2018	-	-	718.3	718.3	-	-	646.1	651.4	-	-	1,364.5	1,369.8
Pacific Cod	2014	2.2	34.9	42.1	79.1	122.4	7.6	35.4	165.4	124.6	42.5	77.4	244.5
	2015	0.8	29.9	37.7	68.4	127.9	8.0	34.7	170.5	128.7	37.9	72.4	239.0
	2016	0	39.4	46.5	86.0	126.9	7.6	37.1	171.6	126.9	47.1	83.7	257.6
	2017	0.1	43.2	44.7	88.0	124.3	5.8	31.9	162.1	124.4	49.0	76.7	250.0
	2018	0.9	42.2	39.3	82.5	100.9	4.3	30.3	135.5	101.8	46.5	69.6	217.9
Sablefish	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	*	0.1	0.2	0.1	*	0.5	0.5	0.2	*	0.5	0.7
	2018	0.2	0.3	0.3	0.8	0.1	*	0.6	0.7	0.3	0.3	0.9	1.5
Atka Mackerel	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
	2018	-	-	5.6	5.7	0	-	63.8	63.9	0	-	69.5	69.5
Yellowfin	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
	2018	-	-	12.2	12.3	0.2	-	114.9	115.0	0.2	-	127.1	127.3
Rock Sole	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	-	-	2.4	2.4	*	-	40.9	40.9	*	-	43.3	43.3
	2017	-	-	3.1	3.1	0	-	30.8	30.8	0	-	33.9	33.9
	2018	*	-	1.6	1.6	0	-	25.6	25.6	0	-	27.1	27.1

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Table 10: 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
Flathead Sole	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
	2018	-	-	0.8	0.8	*	-	9.4	9.4	*	-	10.2	10.2
Arrowtooth	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
	2018	0	-	0.2	0.2	0.1	-	5.6	5.7	0.1	-	5.8	5.9
Kamchatka Flounder	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
	2018	-	-	0	0	0	-	2.8	2.8	0	-	2.9	2.9
Turbot	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
	2018	-	-	0	0	0.3	-	1.5	1.7	0.3	-	1.5	1.7
Other Flatfish	2014	-	-	0.4	0.4	*	-	15.7	15.7	*	-	16.0	16.0
	2015	-	-	1.5	1.5	0	-	12.6	12.6	0	-	14.1	14.1
	2016	-	-	0.9	0.9	*	-	11.4	11.4	*	-	12.3	12.3
	2017	-	-	2.0	2.0	*	-	13.4	13.4	*	-	15.4	15.4
	2018	-	-	1.7	1.7	*	-	20.5	20.5	*	-	22.2	22.2
Pacific Ocean Perch	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
	2018	*	-	3.0	3.0	0	-	29.4	29.4	0	-	32.4	32.4

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Table 10: 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
Northern Rockfish	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
	2018	*	-	0.4	0.4	0	-	4.8	4.9	0	-	5.2	5.2
Other Rockfish	2014	0	-	0	0.1	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	0.1	0	-	0.7	0.8	0.1	-	0.8	0.8
	2018	0	-	0.1	0.1	0	-	1.0	1.0	0.1	-	1.0	1.1
Other Groundfish	2014	0	-	1.2	1.3	6.6	-	1.6	8.2	6.6	-	2.8	9.4
	2015	0	-	2.2	2.3	6.6	-	1.1	7.8	6.6	-	3.3	10.0
	2016	0	-	0.5	0.5	5.1	-	1.7	6.8	5.1	-	2.1	7.3
	2017	*	-	1.0	1.1	7.7	-	1.7	9.4	7.7	-	2.7	10.5
	2018	0	-	1.6	1.8	9.5	-	2.5	12.0	9.5	-	4.2	13.8
All Groundfish	2014	2.7	-	715.1	752.8	135.4	-	954.4	1,097.4	138.1	-	1,669.5	1,850.1
	2015	1.2	-	745.2	776.5	142.3	-	934.2	1,084.5	143.4	-	1,679.4	1,860.9
	2016	0.3	-	771.8	811.6	138.9	-	953.9	1,100.4	139.2	-	1,725.7	1,912.1
	2017	0.3	-	784.2	827.8	139.6	-	938.4	1,083.9	139.9	-	1,722.6	1,911.6
	2018	1.2	-	785.2	829.2	116.3	-	959.0	1,079.5	117.4	-	1,744.2	1,908.7

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 11: Bering Sea & Aleutian Islands groundfish retained catch by species, gear, and target fishery, 2017-2018, (1,000 metric tons, round weight).

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
Hook and Line	Catcher Processors	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
		2018	Sablefish	-	0	-	*	-	-	-	*	-	-	0	-	-	0
			Pacific Cod	5.3	0	100.8	0.1	0	*	0	0.1	0.2	*	0	0	9.5	116.0
			Turbot	*	0	*	*	*	-	-	0.2	-	*	0	-	*	0.2
			Rockfish	*	*	-	-	*	-	-	*	-	-	0	-	-	0
			Halibut	-	-	*	-	-	-	-	-	-	-	-	-	-	*
			All Targets	5.3	0.1	100.9	0.1	0	*	0	0.3	0.2	*	0	0	9.5	116.3
	Catcher Vessels	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
		2018	Sablefish	-	0.1	*	-	-	-	-	-	-	-	0	-	-	0.1
			Pacific Cod	*	*	0.9	0	-	-	*	-	-	-	0	-	*	0.9
			Halibut	-	0.1	0	*	-	-	-	-	-	-	0	-	0	0.2
			All Targets	*	0.2	0.9	0	-	-	*	-	-	-	0	-	0	1.2
Pot	Catcher Processors	2017	Sablefish	-	*	*	*	*	-	-	*	-	-	*	-	-	*
			Pacific Cod	0	-	5.8	-	-	-	-	-	*	-	-	-	*	5.8
			All Targets	0	*	5.8	*	*	-	-	*	*	-	*	-	*	5.8
		2018	Sablefish	-	*	*	*	*	-	-	-	-	-	-	-	-	*
			Pacific Cod	*	-	4.3	-	-	-	-	-	*	-	*	*	*	4.3
			All Targets	*	*	4.3	*	*	-	-	-	*	-	*	*	*	4.3
	Catcher Vessels	2017	Sablefish	-	*	-	-	-	-	-	-	-	-	-	-	-	*
			Pacific Cod	0	*	43.2	*	-	0	0	-	0	*	0	0	0.1	43.2
			All Targets	0	*	43.2	*	-	0	0	-	0	*	0	0	0.1	43.2
		2018	Sablefish	-	0.3	-	-	-	-	-	-	-	-	*	-	*	0.3
			Pacific Cod	0	*	42.2	0	-	0	0	-	0.1	0	0	0	0.2	42.5
			All Targets	0	0.3	42.2	0	-	0	0	-	0.1	0	0	0	0.2	42.8

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Table 11: 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	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	16.6	*	11.9	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
		2018	Pollock, Bottom	9.0	*	0.2	0.1	0	0.1	0.1	*	0.4	0.1	0.7	0	0	10.7
			Pollock, Pelagic	607.5	0	1.7	0.1	0	0.4	0.5	0	0.2	0	0.7	0	0.4	611.5
			Sablefish	0.1	0.4	0	0.1	0.1	0	*	0	-	0	0	-	*	0.6
			Pacific Cod	1.0	-	6.8	0	0	0	1.8	-	0.1	0	0	*	0.1	9.9
			Arrowtooth	0.1	0	0	0.4	0.1	0.1	0	0.1	0	0	0	*	0	0.9
			Kamchatka Flounder	0.1	0	0	0.4	1.3	0	*	0.2	*	0	0.1	*	*	2.1
			Flathead Sole	1.9	-	1.3	0.9	0	4.4	0.9	0	3.2	0.5	*	*	0.2	13.4
			Rock Sole	4.5	*	5.3	0.2	0	0.4	13.7	-	13.1	4.1	*	-	0.2	41.5
			Turbot	0.2	*	0	0.2	0.4	0.2	-	1.1	*	0.1	0.2	-	0	2.3
			Yellowfin	19.6	*	11.3	2.6	0.2	3.7	8.4	0	96.8	12.9	*	*	1.2	156.6
			Other Flatfish	0.4	*	0.4	0.1	0	0	0.1	0	1.1	2.8	0	-	0	4.9
			Rockfish	1.4	0.1	0.5	0.2	0.3	0.1	0	0.1	0	0	21.2	5.2	0.1	29.2
			Atka Mackerel	0.6	0.1	2.8	0.3	0.4	0	0.1	0	0	0	12.3	58.6	0.4	75.6
			All Targets	646.1	0.6	30.3	5.6	2.8	9.4	25.6	1.5	114.9	20.5	35.2	63.8	2.5	959.0

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Table 11: 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 Vessels	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	0.7	701.5
			Pacific Cod	0.3	0	38.2	0	0	0	0.3	-	0.1	0	0	*	0.1	39.0
			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	0.1	44.7	0.1	0.1	0.6	3.1	0	15.2	2.0	2.5	4.4	1.0	784.2
		2018	Pollock, Bottom	12.2	0	0.1	0	*	0	0	0	*	0	0.3	0.3	0.2	13.1
			Pollock, Pelagic	704.2	0.3	2.2	0.1	0	0.4	0.3	0	0.1	0.1	0.8	0.2	1.0	709.7
			Pacific Cod	0.4	*	35.0	0	0	0	0.1	-	0	0	0	*	0.1	35.7
			Flathead Sole	0.1	-	0.1	*	*	0.1	0.1	-	0.4	0.1	-	-	0.1	1.0
			Rock Sole	0.1	-	0.1	-	-	*	0.2	-	0.3	0.1	-	-	*	0.7
			Yellowfin	1.3	-	1.2	0.1	0	0.2	0.8	*	11.4	1.2	-	-	0.1	16.2
			Other Flatfish	0	-	0	-	-	*	0	-	0.1	0.1	-	-	*	0.2
			Rockfish	0	*	0.1	0	0	*	*	*	-	*	1.7	0.3	*	2.1
			Atka Mackerel	0.1	*	0.6	0	0	*	0	*	-	*	0.7	4.9	0.1	6.4
			All Targets	718.3	0.3	39.3	0.2	0	0.8	1.6	0	12.2	1.7	3.5	5.6	1.6	785.2
All Gear	Catch Proc.	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
		2018	All Targets	651.4	0.7	135.5	5.7	2.8	9.4	25.6	1.7	115.0	20.5	35.3	63.9	12.0	1,079.5
	Catch Vess.	2017	All Targets	710.4	0.2	88.0	0.1	0.1	0.6	3.1	0	15.2	2.0	2.5	4.4	1.1	827.8
		2018	All Targets	718.3	0.8	82.5	0.2	0	0.8	1.6	0	12.3	1.7	3.5	5.7	1.8	829.2

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 12: Bering Sea & Aleutian Islands ex-vessel prices in the groundfish fisheries by gear, and species, 2014-2018; 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	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
	2018	0.145	0.156	0.156	0.145	0.119	0.119	0.145	0.135	0.135
Pacific Cod	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
	2018	0.410	0.384	0.399	0.437	0.349	0.413	0.429	0.365	0.408
Sablefish	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	3.975	4.010	1.193	2.032	4.010	1.193	3.017
	2017	3.980	1.172	3.769	3.980	1.172	1.875	3.980	1.172	2.741
	2018	2.121	0.809	1.690	2.121	0.809	1.276	2.121	0.809	1.467
Atka Mackerel	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	0.352	0.015	0.356	0.356	0.015	0.356	0.356
	2018	0.203	0.348	0.347	0.203	0.348	0.348	0.203	0.348	0.348
Yellowfin	2014	0.131	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
	2018	0.015	0.216	0.175	0.015	0.216	0.216	0.015	0.216	0.216
Rock Sole	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	0.113	0.167	0.167	*	0.167	0.167	0.113	0.167	0.167
	2017	0.015	0.194	0.194	0.015	0.194	0.194	0.015	0.194	0.194
	2018	0.015	0.237	0.237	0.015	0.237	0.237	0.015	0.237	0.237

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Table 12: Continued

	Year	Shoreside Fixed	Shoreside Trawl	Shoreside All Gear	At Sea Fixed	At Sea Trawl	At Sea All Gear	All Sectors Fixed	All Sectors Trawl	All Sectors All Gear
Flathead Sole	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	0.004	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	0.220	0.015	0.221	0.221	0.015	0.221	0.221
	2018	0.016	0.255	0.254	*	0.254	0.254	0.016	0.254	0.254
Arrowtooth	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	0.211	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
	2018	0.016	0.218	0.217	0.015	0.218	0.214	0.015	0.218	0.214
Kamchatka Flounder	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
	2018	-	*	*	0.015	0.316	0.314	0.015	0.316	0.314
Turbot	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
	2018	-	0.685	0.685	0.015	0.685	0.589	0.015	0.685	0.589
Other Flatfish	2014	*	0.420	0.420	*	0.141	0.141	*	0.143	0.143
	2015	-	0.415	0.415	0.003	0.135	0.135	0.003	0.137	0.137
	2016	0.113	0.366	0.364	*	0.145	0.145	0.113	0.146	0.146
	2017	*	0.405	0.405	*	0.229	0.229	*	0.229	0.229
	2018	0.015	0.208	0.204	0.015	0.169	0.169	0.015	0.169	0.169
Pacific Ocean Perch	2014	0.630	0.238	0.241	0.630	0.238	0.238	0.630	0.238	0.239
	2015	*	0.209	0.209	0.833	0.209	0.209	0.833	0.209	0.209
	2016	0.780	0.180	0.180	*	0.180	0.180	0.780	0.180	0.180
	2017	*	0.218	0.218	1.001	0.218	0.218	1.001	0.218	0.218
	2018	*	0.217	0.217	0.771	0.217	0.217	0.771	0.217	0.217

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Table 12: Continued

	Year	Shoreside			At Sea			All Sectors		
		Fixed	Trawl	All Gear	Fixed	Trawl	All Gear	Fixed	Trawl	All Gear
Northern Rockfish	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
	2018	*	0.156	0.156	0.771	0.156	0.157	0.771	0.156	0.157
Other Rockfish	2014	0.639	0.191	0.565	0.630	0.425	0.444	0.634	0.423	0.451
	2015	0.823	0.366	0.745	0.833	0.277	0.344	0.830	0.278	0.365
	2016	0.721	0.301	0.646	0.780	0.351	0.390	0.764	0.351	0.400
	2017	0.932	0.327	0.802	1.001	0.381	0.424	0.984	0.381	0.436
	2018	0.894	0.295	0.722	0.771	0.296	0.313	0.819	0.296	0.325
Other Groundfish	2014	0.568	0.151	0.183	0.568	0.151	0.477	0.568	0.151	0.440
	2015	0.154	0.122	0.122	0.154	0.049	0.136	0.154	0.093	0.133
	2016	0.280	0.150	0.171	0.280	0.017	0.213	0.280	0.042	0.210
	2017	0.306	0.207	0.217	0.306	0.015	0.246	0.306	0.067	0.243
	2018	0.324	0.181	0.198	0.324	0.024	0.253	0.324	0.072	0.248

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 13: Bering Sea & Aleutian Islands ex-vessel value of the groundfish catch by vessel category, gear, and species, 2014-2018; 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	2014	-	-	226.54	226.55	-	-	200.28	201.43	-	-	426.82	427.97
	2015	-	-	227.42	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	-	-	352.68	352.89
	2018	-	-	236.67	236.67	-	-	169.88	171.56	-	-	406.56	408.24
Pacific Cod	2014	1.38	22.13	21.27	44.77	80.21	4.99	24.74	109.94	81.59	27.12	46.01	154.71
	2015	0.45	17.33	16.33	34.12	83.66	5.22	20.84	109.72	84.12	22.55	37.17	143.84
	2016	0.04	24.18	20.42	44.64	81.58	4.89	25.20	111.67	81.62	29.07	45.62	156.31
	2017	0.08	31.63	22.40	54.10	93.25	4.38	26.36	123.99	93.33	36.01	48.75	178.09
	2018	0.84	38.16	26.07	65.07	97.20	4.12	29.90	131.22	98.04	42.28	55.97	196.29
Sablefish	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	1.96	*	0.01	1.97	1.04	-	0.73	1.76	2.99	*	0.74	3.73
	2017	1.41	*	0.14	1.55	0.73	*	1.61	2.34	2.14	*	1.75	3.89
	2018	1.01	1.59	0.49	3.08	0.28	*	1.11	1.38	1.28	1.59	1.59	4.47
Atka Mackerel	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	-	-	0.01	0.01	-	-	50.24	50.24	-	-	50.25	50.25
	2018	-	-	0.39	0.39	-	-	53.02	53.03	-	-	53.42	53.42
Yellowfin	2014	-	-	0.07	0.07	0.01	-	42.07	42.08	0.01	-	42.14	42.15
	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
	2018	-	-	0.13	0.13	0.01	-	60.38	60.38	0.01	-	60.51	60.52
Rock Sole	2014	-	-	0.27	0.27	*	-	16.50	16.50	*	-	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	-	14.52	14.52
	2018	*	-	0.19	0.19	0	-	14.02	14.02	0	-	14.21	14.21

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Table 13: 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	2014	*	-	0.34	0.34	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	-	-	0.11	0.11	-	-	3.74	3.74	-	-	3.85	3.85
	2017	-	-	0.15	0.15	0	-	3.80	3.80	0	-	3.95	3.95
	2018	-	-	0.21	0.21	*	-	5.50	5.50	*	-	5.71	5.71
Arrowtooth	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
	2018	0	-	0.05	0.05	0	-	2.73	2.74	0	-	2.78	2.78
Kamchatka Flounder	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
	2018	-	-	0	0	0	-	1.99	1.99	0	-	1.99	1.99
Turbot	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
	2018	-	-	0.01	0.01	0.01	-	2.27	2.28	0.01	-	2.28	2.29
Other Flatfish	2014	-	-	0.13	0.13	*	-	5.14	5.14	*	-	5.26	5.26
	2015	-	-	0.08	0.08	0	-	4.19	4.19	0	-	4.26	4.26
	2016	-	-	0.06	0.06	*	-	3.90	3.90	*	-	3.96	3.96
	2017	-	-	0.08	0.08	*	-	7.76	7.76	*	-	7.84	7.84
	2018	-	-	0.07	0.07	0	-	8.19	8.19	0	-	8.26	8.26
Pacific Ocean Perch	2014	0	-	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	-	0.25	0.25	*	-	11.78	11.78	0	-	12.03	12.03
	2017	-	-	0.31	0.31	0	-	14.24	14.24	0	-	14.56	14.56
	2018	*	-	0.54	0.54	0	-	14.98	14.98	0	-	15.53	15.53

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Table 13: 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
Northern Rockfish	2014	-	-	0.02	0.02	0	-	0.85	0.85	0	-	0.87	0.87
	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
	2018	*	-	0.01	0.01	0.01	-	1.80	1.81	0.01	-	1.81	1.81
Other Rockfish	2014	0.07	-	0	0.07	0.12	-	0.81	0.92	0.18	-	0.81	1.00
	2015	0.06	-	0.01	0.07	0.17	-	0.41	0.57	0.23	-	0.41	0.65
	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
	2018	0.04	-	0.01	0.05	0.06	-	0.68	0.74	0.11	-	0.68	0.80
Other Groundfish	2014	0.01	-	0.38	0.49	8.23	-	0.61	8.83	8.24	-	0.98	9.33
	2015	0	-	0.54	0.56	2.25	-	0.14	2.39	2.25	-	0.69	2.96
	2016	0	-	0.13	0.18	3.16	-	0.07	3.23	3.16	-	0.20	3.41
	2017	*	-	0.34	0.40	5.19	-	0.07	5.25	5.19	-	0.41	5.65
	2018	0	-	0.51	0.64	6.78	-	0.15	6.93	6.78	-	0.67	7.56
All Species	2014	6.00	-	249.38	277.61	91.68	-	347.14	443.81	97.68	-	596.52	721.43
	2015	3.44	-	245.07	266.84	89.46	-	312.82	407.50	92.89	-	557.89	674.34
	2016	2.04	-	230.49	256.77	86.41	-	308.91	400.21	88.46	-	539.40	656.98
	2017	1.54	-	229.17	262.39	99.57	-	327.70	431.65	101.10	-	556.87	694.04
	2018	1.89	-	265.35	307.12	106.03	-	366.60	476.75	107.92	-	631.95	783.87

Notes: Ex-vessel value is calculated by multiplying ex-vessel prices by the retained round weight catch. Refer to Table 12 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 14: 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, 2014-2018; 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	2014	88	14	2,789.81	245.50	33.93	20.00
	2015	86	15	2,814.32	242.03	35.93	22.07
	2016	89	18	2,594.84	230.94	35.08	20.23
	2017	86	16	2,652.07	228.08	32.61	19.22
	2018	86	17	3,043.01	261.70	33.33	21.00
AFA CP	2014	17	17	12,184.00	207.13	28.62	16.88
	2015	17	17	10,984.64	186.74	27.72	17.03
	2016	16	16	10,178.78	162.86	24.74	14.27
	2017	16	16	9,909.06	158.55	22.67	13.36
	2018	15	15	10,999.90	165.00	21.01	13.24
A80	2014	18	18	7,227.05	130.09	17.98	10.60
	2015	18	18	6,477.65	116.60	17.31	10.63
	2016	19	19	6,599.32	125.39	19.05	10.98
	2017	19	19	7,867.07	149.47	21.37	12.60
	2018	19	19	8,741.75	166.09	21.15	13.33
BSAI Trawl	2014	12	9	1,131.85	13.58	1.88	1.11
	2015	13	12	969.00	12.60	1.87	1.15
	2016	13	12	1,602.91	20.84	3.17	1.83
	2017	16	15	1,354.81	21.68	3.10	1.83
	2018	21	18	1,893.33	39.76	5.06	3.19

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Table 14: 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	2014	6	7	*	*	*	*
	2015	5	5	*	*	*	*
	2016	1	1	*	*	*	*
	2017	5	4	*	*	*	*
	2018	7	6	*	*	*	*
CP Hook and Line	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
	2018	25	25	4,239.21	105.98	13.50	8.51
Sablefish IFQ	2014	22	10	391.70	8.62	1.19	0.70
	2015	18	8	231.84	4.17	0.62	0.38
	2016	20	7	186.27	3.73	0.57	0.33
	2017	17	10	382.27	6.50	0.93	0.55
	2018	21	9	167.77	3.52	0.45	0.28
Pot	2014	56	18	486.33	27.23	3.76	2.22
	2015	48	18	470.43	22.58	3.35	2.06
	2016	56	17	520.03	29.12	4.42	2.55
	2017	64	17	563.56	36.07	5.16	3.04
	2018	78	17	543.57	42.40	5.40	3.40

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 15: Bering Sea & Aleutian Islands production of groundfish products by species, 2014-2018, (1,000 metric tons product weight).

		2014			2015			2016			2017			2018		
	Product	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
Pollock	Whole Fish	0.31	1.09	1.40	1.11	0.68	1.80	0.10	0.69	0.79	0.04	0.25	0.30	0.01	0.27	0.28
	Head And Gut	34.77	2.77	37.54	25.38	*	25.38	28.61	0.04	28.65	24.21	-	24.21	21.47	*	21.47
	Roe	11.71	8.89	20.60	12.01	6.74	18.75	10.44	3.82	14.26	11.71	6.72	18.43	13.00	7.64	20.64
	Deep-Skin Fillets	32.68	11.01	43.69	34.56	9.22	43.77	38.24	8.55	46.79	45.10	13.03	58.13	40.96	15.75	56.72
	Other Fillets	63.68	68.41	132.09	57.44	65.80	123.24	49.61	64.89	114.50	42.13	56.69	98.82	53.94	56.97	110.91
	Surimi	87.81	83.52	171.33	95.94	91.80	187.74	100.51	90.31	190.82	102.60	94.13	196.73	104.36	92.16	196.53
	Minced Fish	19.98	6.09	26.06	19.71	5.47	25.19	22.38	11.69	34.07	17.05	9.44	26.49	13.06	7.35	20.41
	Fishmeal	23.25	33.60	56.85	26.45	34.59	61.03	27.15	36.25	63.40	27.94	34.69	62.63	28.22	38.36	66.58
	Other Products	13.57	22.40	35.97	12.60	21.44	34.04	14.52	27.09	41.61	13.32	24.88	38.20	13.97	24.93	38.90
	All Products	287.75	237.78	525.54	285.20	235.74	520.94	291.54	243.34	534.89	284.10	239.84	523.94	289.00	243.43	532.44
Pacific Cod	Whole Fish	0.19	0.79	0.98	0.12	0.39	0.51	1.36	0.43	1.79	0.22	*	0.22	0.16	0.15	0.32
	Head And Gut	81.36	19.20	100.56	84.84	15.98	100.82	84.44	14.24	98.68	80.10	12.28	92.38	66.10	12.94	79.04
	Roe	0.69	2.77	3.46	0.58	1.79	2.37	0.52	1.61	2.13	0.47	1.73	2.20	1.05	2.50	3.55
	Fillets	0.15	8.27	8.42	0.20	6.08	6.28	0.14	9.89	10.03	0.14	9.88	10.01	0.14	10.23	10.36
	Other Products	3.03	7.06	10.10	5.23	5.26	10.48	6.61	7.16	13.77	7.07	7.66	14.73	6.81	7.33	14.14
	All Products	85.42	38.09	123.51	90.97	29.49	120.47	93.06	33.34	126.40	87.99	31.55	119.54	74.27	33.15	107.41
Sablefish	Head And Gut	0.15	0.54	0.69	0.08	0.38	0.46	0.22	0.28	0.50	0.42	0.45	0.87	0.56	0.40	0.96
	Other Products	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.02	0.05	0.04	0.08	0.09	0.03	0.13
	All Products	0.16	0.55	0.71	0.09	0.39	0.47	0.23	0.29	0.52	0.46	0.49	0.95	0.65	0.43	1.09

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Table 15: Continued

		2014			2015			2016			2017			2018		
	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	3.17	0.08	3.25	3.31	*	3.31	2.13	0.01	2.14	6.40	*	6.40	6.62	0.29	6.91
	Head And Gut	17.12	-	17.12	29.09	-	29.09	30.53	-	30.53	35.45	-	35.45	36.21	*	36.21
	Other Products	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.02
	All Products	20.29	0.08	20.38	32.40	0.00	32.40	32.66	0.01	32.67	41.85	0.00	41.86	42.83	0.30	43.13
Yellowfin	Whole Fish	16.72	*	16.72	7.18	-	7.18	9.76	-	9.76	9.23	-	9.23	6.88	0.20	7.08
	Head And Gut	76.69	-	76.69	66.73	-	66.73	68.36	-	68.36	67.77	-	67.77	69.59	-	69.59
	Fillets	-	-	-	-	-	-	-	-	-	*	-	*	-	-	-
	Other Products	0.36	0.02	0.38	0.08	0.01	0.09	0.16	0.01	0.16	0.09	0.00	0.10	0.05	0.02	0.08
	All Products	93.77	0.02	93.79	73.98	0.01	73.99	78.28	0.01	78.28	77.10	0.00	77.10	76.53	0.23	76.75
Rock Sole	Whole Fish	2.53	*	2.53	0.47	-	0.47	0.63	*	0.63	1.56	*	1.56	0.43	0.06	0.49
	Head And Gut	25.87	-	25.87	24.48	-	24.48	23.90	-	23.90	17.33	-	17.33	14.21	*	14.21
	Fillets	0.00	-	0.00	0.01	-	0.01	*	-	*	*	*	*	0.00	-	0.00
	Other Products	0.31	0.08	0.38	0.12	0.06	0.18	0.08	0.08	0.16	0.13	0.07	0.20	0.07	0.03	0.10
	All Products	28.71	0.08	28.79	25.08	0.06	25.13	24.61	0.08	24.69	19.02	0.07	19.09	14.72	0.08	14.80
Flathead Sole	Whole Fish	0.56	0.13	0.69	0.26	0.01	0.26	0.52	*	0.52	0.10	*	0.10	0.37	0.06	0.43
	Head And Gut	6.96	-	6.96	4.45	-	4.45	4.13	-	4.13	4.03	-	4.03	5.09	*	5.09
	Fillets	*	-	*	0.00	-	0.00	-	-	-	-	-	-	*	*	*
	Other Products	0.25	0.09	0.34	0.30	0.08	0.37	0.11	0.05	0.16	0.05	0.05	0.11	0.05	0.04	0.10
	All Products	7.77	0.21	7.99	5.00	0.09	5.09	4.75	0.05	4.81	4.19	0.05	4.25	5.52	0.10	5.62

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Table 15: Continued

	Product	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	2018 At Sea	2018 Shoreside	2018 All
Arrowtooth	Whole Fish	0.03	*	0.03	*	*	*	0.25	*	0.25	*	-	*	*	-	*
	Head And Gut	6.89	-	6.89	4.73	*	4.73	4.39	-	4.39	3.46	-	3.46	2.92	-	2.92
	Other Products	0.05	0.09	0.14	0.03	0.03	0.06	0.01	0.02	0.03	0.01	0.02	0.03	0.01	0.04	0.05
	All Products	6.98	0.09	7.06	4.75	0.03	4.79	4.64	0.02	4.67	3.46	0.02	3.48	2.93	0.04	2.97
Kamchatka Flounder	Whole Fish	-	-	-	-	-	-	*	-	*	-	-	-	-	-	-
	Head And Gut	5.33	-	5.33	2.79	-	2.79	2.72	-	2.72	2.05	-	2.05	1.40	-	1.40
	Fishmeal	0.01	-	0.01	0.01	-	0.01	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00
	Other Products	-	-	-	-	-	-	-	-	-	-	-	-	*	-	*
	All Products	5.34	-	5.34	2.80	-	2.80	2.72	-	2.72	2.05	-	2.05	1.40	-	1.40
Turbot	Whole Fish	-	*	*	-	*	*	0.03	-	0.03	-	-	-	-	-	-
	Head And Gut	0.75	*	0.75	1.19	-	1.19	1.29	*	1.29	1.75	-	1.75	1.19	-	1.19
	Other Products	0.23	0.00	0.24	0.43	0.00	0.43	0.51	0.00	0.51	0.68	0.00	0.68	0.42	0.00	0.42
	All Products	0.99	0.00	0.99	1.63	0.00	1.63	1.83	0.00	1.83	2.43	0.00	2.43	1.61	0.00	1.61
Other Flatfish	Whole Fish	1.58	*	1.58	2.37	*	2.37	2.05	*	2.05	1.33	0.04	1.37	0.36	*	0.36
	Head And Gut	6.67	-	6.67	5.73	-	5.73	4.79	*	4.79	7.11	*	7.11	11.55	*	11.55
	Fillets	-	-	-	-	-	-	-	-	-	-	*	*	-	*	*
	Other Products	0.09	0.01	0.11	0.01	0.02	0.02	0.02	0.01	0.03	0.01	0.01	0.02	0.04	0.01	0.05
	All Products	8.34	0.01	8.36	8.11	0.02	8.13	6.87	0.01	6.87	8.45	0.04	8.49	11.95	0.01	11.96
Pacific Ocean Perch	Whole Fish	*	0.21	0.21	-	0.37	0.37	0.31	0.43	0.74	0.41	0.41	0.82	2.08	0.13	2.21
	Head And Gut	15.95	*	15.95	14.90	*	14.90	14.15	*	14.15	13.82	*	13.82	14.17	*	14.17
	Other Products	0.04	0.01	0.05	0.09	0.07	0.16	0.21	0.02	0.23	0.27	0.03	0.30	0.19	0.06	0.25
	All Products	15.98	0.23	16.21	14.99	0.44	15.42	14.67	0.45	15.12	14.50	0.44	14.94	16.44	0.19	16.63

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Table 15: Continued

		2014			2015			2016			2017			2018		
	Product	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	1.22	-	1.22	3.59	-	3.59	1.96	-	1.96	2.03	-	2.03	2.26	*	2.26
	Other Products	0.01	0.00	0.01	0.01	*	0.01	0.01	0.00	0.01	0.00	*	0.00	0.00	*	0.00
	All Products	1.23	0.01	1.24	3.59	0.01	3.60	1.97	0.00	1.97	2.03	*	2.03	2.27	*	2.27
Other Rockfish	Whole Fish	0.24	0.02	0.26	0.10	*	0.10	0.15	*	0.15	0.17	0.00	0.18	0.15	*	0.15
	Head And Gut	0.31	0.02	0.33	0.25	0.02	0.27	0.29	0.02	0.30	0.27	0.01	0.28	0.35	0.01	0.36
	Other Products	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01
	All Products	0.55	0.04	0.59	0.35	0.03	0.38	0.44	0.02	0.46	0.45	0.02	0.47	0.50	0.01	0.51
Other Groundfish	Whole Fish	*	0.34	0.34	*	0.38	0.38	0.00	0.15	0.16	*	0.26	0.26	0.02	0.50	0.52
	Head And Gut	0.01	*	0.01	0.01	*	0.01	0.01	-	0.01	0.01	*	0.01	0.04	0.07	0.12
	Roe	-	-	-	-	-	-	-	-	-	-	-	-	*	-	*
	Fillets	-	-	-	-	-	-	*	-	*	-	-	-	*	-	*
	Fishmeal	0.10	0.17	0.27	0.05	0.48	0.53	0.05	0.15	0.19	0.06	0.17	0.23	0.04	0.07	0.12
	Other Products	2.26	0.12	2.38	2.06	0.31	2.37	1.79	0.02	1.81	2.40	*	2.40	3.42	0.02	3.44
	All Products	2.37	0.63	3.00	2.12	1.17	3.30	1.85	0.32	2.17	2.48	0.43	2.91	3.52	0.67	4.20

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Table 15: Continued

	Product	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	2018 At Sea	2018 Shoreside	2018 All
All Species	Whole Fish	25.34	2.66	28.00	14.90	1.84	16.75	17.29	1.71	19.00	19.48	0.97	20.45	17.09	1.66	18.75
	Head And Gut	280.06	22.53	302.58	268.26	16.38	284.64	269.78	14.58	284.36	259.81	12.75	272.56	247.12	13.42	260.55
	Roe	12.40	11.66	24.06	12.59	8.52	21.12	10.96	5.43	16.39	12.17	8.46	20.63	14.06	10.14	24.19
	Fillets	0.15	8.27	8.42	0.21	6.08	6.28	0.14	9.89	10.03	0.14	9.88	10.01	0.14	10.23	10.36
	Deep-Skin Fillets	32.68	11.01	43.69	34.56	9.22	43.77	38.24	8.55	46.79	45.10	13.03	58.13	40.96	15.75	56.72
	Other Fillets	63.68	68.41	132.09	57.44	65.80	123.24	49.61	64.89	114.50	42.13	56.69	98.82	53.94	56.97	110.91
	Surimi	87.81	83.52	171.33	95.94	91.80	187.74	100.51	90.31	190.82	102.60	94.13	196.73	104.36	92.16	196.53
	Minced Fish	19.98	6.09	26.06	19.71	5.47	25.19	22.38	11.69	34.07	17.05	9.44	26.49	13.06	7.35	20.41
	Fishmeal	23.36	33.77	57.13	26.50	35.07	61.57	27.20	36.40	63.60	28.01	34.86	62.87	28.26	38.43	66.70
	Other Products	20.22	29.91	50.13	20.97	27.28	48.24	24.03	34.48	58.51	24.09	32.76	56.85	25.13	32.55	57.68
	All Products	565.67	277.82	843.49	551.07	267.46	818.53	560.13	277.94	838.06	550.58	272.96	823.54	544.13	278.66	822.79

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 16: Bering Sea & Aleutian Islands gross value of groundfish products by species, 2014-2018, ($ million).

		2014			2015			2016			2017			2018		
	Product	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
Pollock	Whole Fish	0.3	0.8	1.1	1.1	0.8	1.9	0.1	0.5	0.6	0.0	0.2	0.3	0.0	0.3	0.3
	Head And Gut	49.4	3.9	53.3	35.6	*	35.6	48.9	0.0	48.9	29.0	-	29.0	27.5	*	27.5
	Roe	85.5	46.9	132.4	69.9	24.8	94.7	72.4	17.1	89.4	85.9	31.0	116.9	90.5	40.9	131.4
	Deep-Skin Fillets	117.2	36.4	153.6	120.3	29.9	150.2	142.7	26.3	169.0	150.1	41.3	191.4	136.7	49.5	186.2
	Other Fillets	183.3	195.5	378.8	176.1	172.6	348.7	141.9	191.3	333.2	107.8	145.8	253.5	154.2	164.4	318.6
	Surimi	230.8	186.5	417.3	268.4	204.4	472.8	291.9	210.2	502.1	370.2	207.2	577.4	316.7	234.1	550.8
	Minced Fish	26.3	7.9	34.2	29.1	7.9	37.1	39.7	19.2	58.9	26.1	13.1	39.2	19.7	10.8	30.4
	Fishmeal	49.1	47.0	96.1	53.7	47.8	101.5	50.3	53.4	103.7	45.7	50.7	96.4	48.1	51.8	99.9
	Other Products	14.0	20.6	34.6	14.4	18.1	32.5	20.4	25.2	45.6	16.1	17.9	34.0	17.2	20.7	37.9
	All Products	756.0	545.4	1,301.4	768.7	506.3	1,275.0	808.3	543.2	1,351.5	830.8	507.3	1,338.1	810.5	572.6	1,383.1
Pacific Cod	Whole Fish	0.1	1.7	1.8	0.1	0.5	0.6	2.1	0.7	2.8	0.4	*	0.4	0.3	0.3	0.5
	Head And Gut	236.2	41.4	277.6	266.8	36.3	303.1	250.6	30.7	281.4	287.9	32.5	320.4	276.0	48.5	324.5
	Roe	1.4	6.1	7.5	0.8	3.0	3.8	0.6	2.3	2.8	0.6	2.7	3.4	2.5	7.2	9.7
	Fillets	0.3	49.5	49.8	0.5	36.4	36.9	0.4	74.1	74.5	0.5	81.2	81.7	0.9	93.3	94.2
	Other Products	4.9	10.9	15.9	11.1	9.5	20.5	15.0	11.8	26.9	13.6	15.2	28.7	11.8	18.0	29.8
	All Products	242.9	109.6	352.5	279.2	85.7	365.0	268.8	119.5	388.3	303.1	131.6	434.7	291.6	167.3	458.8
Sablefish	Head And Gut	2.5	8.0	10.5	1.5	6.2	7.8	3.0	4.9	7.9	4.7	7.2	11.9	4.2	5.0	9.3
	Other Products	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.5	0.6	0.1	0.6	0.8
	All Products	2.5	8.0	10.5	1.6	6.3	7.8	3.0	5.0	8.0	4.8	7.7	12.5	4.4	5.7	10.0

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Table 16: Continued

		2014			2015			2016			2017			2018		
	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	4.6	0.1	4.7	3.9	*	3.9	4.1	0.0	4.1	11.9	*	11.9	15.0	0.5	15.5
	Head And Gut	56.9	-	56.9	69.1	-	69.1	69.6	-	69.6	114.8	-	114.8	112.7	*	112.7
	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	61.5	0.1	61.6	73.0	0.0	73.0	73.7	0.0	73.7	126.6	0.0	126.6	127.7	0.5	128.1
Yellowfin	Whole Fish	17.1	*	17.1	7.0	-	7.0	10.6	-	10.6	12.4	-	12.4	10.8	0.3	11.1
	Head And Gut	76.9	-	76.9	71.2	-	71.2	83.3	-	83.3	98.2	-	98.2	125.4	-	125.4
	Fillets	-	-	-	-	-	-	-	-	-	*	-	*	-	-	-
	Other Products	0.7	0.0	0.8	0.2	0.0	0.2	0.3	0.0	0.3	0.2	0.0	0.2	0.1	0.0	0.1
	All Products	94.7	0.0	94.7	78.4	0.0	78.4	94.2	0.0	94.2	110.8	0.0	110.8	136.3	0.3	136.6
Rock Sole	Whole Fish	2.9	*	2.9	0.5	-	0.5	0.8	*	0.8	2.0	*	2.0	0.7	0.1	0.8
	Head And Gut	31.4	-	31.4	29.4	-	29.4	33.0	-	33.0	28.0	-	28.0	28.2	*	28.2
	Fillets	0.0	-	0.0	0.0	-	0.0	*	-	*	*	*	*	0.0	-	0.0
	Other Products	0.6	0.2	0.8	0.2	0.1	0.3	0.1	0.1	0.3	0.2	0.1	0.3	0.1	0.0	0.2
	All Products	35.0	0.2	35.2	30.2	0.1	30.3	33.9	0.1	34.0	30.2	0.1	30.3	29.0	0.1	29.1
Flathead Sole	Whole Fish	0.8	0.1	0.9	0.3	0.0	0.3	0.6	*	0.6	0.1	*	0.1	0.7	0.1	0.7
	Head And Gut	10.8	-	10.8	6.2	-	6.2	6.9	-	6.9	7.7	-	7.7	11.0	*	11.0
	Fillets	*	-	*	0.0	-	0.0	-	-	-	-	-	-	*	*	*
	Other Products	0.5	0.2	0.7	0.6	0.1	0.7	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1
	All Products	12.1	0.3	12.4	7.0	0.2	7.2	7.7	0.1	7.8	7.9	0.1	8.0	11.8	0.1	11.9

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Table 16: Continued

	Product	2014			2015			2016			2017			2018		
		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	12.5	-	12.5	7.7	*	7.7	8.3	-	8.3	9.9	-	9.9	5.6	-	5.6
	Other Products	0.1	0.2	0.3	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1
	All Products	12.7	0.2	12.8	7.8	0.1	7.8	8.6	0.0	8.7	9.9	0.0	9.9	5.6	0.1	5.7
Kamchatka Flounder	Whole Fish	-	-	-	-	-	-	*	-	*	-	-	-	-	-	-
	Head And Gut	8.7	-	8.7	4.1	-	4.1	5.0	-	5.0	6.7	-	6.7	3.9	-	3.9
	Fishmeal	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0
	Other Products	-	-	-	-	-	-	-	-	-	-	-	-	*	-	*
	All Products	8.7	-	8.7	4.1	-	4.1	5.0	-	5.0	6.7	-	6.7	3.9	-	3.9
Turbot	Whole Fish	-	*	*	-	*	*	0.1	-	0.1	-	-	-	-	-	-
	Head And Gut	3.5	*	3.5	5.3	-	5.3	7.2	*	7.2	9.3	-	9.3	6.4	-	6.4
	Other Products	1.0	0.0	1.0	1.6	0.0	1.6	2.0	0.0	2.0	2.2	0.0	2.2	1.0	0.0	1.0
	All Products	4.4	0.0	4.4	6.9	0.0	6.9	9.3	0.0	9.3	11.5	0.0	11.5	7.4	0.0	7.4
Other Flatfish	Whole Fish	2.3	*	2.3	2.7	*	2.7	2.7	*	2.7	2.3	0.1	2.4	0.5	*	0.5
	Head And Gut	7.2	-	7.2	5.8	-	5.8	5.0	*	5.0	12.7	*	12.7	16.4	*	16.4
	Fillets	-	-	-	-	-	-	-	-	-	-	*	*	-	*	*
	Other Products	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
	All Products	9.7	0.0	9.8	8.4	0.0	8.5	7.7	0.0	7.7	15.0	0.1	15.2	17.0	0.0	17.0
Pacific Ocean Perch	Whole Fish	*	0.3	0.3	-	0.5	0.5	0.4	0.5	1.0	0.5	0.5	1.0	2.8	0.2	3.0
	Head And Gut	42.2	*	42.2	34.9	*	34.9	29.1	*	29.1	34.6	*	34.6	34.5	*	34.5
	Other Products	0.1	0.0	0.1	0.2	0.1	0.3	0.3	0.0	0.3	0.4	0.0	0.4	0.3	0.1	0.4
	All Products	42.3	0.3	42.6	35.1	0.6	35.7	29.8	0.6	30.3	35.5	0.5	36.1	37.6	0.3	37.9

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Table 16: Continued

	Product	2014			2015			2016			2017			2018		
		At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All	At Sea	Shoreside	All
Northern Rockfish	Whole Fish	*	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	*	*	*	*	*
	Head And Gut	2.5	-	2.5	5.9	-	5.9	2.8	-	2.8	3.4	-	3.4	3.9	*	3.9
	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	2.5	0.0	2.5	5.9	0.0	5.9	2.8	0.0	2.8	3.4	*	3.4	3.9	*	3.9
Other Rockfish	Whole Fish	1.1	0.0	1.1	0.4	*	0.4	0.7	*	0.7	0.9	0.0	0.9	0.6	*	0.6
	Head And Gut	0.8	0.1	0.9	0.6	0.2	0.8	0.7	0.1	0.8	0.7	0.1	0.7	0.9	0.0	0.9
	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	0.1	2.0	1.0	0.2	1.2	1.4	0.1	1.5	1.6	0.1	1.6	1.4	0.0	1.5
Other Groundfish	Whole Fish	*	0.5	0.5	*	0.4	0.4	0.0	0.3	0.3	*	0.5	0.5	0.0	1.2	1.2
	Head And Gut	0.0	*	0.0	0.0	*	0.0	0.0	-	0.0	0.0	*	0.0	0.1	0.4	0.5
	Roe	-	-	-	-	-	-	-	-	-	-	-	-	*	-	*
	Fillets	-	-	-	-	-	-	*	-	*	-	-	-	*	-	*
	Fishmeal	0.1	0.2	0.3	0.1	0.9	1.0	0.1	0.2	0.3	0.1	0.3	0.4	0.1	0.1	0.2
	Other Products	3.7	0.7	4.3	3.9	1.1	5.1	2.8	0.2	3.0	4.5	*	4.5	7.6	0.1	7.7
	All Products	3.8	1.4	5.2	4.1	2.5	6.6	2.9	0.7	3.7	4.6	0.8	5.3	7.8	1.8	9.6

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Table 16: Continued

	Product	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	2018 At Sea	2018 Shoreside	2018 All
All Species	Whole Fish	29.3	3.5	32.8	15.9	2.2	18.1	22.6	2.0	24.6	30.6	1.3	31.9	31.4	2.8	34.2
	Head And Gut	541.5	53.3	594.8	544.1	42.7	586.9	553.4	35.8	589.1	647.6	39.8	687.5	656.8	54.0	710.8
	Roe	86.8	53.1	139.9	70.7	27.8	98.5	72.9	19.3	92.3	86.6	33.7	120.3	93.0	48.1	141.2
	Fillets	0.4	49.5	49.8	0.6	36.4	37.0	0.4	74.1	74.5	0.5	81.2	81.7	0.9	93.3	94.2
	Deep-Skin Fillets	117.2	36.4	153.6	120.3	29.9	150.2	142.7	26.3	169.0	150.1	41.3	191.4	136.7	49.5	186.2
	Other Fillets	183.3	195.5	378.8	176.1	172.6	348.7	141.9	191.3	333.2	107.8	145.8	253.5	154.2	164.4	318.6
	Surimi	230.8	186.5	417.3	268.4	204.4	472.8	291.9	210.2	502.1	370.2	207.2	577.4	316.7	234.1	550.8
	Minced Fish	26.3	7.9	34.2	29.1	7.9	37.1	39.7	19.2	58.9	26.1	13.1	39.2	19.7	10.8	30.4
	Fishmeal	49.3	47.2	96.5	53.8	48.7	102.5	50.4	53.6	104.0	45.8	51.0	96.8	48.2	51.9	100.1
	Other Products	25.8	32.8	58.6	32.3	29.3	61.6	41.2	37.6	78.8	37.1	33.9	71.1	38.4	39.8	78.2
	All Products	1,290.7	665.7	1,956.4	1,311.3	601.9	1,913.3	1,357.1	669.4	2,026.5	1,502.4	648.4	2,150.7	1,496.0	748.7	2,244.7

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 17: Bering Sea & Aleutian Islands price per pound of groundfish products by species and processing mode, 2014-2018, ($/lb).

		2014		2015		2016		2017		2018	
	Product	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside
Pollock	Whole Fish	0.47	0.32	0.45	0.51	0.35	0.34	0.29	0.42	0.42	0.55
	Head And Gut	0.64	0.64	0.64	*	0.78	0.41	0.54	-	0.58	*
	Roe	3.31	2.39	2.64	1.67	3.14	2.03	3.33	2.09	3.16	2.43
	Deep-Skin Fillets	1.63	1.50	1.58	1.47	1.69	1.39	1.51	1.44	1.51	1.43
	Other Fillets	1.31	1.30	1.39	1.19	1.30	1.34	1.16	1.17	1.30	1.31
	Surimi	1.19	1.01	1.27	1.01	1.32	1.06	1.64	1.00	1.38	1.15
	Minced Fish	0.60	0.59	0.67	0.66	0.80	0.74	0.69	0.63	0.68	0.66
	Fishmeal	0.96	0.63	0.92	0.63	0.84	0.67	0.74	0.66	0.77	0.61
	Other Products	0.47	0.42	0.52	0.38	0.64	0.42	0.55	0.33	0.56	0.38
	All Products	1.19	1.04	1.22	0.97	1.26	1.01	1.33	0.96	1.27	1.07
Pacific Cod	Whole Fish	0.36	0.97	0.34	0.57	0.71	0.69	0.87	*	0.83	0.74
	Head And Gut	1.32	0.98	1.43	1.03	1.35	0.98	1.63	1.20	1.89	1.70
	Roe	0.90	1.00	0.60	0.77	0.51	0.64	0.62	0.71	1.08	1.31
	Fillets	0.94	2.71	1.18	2.72	1.37	3.40	1.79	3.73	2.98	4.14
	Other Products	0.73	0.70	0.96	0.82	1.03	0.75	0.87	0.90	0.79	1.11
	All Products	1.29	1.31	1.39	1.32	1.31	1.63	1.56	1.89	1.78	2.29
Sablefish	Head And Gut	7.48	6.70	8.60	7.43	6.24	7.93	5.12	7.22	3.42	5.70
	Other Products	0.50	2.67	1.93	2.30	0.83	3.17	0.87	6.31	0.61	8.58
	All Products	7.01	6.64	8.34	7.37	6.02	7.74	4.68	7.16	3.02	5.92
Atka Mackerel	Whole Fish	0.66	0.60	0.53	*	0.86	0.62	0.84	*	1.03	0.70
	Head And Gut	1.51	-	1.08	-	1.03	-	1.47	-	1.41	*
	Other Products	1.15	0.51	0.87	0.88	0.73	0.74	0.55	0.81	0.77	0.70
	All Products	1.37	0.60	1.02	0.88	1.02	0.66	1.37	0.81	1.35	0.70

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Table 17: Continued

		2014		2015		2016		2017		2018	
	Product	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside
Yellowfin	Whole Fish	0.46	*	0.45	-	0.49	-	0.61	-	0.71	0.61
	Head And Gut	0.45	-	0.48	-	0.55	-	0.66	-	0.82	-
	Fillets	-	-	-	-	-	-	*	-	-	-
	Other Products	0.90	0.92	1.02	0.87	0.86	0.73	0.74	0.80	0.83	0.70
	All Products	0.46	0.92	0.48	0.87	0.55	0.73	0.65	0.80	0.81	0.62
Rock Sole	Whole Fish	0.53	*	0.50	-	0.59	*	0.59	*	0.75	0.46
	Head And Gut	0.45	-	0.49	-	0.56	-	0.65	-	0.83	*
	Head And Gut With Roe	0.85	-	0.89	-	1.00	-	1.24	-	1.50	-
	Fillets	5.70	-	2.78	-	*	-	*	*	2.73	-
	Other Products	0.92	0.92	0.87	0.87	0.78	0.73	0.63	0.80	0.72	0.70
	All Products	0.55	0.92	0.55	0.87	0.62	0.73	0.72	0.80	0.89	0.53
Flathead Sole	Whole Fish	0.62	0.37	0.44	0.55	0.57	*	0.61	*	0.82	0.52
	Head And Gut	0.70	-	0.63	-	0.76	-	0.87	-	0.98	*
	Fillets	*	-	2.33	-	-	-	-	-	*	*
	Other Products	0.93	0.92	0.87	0.87	0.66	0.73	0.59	0.80	0.70	0.70
	All Products	0.70	0.59	0.64	0.84	0.74	0.73	0.86	0.80	0.97	0.60
Arrowtooth	Whole Fish	0.54	*	*	*	0.56	*	*	-	*	-
	Head And Gut	0.82	-	0.74	*	0.86	-	1.30	-	0.87	-
	Other Products	0.93	0.92	0.87	0.87	0.64	0.73	0.65	0.80	0.70	0.70
	All Products	0.82	0.92	0.74	0.87	0.84	0.73	1.30	0.80	0.87	0.70
Kamchatka Flounder	Whole Fish	-	-	-	-	*	-	-	-	-	-
	Head And Gut	0.74	-	0.67	-	0.83	-	1.48	-	1.27	-
	Fishmeal	0.93	-	0.94	-	0.86	-	0.67	-	0.82	-
	Other Products	-	-	-	-	-	-	-	-	*	-
	All Products	0.74	-	0.67	-	0.83	-	1.48	-	1.27	-
Turbot	Whole Fish	-	*	-	*	1.97	-	-	-	-	-
	Head And Gut	2.09	*	2.01	-	2.52	*	2.41	-	2.44	-
	Other Products	1.84	0.93	1.69	0.88	1.76	0.73	1.45	0.80	1.04	0.70
	All Products	2.03	0.93	1.93	0.88	2.30	0.73	2.14	0.80	2.08	0.70

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Table 17: Continued

		2014		2015		2016		2017		2018	
	Product	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside
Other Flatfish	Whole Fish	0.67	*	0.51	*	0.59	*	0.78	1.62	0.68	*
	Head And Gut	0.49	-	0.46	-	0.47	*	0.81	*	0.64	*
	Fillets	-	-	-	-	-	-	-	*	-	*
	Other Products	0.91	0.92	0.88	0.87	0.76	0.73	0.65	0.80	0.82	0.71
	All Products	0.53	0.92	0.47	0.87	0.51	0.73	0.81	1.49	0.64	0.71
Pacific Ocean Perch	Whole Fish	*	0.55	-	0.56	0.65	0.58	0.57	0.54	0.61	0.61
	Head And Gut	1.20	*	1.06	*	0.93	*	1.14	*	1.11	*
	Other Products	0.80	0.80	0.87	0.87	0.60	0.73	0.60	0.80	0.70	0.70
	All Products	1.20	0.56	1.06	0.61	0.92	0.58	1.11	0.56	1.04	0.64
Northern Rockfish	Whole Fish	*	0.58	-	0.46	-	0.67	-	*	*	*
	Head And Gut	0.92	-	0.75	-	0.64	-	0.77	-	0.79	*
	Other Products	0.80	0.80	0.87	*	0.59	0.73	0.61	*	0.63	*
	All Products	0.92	0.74	0.75	0.46	0.64	0.71	0.77	*	0.79	*
Other Rockfish	Whole Fish	2.08	0.92	1.72	*	2.27	*	2.29	0.69	1.72	*
	Head And Gut	1.18	2.42	1.08	3.28	1.06	2.95	1.14	2.42	1.14	1.74
	Other Products	0.92	0.58	0.99	1.35	0.78	1.40	0.75	0.77	0.87	0.83
	All Products	1.57	1.49	1.26	3.08	1.47	2.83	1.58	1.93	1.31	1.58
Other Groundfish	Whole Fish	*	0.72	*	0.53	1.02	0.96	*	0.80	0.12	1.08
	Head And Gut	0.75	*	0.64	*	1.83	-	0.78	*	0.81	2.70
	Roe	-	-	-	-	-	-	-	-	*	-
	Fillets	-	-	-	-	*	-	-	-	*	-
	Fishmeal	0.59	0.50	0.87	0.87	0.68	0.73	0.71	0.78	0.74	0.70
	Other Products	0.73	2.49	0.87	1.69	0.72	4.01	0.84	*	1.01	1.43
	All Products	0.73	1.00	0.87	0.97	0.72	1.03	0.84	0.79	1.00	1.23

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 18: Bering Sea & Aleutian Islands total product value per round metric ton of retained catch by processor type, species, and year, 2014-2018, ($/mt).

	Species	2014	2015	2016	2017	2018
Motherships	Pollock	1,035	971	909	*	974
	Pacific Cod	388	464	709	*	397
Catcher/processors	Pollock	1,038	1,047	1,090	1,128	1,063
	Sablefish	9,747	10,660	7,708	5,760	4,529
	Pacific Cod	1,416	1,579	1,484	1,756	2,024
	Flatfish	693	691	789	969	1,077
	Rockfish	1,369	1,141	977	1,162	1,141
	Atka Mackerel	2,019	1,391	1,363	1,977	1,845
	Other	455	509	426	473	629
Shoreside processors	Pollock	980	887	929	860	959
	Sablefish	9,563	13,156	12,282	11,006	6,856
	Pacific Cod	1,487	1,389	1,564	1,714	2,268
	Flatfish	548	559	968	689	621
	Rockfish	893	1,062	1,142	958	867
	Other	1,145	1,205	1,501	934	1,246

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 19: 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, 2014-2018 ($ millions).

	Year	Processors	Wholesale Value ($million)	Wholesale Value Per Processor ($1,000)	Percent Value, BSAI FMP Groundfish
AFA CP	2014	16	653.91	40,869.42	35.07
	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
	2018	14	678.20	48,442.78	31.91
A80	2014	18	309.44	17,191.11	16.59
	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
	2018	19	426.17	22,429.93	20.05
CP Hook and Line	2014	31	199.28	6,428.24	10.69
	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
	2018	26	225.39	8,668.89	10.61
Sablefish IFQ	2014	8	2.14	267.57	0.11
	2015	5	1.44	287.33	0.08
	2016	7	1.40	200.13	0.07
	2017	6	1.68	280.06	0.08
	2018	8	1.84	230.40	0.09
Motherships & Inshore Floating Procs.	2014	3	115.13	38,376.24	6.17
	2015	3	111.49	37,162.50	6.11
	2016	4	106.69	26,673.75	5.52
	2017	2	*	*	*
	2018	3	116.49	38,828.51	5.48
BSAI Shoreside Processors	2014	8	573.97	71,746.19	30.78
	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
	2018	7	629.17	89,881.78	29.60

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 20: 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, 2014-2018.

	Year	Vessels	Average Length (feet)	Median Length (feet)	Average Capacity (tons)	Median Capacity (tons)
AFA CV	2014	88	128	124	164	133
	2015	86	127	124	163	134
	2016	89	126	123	160	133
	2017	86	125	123	158	133
	2018	86	127	123	160	132
AFA CP	2014	17	289	285	1,604	1,592
	2015	17	289	285	1,623	1,592
	2016	16	302	296	1,717	1,592
	2017	16	290	285	1,571	1,592
	2018	15	302	285	1,850	1,778
A80	2014	18	186	185	426	426
	2015	18	184	185	428	426
	2016	19	185	185	443	426
	2017	19	180	185	477	473
	2018	19	181	185	468	473
BSAI Trawl	2014	12	127	130	193	148
	2015	14	118	108	151	132
	2016	13	133	130	243	132
	2017	16	122	112	171	132
	2018	21	150	144	300	276
CV Hook and Line	2014	3	49	48	35	37
	2015	2	56	58	42	43
	2017	2	57	59	43	47
	2018	5	53	56	77	95
CP Hook and Line	2014	30	146	136	344	260
	2015	30	145	136	333	258
	2016	31	146	136	338	258
	2017	28	148	141	350	296
	2018	25	149	141	336	258
Sablefish IFQ	2014	23	91	98	105	111
	2015	19	77	58	89	98
	2016	21	88	98	105	111
	2017	19	87	72	114	97
	2018	22	95	98	133	127

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Table 20: Continued

	Year	Vessels	Average Length (feet)	Median Length (feet)	Average Capacity (tons)	Median Capacity (tons)
Pot	2014	55	84	58	116	105
	2015	48	86	58	123	105
	2016	56	80	58	114	105
	2017	64	83	58	119	105
	2018	78	80	58	107	105
Jig	2014	3	31	32	19	18
	2015	4	32	33	15	14
	2016	2	42	42	25	26
	2017	1	42	42	26	26
	2018	1	42	42	26	26
No Fleet/ Other	2014	2	48	48	28	28
	2015	1	48	48	28	28
	2017	2	31	30	14	13
	2018	1	34	34	17	17

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 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
		2018	-	-	4	5	2	2	4	3	6	4	4	1	14
	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	58	37	37	6	5	3	-	-	19	25	17	11	76
	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
		2018	77	96	91	62	8	61	67	70	60	3	3	-	105
	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	135	132	129	73	15	66	71	73	85	32	23	12	191
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
		2018	22	24	21	14	6	16	18	19	20	21	21	18	26
	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
		2018	5	2	2	2	1	1	-	1	5	2	-	1	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
		2018	29	33	35	25	21	29	30	33	33	22	14	4	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
		2018	56	59	58	41	28	46	48	53	58	45	35	23	66

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 22: Bering Sea & Aleutian Islands catcher vessel (excluding catcher/processors) weeks of fishing groundfish by vessel-length class (feet), gear, and target, 2014-2018.

		Hook & Line		Pot			Trawl			All Gear		
	Year	<60ft	60-125ft	<60ft	60-125ft	>=125ft	<60ft	60-125ft	>=125ft	<60ft	60-125ft	>=125ft
Pollock	2014	-	-	-	-	-	-	838	551	-	838	551
	2015	-	-	-	-	-	-	904	612	-	904	612
	2016	-	-	-	-	-	-	863	569	-	863	569
	2017	-	-	-	-	-	-	863	498	-	863	498
	2018	-	-	-	-	-	-	899	522	-	899	522
Sablefish	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
	2018	12	14	15	20	6	-	-	-	27	34	6
Pacific Cod	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	-	394	172	39	-	213	31	412	385	70
	2018	44	-	375	153	29	37	201	43	456	354	72
Flatfish	2014	-	-	-	-	-	-	2	31	-	2	31
	2015	-	-	-	-	-	-	27	30	-	27	30
	2016	-	-	-	-	-	-	42	33	-	42	33
	2017	-	-	-	-	-	-	48	53	-	48	53
	2018	-	-	-	-	-	-	32	46	-	32	46
Rockfish	2014	1	-	-	-	-	-	-	11	1	-	11
	2015	1	-	-	-	-	-	4	9	1	4	9
	2016	-	-	-	-	-	-	2	4	-	2	4
	2017	-	-	-	-	-	-	3	4	-	3	4
	2018	-	-	-	-	-	-	3	3	-	3	3
Atka Mackerel	2014	-	-	-	-	-	-	-	12	-	-	12
	2015	-	-	-	-	-	-	5	10	-	5	10
	2016	-	-	-	-	-	-	6	13	-	6	13
	2017	-	-	-	-	-	-	5	15	-	5	15
	2018	-	-	-	-	-	-	9	21	-	9	21
All Groundfish	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	438	1,335	651
	2018	56	14	-	-	-	37	1,144	635	483	1,331	670

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/processor vessel weeks of fishing groundfish by vessel-length class (feet), gear, and target, 2014-2018.

		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	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
	2018	-	-	-	-	-	-	0	6	317	-	0	6	317
Sablefish	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	-
	2018	-	6	2	-	17	-	-	3	-	-	23	5	-
Pacific Cod	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
	2018	9	87	678	-	28	23	2	17	7	9	117	718	7
Flatfish	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
	2018	-	-	13	-	-	-	94	421	56	-	94	434	56
Rockfish	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
	2018	-	-	1	-	-	-	3	43	6	-	3	44	6
Atka Mackerel	2014	-	-	-	-	-	-	-	40	19	-	-	40	19
	2015	-	-	-	-	-	-	-	66	27	-	-	66	27
	2016	-	-	-	-	-	-	-	80	23	-	-	80	23
	2017	-	-	-	-	-	-	7	105	11	-	7	105	11
	2018	-	-	-	-	-	-	7	122	12	-	7	122	12
All Groundfish	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
	2018	9	93	695	-	45	23	106	611	397	9	244	1,329	397

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 24: Bering Sea & Aleutian Islands catcher vessel crew weeks in the groundfish fisheries by month, 2014-2018.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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	1,102	1,768	1,660	989	238	739	1,430	1,116	872	340	236	242	10,732
2018	1,229	2,049	2,043	708	201	822	1,168	1,314	1,254	427	169	120	11,504

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 25: Bering Sea & Aleutian Islands at-sea processor vessel crew weeks in the groundfish fisheries by month, 2014-2018.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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
2018	5,792	13,559	15,843	5,232	3,752	8,024	11,724	12,878	12,374	4,982	3,201	1,897	99,258

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 26: Gulf of Alaska groundfish retained catch by vessel type, gear, and species, 2014-2018 (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	2014	0.1	-	124.2	124.4	0	-	13.1	13.2	0.2	-	141.0	141.2
	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
	2018	0	-	118.3	118.3	*	-	30.5	30.5	0	-	155.7	155.7
Pacific Cod	2014	10.5	21.0	15.5	47.1	6.5	17.1	7.7	31.3	18.2	38.2	23.2	79.6
	2015	9.5	23.1	14.2	46.7	5.1	17.1	7.2	29.3	16.1	40.1	21.3	77.6
	2016	5.1	20.6	7.7	33.5	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	26.4	12.9	48.0
	2018	1.5	3.1	2.1	6.7	1.4	4.5	1.4	7.3	3.3	7.6	3.5	14.4
Sablefish	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
	2018	2.9	0.5	0.6	4.0	0.7	0.4	0.1	1.2	8.4	1.1	0.9	10.5
Atka Mackerel	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
	2018	-	-	0.7	0.7	-	-	0.6	0.6	-	-	1.3	1.3
Arrowtooth	2014	0	-	31.4	31.4	0	-	0.6	0.6	0	-	32.0	32.0
	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
	2018	0	-	16.2	16.2	0	-	0	0.1	0	-	16.2	16.2
Flathead Sole	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
	2018	-	-	2.0	2.0	-	-	0	0	-	-	2.0	2.0

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Table 26: 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	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
	2018	-	-	1.1	1.1	-	-	0	0	-	-	1.2	1.2
Shallow-water Flatfish	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
	2018	-	-	2.5	2.5	*	-	0	0	*	-	2.5	2.5
Deep-water Flatfish	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
	2018	*	-	0.1	0.1	*	-	*	*	*	-	0.1	0.1
Pacific Ocean Perch	2014	*	-	12.2	12.2	*	-	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	*	-	2.5	2.5	*	-	18.6	18.6
	2017	0	-	14.9	14.9	*	-	2.6	2.6	0	-	17.5	17.5
	2018	0	-	17.1	17.1	-	-	3.1	3.1	0	-	20.3	20.3
Northern Rockfish	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
	2018	*	-	2.0	2.0	*	-	0.3	0.3	*	-	2.3	2.3

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Table 26: 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	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
	2018	0	-	2.8	2.8	0	-	0	0	0	-	2.8	2.8
Other Rockfish	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	-	2.0	2.9
	2017	0.3	-	1.3	1.6	0.1	-	0.1	0.2	1.0	-	1.6	2.5
	2018	0.3	-	1.4	1.7	0.1	-	0.2	0.2	1.0	-	1.7	2.7
Other Groundfish	2014	0.5	-	0.9	1.8	0.1	-	0	0.2	0.6	-	1.0	2.2
	2015	0.6	-	0.9	1.8	0.1	-	0	0.1	0.8	-	1.0	2.2
	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
	2018	0	-	0.8	0.9	0	-	0	0.1	0.1	-	0.8	1.0

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 27: Gulf of Alaska groundfish retained catch by species, gear, and target fishery, 2017-2018, (1,000 metric tons, round weight).

			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	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
		2018	Sablefish	*	2.6	0	*	-	-	*	-	0.2	-	*	2.8
			Pacific Cod	0	0	1.2	*	-	-	-	-	0	-	0	1.3
			Rockfish	-	-	*	-	-	-	-	-	0	-	-	0
			All Targets	0	2.9	1.3	0	-	-	*	-	0.3	-	0	4.5
	Western Gulf	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
		2018	Sablefish	-	0.7	*	*	-	-	*	-	0.1	-	-	0.8
			Pacific Cod	*	*	0.3	*	-	-	*	*	*	-	*	0.3
			All Targets	*	0.7	0.3	*	-	-	*	*	0.1	-	0	1.1
	All Gulf	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
		2018	Sablefish	*	7.8	0	*	-	-	*	-	0.7	-	0	8.5
			Pacific Cod	0	0	1.8	*	-	-	*	*	0	-	0	1.9
			Rockfish	*	*	0	-	-	-	-	-	0.1	-	-	0.1
			All Targets	0	8.4	2.0	0	-	-	*	*	1.0	-	0.1	11.5
Pot	Central Gulf	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
		2018	Sablefish	-	0.5	*	-	-	-	-	*	0	-	-	0.5
			Pacific Cod	0	-	3.1	*	-	-	-	-	0	-	0.1	3.2
			All Targets	0	0.5	3.1	*	-	-	-	*	0	-	0.1	3.7

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Table 27: Continued

			Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	Other	All Species
Pot	Western Gulf	2017	Pollock, Bottom	-	-	*	-	-	-	-	-	-	-	-	*
			Sablefish	-	0.2	-	-	-	-	-	-	*	-	-	0.2
			Pacific Cod	0	*	15.0	*	*	-	-	0	0	*	0.1	15.1
			All Targets	0	0.2	15.0	*	*	-	-	0	0	*	0.1	15.3
		2018	Sablefish	-	0.4	*	-	-	-	-	-	0	-	-	0.4
			Pacific Cod	*	*	4.5	-	0	-	-	*	*	*	0.1	4.6
			All Targets	*	0.4	4.5	-	0	-	-	*	0	*	0.1	5.0
	All Gulf	2017	Pollock, Bottom	-	-	*	-	-	-	-	-	-	-	-	*
			Sablefish	-	0.9	*	*	-	-	-	-	0	-	-	0.9
			Pacific Cod	0	*	26.4	*	*	-	-	0	0	*	0.2	26.6
			All Targets	0	0.9	26.4	*	*	-	-	0	0	*	0.2	27.5
		2018	Sablefish	-	1.1	*	-	-	-	-	*	0	-	-	1.1
			Pacific Cod	0	*	7.6	*	0	-	-	*	0	*	0.1	7.8
			All Targets	0	1.1	7.6	*	0	-	-	*	0	*	0.1	8.9
Trawl	Central Gulf	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	125.3
			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	20.0	0.2	0.8	189.2
		2018	Pollock, Bottom	11.1	0	0.5	1.9	0.2	0.1	0	0.2	0.5	*	0.1	14.8
			Pollock, Pelagic	105.3	0	0	0.1	0	0	*	0	0.5	*	0	106.0
			Sablefish	0	0.2	0	0	0	0	*	*	0	-	*	0.3
			Pacific Cod	*	*	0.2	0	0	*	*	0	*	*	0	0.2
			Arrowtooth	1.3	0.1	0.8	13.3	1.4	0.9	0	0.5	0.6	0.1	0.5	19.6
			Flathead Sole	-	-	*	*	*	*	*	*	*	-	*	*
			Rex Sole	*	*	*	*	*	*	*	*	*	-	*	*
			Flatfish, Shallow	0.1	*	0.1	0.1	0.1	0	*	1.0	0	0	0	1.5
			Rockfish	0.3	0.3	0.3	0.5	0	0.1	0	0	21.6	0.5	0	23.7
			Atka Mackerel	*	*	*	*	*	*	-	*	-	*	*	*
			All Targets	118.1	0.6	2.0	15.9	1.8	1.1	0.1	1.8	23.3	0.6	0.7	166.1

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Table 27: Continued

			Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	Other	All Species
Trawl	Western Gulf	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	*	*	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
		2018	Pollock, Bottom	0.4	*	0	0	*	*	-	*	*	*	*	0.4
			Pollock, Pelagic	29.8	0	0	0	0	0	-	0	0	0	0	29.9
			Pacific Cod	0	*	1.3	*	*	*	*	-	-	*	*	1.3
			Arrowtooth	*	*	*	*	*	*	*	*	*	*	*	*
			Rex Sole	*	*	*	*	*	*	*	*	*	-	*	*
			Rockfish	0.3	0.1	0	0	0	0	*	0	3.5	0.6	0	4.6
			Atka Mackerel	*	*	*	*	*	*	-	*	*	*	-	*
			All Targets	30.5	0.1	1.4	0	0	0	*	0	3.5	0.6	0	36.3

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Table 27: Continued

			Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	Other	All Species
Trawl	All Gulf	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	0.3	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	251.5
		2018	Pollock, Bottom	11.5	0	0.5	1.9	0.2	0.1	0	0.2	0.5	*	0.1	15.1
			Pollock, Pelagic	142.1	0	0.1	0.1	0	0	*	0	0.6	0	0	142.9
			Sablefish	0	0.2	0	0	0	0	*	*	0	-	*	0.3
			Pacific Cod	0	*	1.5	0	0	*	*	0	*	*	0	1.6
			Arrowtooth	1.3	0.1	0.8	13.3	1.4	0.9	0	0.5	0.6	0.1	0.5	19.6
			Flathead Sole	-	-	*	*	*	*	*	*	*	-	*	*
			Rex Sole	*	*	*	*	*	*	*	*	*	-	*	*
			Flatfish, Shallow	0.1	*	0.1	0.1	0.1	0	*	1.0	0	0	0	1.5
			Rockfish	0.6	0.4	0.3	0.5	0	0.1	0	0	25.1	1.1	0	28.3
			Atka Mackerel	*	*	*	*	*	*	-	*	*	*	*	*
			All Targets	155.5	0.7	3.4	16.0	1.8	1.1	0.1	1.8	26.9	1.3	0.7	209.4
All Gear	Ctr. Gulf	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
		2018	All Targets	118.2	4.0	6.4	15.9	1.8	1.1	0.1	1.8	23.6	0.6	0.8	174.4
	West. Gulf	2017	All Targets	49.2	1.1	27.0	0.1	0	0	0	0	3.1	0.4	0.2	81.3
		2018	All Targets	30.5	1.2	6.3	0	0	0	*	0	3.6	0.6	0.1	42.4
	All Gulf	2017	All Targets	184.3	9.9	48.0	24.7	1.8	1.2	0.1	1.5	23.9	0.7	1.3	297.2
		2018	All Targets	155.6	10.3	13.0	16.0	1.8	1.1	0.1	1.8	27.9	1.3	0.9	229.8

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 28: Gulf of Alaska ex-vessel prices in the groundfish fisheries by gear, and species, 2014-2018; calculations based on COAR ($/lb, round weight).

	Year	Fixed	Trawl	All Gear
Pollock	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
	2018	0.036	0.123	0.123
Pacific Cod	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
	2018	0.465	0.412	0.452
Sablefish	2014	3.878	2.972	3.802
	2015	4.064	3.008	3.973
	2016	4.743	1.910	4.471
	2017	5.314	3.926	5.179
	2018	3.929	2.344	3.783
Atka Mackerel	2014	0.016	0.377	0.377
	2015	0.010	0.302	0.302
	2016	0.016	0.294	0.294
	2017	0.016	0.387	0.387
	2018	*	0.355	0.355
Arrowtooth	2014	0.241	0.115	0.115
	2015	0.337	0.113	0.113
	2016	0.105	0.085	0.085
	2017	0.088	0.108	0.108
	2018	0.245	0.102	0.102
Flathead Sole	2014	*	0.157	0.157
	2015	0.336	0.147	0.147
	2016	*	0.144	0.144
	2017	*	0.135	0.135
	2018	0.245	0.142	0.142
Rex Sole	2014	*	0.250	0.250
	2015	*	0.219	0.219
	2016	-	0.273	0.273
	2017	-	0.199	0.199
	2018	-	0.254	0.254
Shallow-water Flatfish	2014	0.264	0.209	0.209
	2015	0.131	0.198	0.198
	2016	0.105	0.142	0.142
	2017	0.088	0.158	0.158
	2018	0.245	0.160	0.160
Deep-water Flatfish	2014	0.241	0.113	0.113
	2015	0.336	0.102	0.102
	2016	0.105	0.098	0.098
	2017	0.088	0.110	0.110
	2018	*	0.108	0.108

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Table 28: Continued

	Year	Fixed	Trawl	All Gear
Pacific Ocean Perch	2014	0.637	0.182	0.182
	2015	0.193	0.187	0.187
	2016	0.010	0.186	0.186
	2017	0.441	0.178	0.178
	2018	1.174	0.192	0.192
Northern Rockfish	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
	2018	0.843	0.180	0.180
Dusky Rockfish	2014	0.443	0.178	0.180
	2015	0.367	0.179	0.182
	2016	0.422	0.176	0.180
	2017	0.549	0.171	0.177
	2018	0.576	0.185	0.188
Other Rockfish	2014	0.818	0.229	0.438
	2015	0.775	0.216	0.466
	2016	0.788	0.200	0.397
	2017	0.850	0.195	0.443
	2018	0.906	0.186	0.449

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 29: Gulf of Alaska ex-vessel value of the groundfish catch by vessel category, gear, and species, 2014-2018; 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	2014	-	-	33.39	33.43	-	-	3.46	3.47	-	-	37.84	37.89
	2015	-	-	34.83	34.86	-	-	7.50	7.50	-	-	43.56	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
	2018	-	-	32.03	32.04	-	-	8.28	8.28	-	-	42.24	42.25
Pacific Cod	2014	7.11	14.25	9.31	30.67	4.41	11.58	4.60	20.59	12.38	25.83	13.91	52.11
	2015	6.37	15.62	8.13	30.12	3.32	11.58	4.18	19.09	10.80	27.20	12.32	50.31
	2016	3.41	13.79	4.58	21.78	2.70	11.35	4.41	18.47	6.86	25.14	8.99	40.99
	2017	2.82	8.44	3.87	15.14	3.15	11.20	5.50	19.85	6.33	19.64	9.37	35.34
	2018	1.58	3.22	1.93	6.73	1.34	4.68	1.33	7.35	3.33	7.90	3.26	14.50
Sablefish	2014	32.29	-	4.55	36.84	9.37	-	0.39	9.76	82.36	-	5.82	88.18
	2015	32.41	-	4.30	36.71	8.25	-	0.27	8.52	83.28	-	5.83	89.11
	2016	33.21	-	3.56	36.76	9.48	-	0.07	9.55	85.48	-	3.68	89.16
	2017	35.51	5.18	6.28	46.97	9.29	2.63	0.57	12.49	95.74	10.98	8.50	115.22
	2018	24.86	4.72	3.07	32.65	6.32	3.10	0.81	10.22	72.86	10.03	5.02	87.90
Atka Mackerel	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	-	-	0.54	0.54	-	-	0.09	0.09	-	-	0.63	0.63
	2017	-	-	0.18	0.18	-	-	0.41	0.41	-	-	0.59	0.59
	2018	-	-	0.56	0.56	-	-	0.53	0.53	-	-	1.09	1.09
Arrowtooth	2014	0	-	7.96	7.96	0.01	-	0.39	0.40	0.01	-	8.36	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	3.28	0	-	0.13	0.13	0	-	3.41	3.41
	2017	0	-	5.91	5.91	0.01	-	0.03	0.03	0.01	-	5.94	5.95
	2018	0	-	3.67	3.67	0	-	0.20	0.20	0	-	3.88	3.88
Flathead Sole	2014	-	-	0.80	0.80	-	-	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
	2018	-	-	0.63	0.63	-	-	0.04	0.04	-	-	0.67	0.67

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Table 29: 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	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
	2018	-	-	0.89	0.89	-	-	0.05	0.05	-	-	0.94	0.94
Shallow-water Flatfish	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
	2018	-	-	0.88	0.88	*	-	0.01	0.01	*	-	0.89	0.89
Deep-water Flatfish	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
	2018	*	-	0.02	0.02	*	-	0	0	*	-	0.02	0.02
Pacific Ocean Perch	2014	*	-	4.87	4.87	*	-	0.83	0.83	*	-	6.44	6.44
	2015	*	-	5.82	5.82	-	-	0.80	0.80	*	-	7.43	7.43
	2016	-	-	6.61	6.61	*	-	1.03	1.03	*	-	8.79	8.79
	2017	0	-	5.89	5.89	*	-	1.03	1.03	0	-	8.00	8.00
	2018	0	-	7.29	7.29	-	-	1.33	1.33	0	-	9.99	9.99
Northern Rockfish	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	-	1.23	1.23
	2017	0	-	0.57	0.57	0	-	0.08	0.08	0	-	0.64	0.64
	2018	0	-	0.78	0.78	*	-	0.12	0.12	0	-	0.90	0.90

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Table 29: 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
Dusky Rockfish	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
	2018	0.01	-	1.13	1.14	0.01	-	0.02	0.02	0.03	-	1.15	1.18
Other Rockfish	2014	0.60	-	0.79	1.39	0.18	-	0.09	0.27	1.82	-	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	-	0.07	0.25	1.72	-	0.86	2.59
	2017	0.56	-	0.55	1.12	0.20	-	0.05	0.24	1.80	-	0.68	2.49
	2018	0.56	-	0.58	1.14	0.15	-	0.07	0.22	2.03	-	0.73	2.77
Other Groundfish	2014	0.49	-	0.91	1.83	0.06	-	0.03	0.19	0.64	-	1.01	2.19
	2015	0.54	-	0.95	1.82	0.12	-	0.01	0.15	0.79	-	1.07	2.20
	2016	0.17	-	1.05	1.36	0.08	-	0.01	0.16	0.30	-	1.09	1.59
	2017	0.10	-	0.83	1.05	0.14	-	0.02	0.23	0.27	-	0.85	1.31
	2018	0.04	-	0.76	0.86	0.03	-	0.05	0.16	0.11	-	0.81	1.05

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 30: 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, 2014-2018; 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	2014	35	13	302.24	10.58	5.25	1.56
	2015	34	14	402.68	13.69	6.85	2.13
	2016	40	16	417.71	16.71	9.47	3.11
	2017	42	15	408.20	17.14	8.53	2.27
	2018	36	12	356.85	12.85	7.92	2.42
Central Gulf Trawl	2014	69	20	1,014.96	70.03	34.78	10.33
	2015	62	18	1,035.93	64.23	32.14	10.01
	2016	63	17	707.10	44.55	25.24	8.30
	2017	58	13	903.14	52.38	26.06	6.93
	2018	61	14	892.65	54.45	33.57	10.24
CV Hook and Line	2014	101	37	72.38	7.31	3.63	1.08
	2015	108	33	66.80	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	0.40
	2018	70	27	37.92	2.65	1.64	0.50
CP Hook and Line	2014	10	10	426.78	4.27	2.12	0.63
	2015	11	11	429.37	4.72	2.36	0.74
	2016	11	11	292.28	3.22	1.82	0.60
	2017	9	9	479.69	4.32	2.15	0.57
	2018	3	3	458.04	1.37	0.85	0.26
Sablefish IFQ	2014	277	37	278.28	77.08	38.28	11.37
	2015	267	37	287.29	76.71	38.39	11.96
	2016	269	35	297.78	80.10	45.39	14.92
	2017	264	40	382.61	101.01	50.25	13.37
	2018	263	39	296.32	77.93	48.05	14.65
Pot	2014	102	24	261.21	26.64	13.23	3.93
	2015	116	25	237.59	27.56	13.79	4.30
	2016	119	26	215.56	25.65	14.53	4.78
	2017	110	26	180.40	19.84	9.87	2.63
	2018	58	21	138.49	8.03	4.95	1.51
Jig	2014	259	38	10.32	2.67	1.33	0.39
	2015	242	41	9.22	2.23	1.12	0.35
	2016	208	41	7.11	1.48	0.84	0.28
	2017	108	33	1.40	0.15	0.08	0.02
	2018	101	38	3.64	0.37	0.23	0.07

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 31: Gulf of Alaska production of groundfish products by species, 2014-2018, (1,000 metric tons product weight).

	Product	2014	2015	2016	2017	2018
Pollock	Whole Fish	0.27	2.30	14.49	9.34	0.56
	Head And Gut	29.68	30.34	27.81	37.39	39.83
	Roe	3.51	3.12	0.54	1.09	2.39
	Deep-Skin Fillets	*	-	*	0.63	*
	Other Fillets	8.19	9.10	14.32	15.09	13.08
	Surimi	12.33	14.65	13.41	10.61	9.77
	Minced Fish	0.19	*	1.25	1.44	0.98
	Fishmeal	*	*	1.39	*	1.11
	Other Products	0.49	0.27	1.92	2.46	1.34
	All Products	54.66	59.78	75.14	78.06	69.06
Pacific Cod	Whole Fish	0.45	0.69	0.25	0.14	0.25
	Head And Gut	13.95	19.05	8.43	6.11	1.92
	Roe	1.79	1.34	0.78	1.04	0.37
	Fillets	9.85	6.39	7.87	6.52	2.00
	Other Products	5.03	4.52	4.33	3.58	1.04
	All Products	31.07	32.00	21.65	17.39	5.58
Sablefish	Head And Gut	5.60	5.35	5.03	5.28	5.84
	Other Products	0.39	0.24	0.30	0.36	0.29
	All Products	5.99	5.59	5.34	5.64	6.13
Atka Mackerel	Whole Fish	*	*	*	*	0.08
	Head And Gut	0.51	0.47	0.45	0.37	0.73
	Other Products	-	*	*	*	*
	All Products	0.51	0.47	0.45	0.37	0.81
Arrowtooth	Whole Fish	0.16	0.17	1.09	3.22	2.28
	Head And Gut	15.58	7.59	7.05	11.28	6.24
	Kirimi	*	*	-	-	-
	Fillets	*	*	*	*	*
	Other Products	*	0.08	0.14	*	0.01
	All Products	15.75	7.84	8.28	14.50	8.53
Flathead Sole	Whole Fish	0.81	0.34	0.74	0.45	1.02
	Head And Gut	0.45	0.40	0.38	0.46	0.28
	Kirimi	0.13	0.15	*	*	*
	Fillets	0.04	*	*	*	*
	Other Products	*	-	*	*	*
	All Products	1.44	0.89	1.11	0.91	1.29

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Table 31: Continued

	Product	2014	2015	2016	2017	2018
Rex Sole	Whole Fish	3.18	1.73	1.43	1.27	1.55
	Head And Gut	0.09	0.08	0.07	0.01	0.04
	Kirimi	-	-	-	-	*
	Fillets	*	*	*	0.00	*
	Other Products	*	-	*	*	*
	All Products	3.27	1.81	1.51	1.28	1.59
Shallow-water Flatfish	Whole Fish	1.45	0.37	0.93	0.89	0.82
	Head And Gut	0.87	0.60	0.66	0.21	0.58
	Kirimi	*	0.51	*	*	*
	Fillets	0.10	0.04	0.02	*	*
	Other Products	*	-	*	*	*
	All Products	2.42	1.53	1.61	1.11	1.40
Deep-water Flatfish	Whole Fish	0.06	*	0.00	*	0.00
	Head And Gut	0.06	0.00	0.05	*	0.01
	Fillets	0.02	*	*	*	*
	Other Products	-	-	-	*	-
	All Products	0.14	0.00	0.05	*	0.02
Pacific Ocean Perch	Whole Fish	2.75	3.13	5.13	2.71	3.38
	Head And Gut	6.31	6.96	8.33	8.19	10.26
	Other Products	0.09	0.05	0.03	0.16	0.09
	All Products	9.15	10.14	13.49	11.06	13.73
Northern Rockfish	Whole Fish	0.32	*	0.02	0.00	0.01
	Head And Gut	1.84	1.75	1.42	0.83	1.23
	Other Products	0.03	0.02	0.08	0.01	0.00
	All Products	2.18	1.77	1.51	0.84	1.25
Dusky Rockfish	Whole Fish	0.26	0.27	0.22	0.28	0.06
	Head And Gut	1.15	1.02	1.36	0.97	1.42
	Other Products	0.15	0.12	0.07	0.07	0.02
	All Products	1.56	1.41	1.65	1.31	1.50

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Table 31: Continued

	Product	2014	2015	2016	2017	2018
Other Rockfish	Whole Fish	0.48	0.42	0.61	0.54	0.62
	Head And Gut	0.77	0.67	0.71	0.68	0.76
	Other Products	0.10	0.14	0.13	0.13	0.09
	All Products	1.34	1.23	1.45	1.34	1.46
Other Groundfish	Whole Fish	0.07	0.10	0.04	0.01	0.01
	Head And Gut	0.28	0.17	0.06	0.07	0.02
	Kirimi	*	*	-	*	-
	Fillets	*	*	-	-	*
	Fishmeal	*	*	*	*	*
	Other Products	0.57	0.53	0.49	0.35	0.32
	All Products	0.93	0.80	0.59	0.43	0.36
All Species	Whole Fish	10.26	9.54	24.94	18.84	10.64
	Head And Gut	77.16	74.46	61.82	71.85	69.16
	Kirimi	0.13	0.66	*	*	*
	Roe	5.30	4.46	1.32	2.13	2.76
	Fillets	10.01	6.43	7.89	6.53	2.00
	Deep-Skin Fillets	*	-	*	0.63	*
	Other Fillets	8.19	9.10	14.32	15.09	13.08
	Surimi	12.33	14.65	13.41	10.61	9.77
	Minced Fish	0.19	*	1.25	1.44	0.98
	Fishmeal	*	*	1.39	*	1.11
	Other Products	6.85	5.97	7.49	7.11	3.20
	All Products	130.41	125.26	133.84	134.23	112.71

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 32: Gulf of Alaska gross value of groundfish products by species, 2014-2018, ($ million).

	Product	2014	2015	2016	2017	2018
Pollock	Whole Fish	0.4	2.2	7.0	5.7	0.5
	Head And Gut	40.7	40.6	23.3	30.1	36.2
	Roe	15.8	8.4	1.7	4.3	9.7
	Deep-Skin Fillets	*	-	*	2.1	*
	Other Fillets	24.4	26.1	39.8	32.9	33.6
	Surimi	24.0	27.6	28.7	17.7	20.7
	Minced Fish	0.2	*	1.5	1.5	1.3
	Fishmeal	*	*	2.2	*	1.5
	Other Products	0.3	0.2	2.2	2.5	1.4
	All Products	105.8	105.1	106.4	96.7	104.9
Pacific Cod	Whole Fish	0.7	0.8	0.5	0.2	0.5
	Head And Gut	38.4	52.2	22.7	20.3	8.6
	Roe	4.2	2.5	1.3	1.6	1.1
	Fillets	67.4	37.2	57.3	45.3	19.2
	Other Products	7.4	9.6	9.9	8.0	2.6
	All Products	118.0	102.5	91.8	75.5	31.9
Sablefish	Head And Gut	85.8	81.4	91.6	108.2	88.0
	Other Products	2.8	1.9	2.4	3.1	1.9
	All Products	88.6	83.2	94.1	111.3	89.9
Atka Mackerel	Whole Fish	*	*	*	*	0.2
	Head And Gut	1.7	1.3	1.2	1.2	2.3
	Other Products	-	*	*	*	*
	All Products	1.7	1.3	1.2	1.2	2.5
Arrowtooth	Whole Fish	0.2	0.1	1.1	4.9	1.5
	Head And Gut	22.0	9.9	12.1	26.7	9.3
	Kirimi	*	*	-	-	-
	Fillets	*	*	*	*	*
	Other Products	*	0.1	0.1	*	0.0
	All Products	22.2	10.2	13.3	31.5	10.8
Flathead Sole	Whole Fish	1.0	0.5	0.8	0.6	1.2
	Head And Gut	0.7	0.6	0.7	0.7	0.6
	Kirimi	0.4	0.4	*	*	*
	Fillets	0.1	*	*	*	*
	Other Products	*	-	*	*	*
	All Products	2.1	1.5	1.5	1.3	1.8

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Table 32: Continued

	Product	2014	2015	2016	2017	2018
Rex Sole	Whole Fish	6.7	3.2	3.2	2.8	3.3
	Head And Gut	0.3	0.2	0.2	0.0	0.1
	Kirimi	-	-	-	-	*
	Fillets	*	*	*	0.0	*
	Other Products	*	-	*	*	*
	All Products	7.0	3.4	3.4	2.8	3.4
Shallow-water Flatfish	Whole Fish	1.9	0.9	1.1	1.2	1.1
	Head And Gut	1.3	1.0	1.5	0.3	1.2
	Kirimi	*	1.2	*	*	*
	Fillets	0.3	0.2	0.1	*	*
	Other Products	*	-	*	*	*
	All Products	3.5	3.3	2.7	1.5	2.3
Deep-water Flatfish	Whole Fish	0.0	*	0.0	*	0.0
	Head And Gut	0.1	0.0	0.1	*	0.0
	Fillets	0.1	*	*	*	*
	Other Products	-	-	-	*	-
	All Products	0.2	0.0	0.1	*	0.0
Pacific Ocean Perch	Whole Fish	3.7	5.0	7.4	3.3	4.0
	Head And Gut	15.7	16.3	17.0	24.1	27.7
	Other Products	0.4	0.3	0.2	0.8	0.4
	All Products	19.7	21.5	24.6	28.1	32.1
Northern Rockfish	Whole Fish	0.4	*	0.0	0.0	0.0
	Head And Gut	4.5	3.7	4.1	1.8	2.8
	Other Products	0.1	0.1	0.5	0.1	0.0
	All Products	5.0	3.8	4.6	1.9	2.8
Dusky Rockfish	Whole Fish	0.4	0.6	0.4	0.4	0.1
	Head And Gut	2.8	2.6	3.9	2.1	3.6
	Other Products	0.5	0.5	0.5	0.5	0.1
	All Products	3.7	3.7	4.8	3.0	3.8

Continued on next page.

Table 32: Continued

	Product	2014	2015	2016	2017	2018
Other Rockfish	Whole Fish	2.0	1.6	2.3	2.4	2.5
	Head And Gut	3.0	2.8	2.9	3.0	3.2
	Other Products	0.6	0.7	0.8	0.8	1.0
	All Products	5.7	5.2	6.0	6.2	6.7
Other Groundfish	Whole Fish	0.2	0.2	0.1	0.0	0.0
	Head And Gut	0.5	0.4	0.2	0.2	0.1
	Kirimi	*	*	-	*	-
	Fillets	*	*	-	-	*
	Fishmeal	*	*	*	*	*
	Other Products	2.7	3.0	2.9	1.7	1.4
	All Products	3.4	3.6	3.2	1.9	1.5
All Species	Whole Fish	17.5	15.3	24.0	21.4	14.9
	Head And Gut	217.4	213.0	181.6	218.9	183.6
	Kirimi	0.4	1.5	*	*	*
	Roe	20.0	10.9	3.0	5.9	10.7
	Fillets	67.9	37.4	57.4	45.3	19.2
	Deep-Skin Fillets	*	-	*	2.1	*
	Other Fillets	24.4	26.1	39.8	32.9	33.6
	Surimi	24.0	27.6	28.7	17.7	20.7
	Minced Fish	0.2	*	1.5	1.5	1.3
	Fishmeal	*	*	2.2	*	1.5
	Other Products	14.9	16.5	19.5	17.4	8.8
	All Products	386.7	348.3	357.8	363.0	294.4

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 33: Gulf of Alaska price per pound of groundfish products by species, 2014-2018, ($/lb).

	Product	2014	2015	2016	2017	2018
Pollock	Whole Fish	0.67	0.43	0.22	0.28	0.37
	Head And Gut	0.62	0.61	0.38	0.36	0.41
	Roe	2.03	1.22	1.39	1.80	1.83
	Deep-Skin Fillets	*	-	*	1.49	*
	Other Fillets	1.35	1.30	1.26	0.99	1.16
	Surimi	0.89	0.85	0.97	0.76	0.96
	Minced Fish	0.56	*	0.53	0.46	0.61
	Fishmeal	*	*	0.71	*	0.62
	Other Products	0.31	0.39	0.51	0.45	0.49
	All Products	0.88	0.80	0.64	0.56	0.69
Pacific Cod	Whole Fish	0.66	0.56	0.95	0.81	0.86
	Head And Gut	1.25	1.24	1.22	1.51	2.04
	Roe	1.06	0.86	0.78	0.68	1.28
	Fillets	3.10	2.64	3.30	3.15	4.35
	Other Products	0.67	0.97	1.04	1.02	1.12
	All Products	1.72	1.45	1.92	1.97	2.59
Sablefish	Head And Gut	6.95	6.90	8.26	9.30	6.83
	Other Products	3.27	3.50	3.64	3.92	2.99
	All Products	6.71	6.75	7.99	8.95	6.65
Atka Mackerel	Whole Fish	*	*	*	*	0.97
	Head And Gut	1.54	1.24	1.21	1.47	1.42
	Other Products	-	*	*	*	*
	All Products	1.54	1.24	1.21	1.47	1.38
Arrowtooth	Whole Fish	0.53	0.27	0.46	0.69	0.30
	Head And Gut	0.64	0.59	0.78	1.07	0.67
	Fillets	*	*	*	*	*
	Other Products	*	0.63	0.45	*	0.38
	All Products	0.64	0.59	0.73	0.99	0.57
Flathead Sole	Whole Fish	0.54	0.71	0.49	0.59	0.53
	Head And Gut	0.69	0.63	0.86	0.74	0.95
	Fillets	1.36	*	*	*	*
	Other Products	*	-	*	*	*
	All Products	0.67	0.74	0.62	0.67	0.62
Rex Sole	Whole Fish	0.96	0.84	1.01	0.99	0.97
	Head And Gut	1.67	1.30	1.33	1.45	1.35
	Fillets	*	*	*	0.34	*
	Other Products	*	-	*	*	*
	All Products	0.98	0.86	1.02	0.99	0.98
Shallow-water Flatfish	Whole Fish	0.58	1.06	0.55	0.61	0.61
	Head And Gut	0.69	0.75	1.03	0.68	0.90
	Fillets	1.39	2.37	2.08	*	*
	Other Products	*	-	*	*	*
	All Products	0.65	0.97	0.77	0.63	0.73

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Table 33: Continued

	Product	2014	2015	2016	2017	2018
Deep-water Flatfish	Whole Fish	0.36	*	0.50	*	0.45
	Head And Gut	0.70	1.09	0.73	*	0.39
	Fillets	2.04	*	*	*	*
	Other Products	-	-	-	*	-
	All Products	0.73	1.09	0.72	*	0.40
Pacific Ocean Perch	Whole Fish	0.60	0.72	0.65	0.55	0.54
	Head And Gut	1.13	1.06	0.93	1.33	1.22
	Other Products	1.96	2.36	2.70	2.18	2.02
	All Products	0.98	0.96	0.83	1.15	1.06
Northern Rockfish	Whole Fish	0.59	*	0.72	0.76	0.42
	Head And Gut	1.10	0.97	1.32	1.01	1.04
	Other Products	2.03	1.73	2.82	2.11	1.96
	All Products	1.04	0.98	1.38	1.03	1.03
Dusky Rockfish	Whole Fish	0.66	1.07	0.87	0.62	0.72
	Head And Gut	1.09	1.14	1.30	1.00	1.14
	Other Products	1.62	1.97	3.08	2.98	2.48
	All Products	1.07	1.20	1.31	1.02	1.15
Other Rockfish	Whole Fish	1.92	1.74	1.72	1.98	1.86
	Head And Gut	1.77	1.92	1.85	2.01	1.93
	Other Products	3.01	2.46	2.87	2.91	4.77
	All Products	1.91	1.92	1.89	2.08	2.08
Other Groundfish	Whole Fish	1.13	1.08	1.26	2.19	0.94
	Head And Gut	0.75	0.93	1.61	1.41	1.84
	Fillets	*	*	-	-	*
	Fishmeal	*	*	*	*	*
	Other Products	2.15	2.58	2.71	2.18	2.01
	All Products	1.65	2.03	2.50	2.06	1.96

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 34: Gulf of Alaska total product value per round metric ton of retained catch by species and year, 2014-2018, ($/mt).

Species	2014	2015	2016	2017	2018
Pollock	753	636	616	542	684
Sablefish	8,390	8,156	10,363	11,032	8,526
Pacific Cod	1,481	1,318	1,452	1,571	2,194
Flatfish	825	777	863	1,233	795
Rockfish	1,314	1,280	1,297	1,451	1,443
Atka Mackerel	1,809	1,471	1,243	1,734	1,785
Other	1,535	1,638	1,907	1,497	1,440

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 35: 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, 2014-2018, ($ millions).

	Year	Processors	Wholesale Value ($million)	Wholesale Value Per Processor ($1,000)	Percent Value, GOA FMP Groundfish
Central and Western Gulf Trawl	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
	2018	9	34.64	3,849.27	8.30
CP Hook and Line	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
	2018	7	2.94	420.58	0.71
Sablefish IFQ	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
	2018	5	4.35	870.41	1.04
Motherships & Inshore Floating Procs.	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
	2018	3	113.17	37,724.78	27.12
Kodiak Shoreside Procs.	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
	2018	8	138.62	17,328.11	33.22
Southcentral Gulf Shoreside Procs.	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
	2018	11	29.05	2,640.60	6.96
Southeastern Gulf Shoreside Procs.	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
	2018	14	34.41	2,458.14	8.25
Western Gulf Shoreside Procs.	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
	2018	2	*	*	*

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 36: 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, 2014-2018.

	Year	Vessels	Average Length (feet)	Median Length (feet)	Average Capacity (tons)	Median Capacity (tons)
Central and Western Gulf Trawl	2014	82	88	88.0	112	94.0
	2015	78	87	87.5	112	98.0
	2016	84	87	88.0	110	98.0
	2017	79	90	88.0	122	103.0
	2018	78	88	88.0	113	103.0
CV Hook and Line	2014	61	43	42.0	27	24.0
	2015	64	42	42.0	25	24.0
	2016	58	44	42.0	28	24.0
	2017	49	43	42.0	26	24.0
	2018	33	44	42.0	27	24.0
CP Hook and Line	2014	9	125	128.0	280	134.0
	2015	11	130	128.0	286	143.0
	2016	10	147	136.0	290	132.0
	2017	9	148	136.0	348	132.0
	2018	3	120	136.0	266	132.0
Sablefish IFQ	2014	280	57	57.0	49	36.0
	2015	261	57	57.0	46	39.0
	2016	265	57	57.0	48	37.0
	2017	261	56	57.0	48	36.0
	2018	257	57	57.0	48	39.0
Pot	2014	101	61	58.0	59	52.0
	2015	116	61	58.0	55	48.0
	2016	118	60	58.0	57	48.0
	2017	108	61	58.0	56	48.0
	2018	58	65	58.0	61	51.0
Jig	2014	247	39	39.0	16	14.0
	2015	265	40	40.0	16	14.0
	2016	307	41	41.0	17	16.0
	2017	189	39	40.0	14	14.0
	2018	185	39	40.0	14	12.5
No Fleet/ Other	2014	11	58	51.0	41	23.0
	2015	16	45	40.0	24	10.0
	2016	14	47	48.0	23	24.0
	2017	8	41	38.0	16	13.0
	2018	8	39	35.0	14	10.0

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 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	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	54	81	123	166	171	127	81	73	122	103	55	19	372
		2018	9	48	98	125	177	121	63	102	172	112	100	17	350
	Pot	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
		2018	24	30	46	10	14	11	5	6	16	14	13	5	78
	Trawl	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	45	61	42	21	17	5	4	53	60	35	1	68
		2018	12	53	51	25	19	14	2	35	59	61	28	2	69
	All Gear	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	165	208	257	294	205	153	93	81	185	176	104	28	523
		2018	45	131	187	158	210	145	70	141	246	186	139	24	466
Catcher Processors	Hook & Line	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
		2018	-	2	5	3	1	1	1	1	3	-	1	-	7
	Trawl	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
		2018	-	-	1	2	1	5	8	4	4	1	1	1	9
	All Gear	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
		2018	-	2	6	5	2	6	9	5	7	1	2	1	16

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 38: Gulf of Alaska catcher vessel (excluding catcher/processors) weeks of fishing groundfish by vessel-length class (feet), gear, and target, 2014-2018.

		Hook & Line		Pot		Trawl		All Gear	
	Year	<60ft	60-125ft	<60ft	60-125ft	<60ft	60-125ft	<60ft	60-125ft
Pollock	2014	-	-	-	-	181	550	181	550
	2015	-	-	-	-	237	569	237	569
	2016	-	-	-	-	289	524	289	524
	2017	-	-	-	-	180	527	180	527
	2018	-	-	-	-	187	482	187	482
Sablefish	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	1,326	273	131	45	-	9	1,457	327
	2018	1,449	285	135	57	-	18	1,584	360
Pacific Cod	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	568	-	879	209	109	60	1,556	269
	2018	370	-	190	93	28	3	588	96
Flatfish	2014	-	-	-	-	9	151	9	151
	2015	-	-	-	-	0	76	0	76
	2016	-	-	-	-	2	159	2	159
	2017	-	-	-	-	-	103	-	103
	2018	-	-	-	-	26	139	26	139
Rockfish	2014	425	4	-	-	7	101	432	105
	2015	370	6	-	-	4	97	374	103
	2016	282	3	-	-	3	120	285	123
	2017	278	2	-	-	7	88	285	90
	2018	255	7	-	-	5	97	260	104
Atka Mackerel	2016	-	-	-	-	-	1	-	1
	2018	-	-	-	-	-	0	-	0
All Groundfish	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	2,180	275	-	-	297	786	3,487	1,316
	2018	2,084	292	-	-	247	740	2,660	1,182

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/processor vessel weeks of fishing groundfish by vessel-length class (feet), gear, and target, 2014-2018.

		Hook & Line			Trawl			All Gear			
	Year	<60ft	60-124ft	125-230ft	60-124ft	125-230ft	>230ft	<60ft	60-124ft	125-230ft	>230ft
Pollock	2014	-	-	-	0	0	-	-	0	0	-
	2015	-	-	-	-	1	-	-	-	1	-
	2018	-	-	-	0	0	-	-	0	0	-
Sablefish	2014	7	-	18	0	-	-	7	0	18	-
	2015	9	-	19	0	-	-	9	0	19	-
	2016	9	-	17	-	-	-	9	-	17	-
	2017	9	-	20	-	-	-	9	-	20	-
	2018	10	-	21	0	-	-	10	0	21	-
Pacific Cod	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	-
	2018	4	-	8	-	-	-	4	-	8	-
Flatfish	2014	-	-	-	62	27	-	-	62	27	-
	2015	-	-	-	49	16	-	-	49	16	-
	2016	-	-	-	41	8	-	-	41	8	-
	2017	-	-	-	62	16	-	-	62	16	-
	2018	-	-	-	34	4	-	-	34	4	-
Rockfish	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
	2018	-	-	-	7	35	-	-	7	35	-
Atka Mackerel	2017	-	-	-	1	-	-	-	1	-	-
	2018	-	-	-	0	0	-	-	0	0	-
All Groundfish	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
	2018	14	-	29	42	40	-	14	42	69	-

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 40: Gulf of Alaska catcher vessel crew weeks in the groundfish fisheries by month, 2014-2018.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2014	1,049	1,860	3,266	2,032	2,336	1,162	516	994	1,986	1,820	864	443	18,327
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	3,065	1,982	1,021	635	903	1,736	2,298	642	371	19,168
2017	1,500	2,191	2,262	2,556	1,486	1,185	598	616	1,682	1,858	648	228	16,810
2018	352	1,144	1,378	1,323	1,721	1,270	494	808	2,240	1,842	926	156	13,654

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 41: Gulf of Alaska at-sea processor vessel crew weeks in the groundfish fisheries by month, 2014-2018.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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
2018	-	*	146	194	114	488	879	408	247	*	*	*	2,476

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 region, 2014-2018, (hundreds of metric tons).

Year	Gulf Of Alaska	Bering Sea And Aleutian Islands	All Alaska
2014	65.15	13.40	78.56
2015	68.30	13.98	82.28
2016	68.71	15.09	83.80
2017	76.81	16.64	93.45
2018	67.75	16.15	83.90

Notes: These estimates include catch from all Alaska commercial fisheries (including CDQ). Net weight is dressed, head-off, slime and ice deducted. "*" 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 H2: Catch (net landed weight) and percent of regional catch in the commercial Pacific halibut fisheries off Alaska by vessel length (feet) and region, 2014-2018, (hundreds of metric tons).

		Gulf of Alaska		Bering Sea and Aleutian Islands		All Alaska	
	Length	Net Tons	Percent	Net Tons	Percent	Net Tons	Percent
2014	<20	0.10	0	0.19	0.01	0.29	0
	20-29	1.54	0.02	1.27	0.09	2.80	0.04
	30-39	10.34	0.16	2.19	0.16	12.53	0.16
	40-49	19.55	0.30	1.28	0.10	20.83	0.27
	50-59	23.46	0.36	5.36	0.40	28.81	0.37
	>=60	9.81	0.15	3.12	0.23	12.93	0.17
2015	<20	0.10	0	*	*	0.10	0
	20-29	1.54	0.02	0.97	0.07	2.51	0.03
	30-39	10.51	0.15	1.96	0.14	12.46	0.15
	40-49	20.12	0.30	1.89	0.14	22.01	0.27
	50-59	25.83	0.38	5.94	0.43	31.77	0.39
	>=60	9.91	0.15	3.18	0.23	13.09	0.16
2016	<20	0.11	0	*	*	0.11	0
	20-29	1.67	0.02	0.95	0.06	2.61	0.03
	30-39	10.99	0.16	1.98	0.13	12.97	0.16
	40-49	20.92	0.31	2.19	0.15	23.12	0.28
	50-59	25.14	0.37	6.35	0.42	31.49	0.38
	>=60	9.53	0.14	3.50	0.23	13.02	0.16
2017	<20	0.10	0	*	*	0.10	0
	20-29	1.66	0.02	0.91	0.05	2.57	0.03
	30-39	12.20	0.16	2.87	0.17	15.06	0.16
	40-49	23.72	0.31	2.74	0.17	26.46	0.28
	50-59	28.18	0.37	6.35	0.38	34.52	0.37
	>=60	10.66	0.14	3.66	0.22	14.33	0.15
2018	<20	0.09	0	*	*	0.09	0
	20-29	1.32	0.02	0.90	0.06	2.21	0.03
	30-39	10.75	0.16	3.19	0.20	13.94	0.17
	40-49	22.23	0.33	2.72	0.17	24.95	0.30
	50-59	24.12	0.36	5.62	0.35	29.74	0.36
	>=60	9.09	0.13	3.57	0.22	12.66	0.15

Notes: Excludes vessels in the Annette Island commercial Pacific halibut fishery. These estimates include catch from all Alaska commercial fisheries (including CDQ). Net weight is dressed, head-off, slime and ice deducted. "*" 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 H3: Non-halibut prohibited species catch on commercial Pacific halibut target trips off Alaska by PSC species and area, 2014-2018.

	Year	Bairdi Tanner Crab (Count)	Chinook Salmon (Count)	Herring (Tons)	Non-Chinook Salmon (Count)	Opilio Tanner (Snow) Crab (Count)	Other King Crab (Count)	Red King Crab (Count)
Gulf of Alaska	2014	21	-	-	-	-	-	379
	2015	-	-	-	-	-	*	-
	2016	37	-	-	-	-	18	178
	2017	0	-	-	-	0	0	-
	2018	134	-	-	-	-	69	17
Bering Sea and Aleutian Islands	2014	-	-	-	-	-	299	-
	2015	-	-	-	-	-	560	-
	2016	8	*	*	*	20	222	12
	2017	18	*	*	*	34	231	201
	2018	21	*	*	33	65	777	28

Notes: These estimates include catch from all Alaska commercial fisheries (including CDQ). 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 fisheries off Alaska by region, 2014-2018, ($ millions and $/lb net weight, respectively).

	Gulf of Alaska		Bering Sea and Aleutian Islands		All Alaska	
Year	Value	Price	Value	Price	Value	Price
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	6.56	19.59	5.89	118.96	6.44
2017	97.78	5.77	19.34	5.27	117.13	5.68
2018	73.27	4.91	14.69	4.13	87.96	4.76

Notes: These estimates include catch from all Alaska commercial fisheries (including CDQ). 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. "*" 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 H4B: Ex-vessel value and price in the commercial Pacific halibut fisheries off Alaska by IPHC area, 2014-2018, ($ millions and $/lb net weight, respectively).

	Variable	2014	2015	2016	2017	2018
2C	Value	21.56	23.66	27.36	26.45	18.50
	Price	6.22	6.30	6.62	5.87	4.87
3A	Value	48.58	50.76	50.31	48.92	39.47
	Price	6.31	6.31	6.60	5.81	4.98
3B	Value	17.83	16.69	17.83	18.58	13.07
	Price	6.10	6.13	6.43	5.61	4.83
4A	Value	4.79	7.94	8.34	7.94	5.78
	Price	5.76	6.00	6.22	5.47	4.27
4B	Value	5.89	6.03	6.30	5.99	4.68
	Price	5.41	5.69	5.76	5.14	4.07
4CDE	Value	6.65	6.93	8.82	9.24	6.47
	Price	5.09	5.62	5.83	5.28	4.12

Notes: Values and prices are for catch from all Alaska commercial fisheries (including CDQ). 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. "*" 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 H5: Ex-vessel value and average annual revenue per vessel in the commercial Pacific halibut fisheries off Alaska by region and vessel length (feet), 2014-2018, ($ 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
2014	<20	0.14	6.01	0.19	12.00	0.33	8.69
	20-29	2.14	18.58	1.10	22.53	3.24	19.76
	30-39	14.08	53.76	2.44	69.63	16.52	57.77
	40-49	26.60	97.43	1.50	115.53	28.10	101.45
	50-59	32.38	185.05	6.56	243.10	38.95	217.59
	>=60	13.71	291.77	3.97	233.41	17.68	353.62
2015	<20	0.14	8.49	*	*	0.18	6.51
	20-29	2.15	21.30	1.09	41.76	3.24	25.49
	30-39	14.41	57.86	2.34	83.47	16.74	62.48
	40-49	27.62	108.33	2.33	166.55	29.95	115.66
	50-59	35.74	196.37	7.69	248.11	43.43	231.01
	>=60	13.86	315.07	4.19	220.73	18.06	376.19
2016	<20	0.15	8.00	*	*	0.28	10.03
	20-29	2.41	23.62	1.06	39.22	3.47	26.89
	30-39	15.78	66.30	2.43	83.68	18.21	70.30
	40-49	30.14	120.07	2.79	199.04	32.92	128.11
	50-59	36.32	199.58	8.41	280.43	44.74	241.82
	>=60	14.06	312.39	4.78	281.20	18.84	400.80
2017	<20	0.13	9.86	*	*	0.27	12.07
	20-29	2.13	23.12	1.03	39.53	3.15	26.74
	30-39	15.46	63.11	3.29	93.87	18.75	69.43
	40-49	30.11	120.93	3.21	214.18	33.32	131.72
	50-59	35.83	205.93	7.30	260.71	43.13	247.88
	>=60	13.72	319.02	4.38	257.69	18.10	393.45
2018	<20	0.09	6.95	*	*	0.27	13.30
	20-29	1.43	18.15	0.76	31.87	2.20	21.34
	30-39	11.58	48.66	2.85	79.14	14.43	55.93
	40-49	23.96	98.18	2.49	155.75	26.45	106.22
	50-59	25.95	153.57	5.09	188.53	31.04	180.49
	>=60	10.10	229.64	3.32	195.12	13.42	285.56

Notes: Values are for catch from all Alaska commercial fisheries (including CDQ). Excludes vessels in the Annette Island commercial Pacific halibut fishery. Length is measured in feet. 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 H6: Ex-vessel value port ranking, annual ex-vessel value, price and percent of statewide value in the commercial Pacific halibut fisheries off Alaska, 2014-2018, ($ millions and $/lb net weight).

	Port	2014	2015	2016	2017	2018
	Homer	18.51	17.25	18.32	13.06	13.18
	Kodiak	15.94	17.28	16.95	19.59	10.55
	Seward	11.56	12.76	13.25	13.46	12.79
Ex-vessel Value	Dutch Harbor	*	*	*	*	*
	Sitka	*	*	8.17	*	5.84
	Juneau	5.79	*	7.50	6.68	5.35
	St Paul Island	*	*	*	*	*
	Petersburg	7.62	7.01	9.93	9.97	6.59
	Yakutat	*	4.07	4.33	*	*
	Homer	6.05	6.11	6.43	5.82	5.24
	Kodiak	6.32	6.23	6.60	5.59	4.60
	Seward	6.20	6.20	6.46	5.79	4.98
	Dutch Harbor	*	*	*	*	*
Price	Sitka	*	*	6.53	*	4.63
	Juneau	6.12	*	6.75	6.01	4.87
	St Paul Island	*	*	*	*	*
	Petersburg	6.24	6.52	6.72	5.93	4.86
	Yakutat	*	6.48	6.52	*	*
	Homer	18 %	15 %	15 %	11 %	15 %
	Kodiak	15 %	15 %	14 %	17 %	12 %
	Seward	11 %	11 %	11 %	11 %	15 %
Percent State Value	Dutch Harbor	*	*	*	*	*
	Sitka	*	*	7 %	*	7 %
	Juneau	5 %	*	6 %	6 %	6 %
	St Paul Island	*	*	*	*	*
	Petersburg	7 %	6 %	8 %	9 %	7 %
	Yakutat	*	4 %	4 %	*	*
	Homer	1	2	1	3	1
	Kodiak	2	1	2	1	3
	Seward	3	3	3	2	2
	Dutch Harbor	6	4	5	5	6
Rank	Sitka	5	6	6	6	5
	Juneau	7	5	7	7	7
	St Paul Island	13	11	11	10	11
	Petersburg	4	7	4	4	4
	Yakutat	10	9	9	9	8

Notes: Displays only the 10 Alaska ports of landing with the highest average ex-vessel value over the last 5 years. Values and prices are for catch from all Alaska commercial fisheries (including CDQ). 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, 2014-2018, (1000s of metric tons, $ millions and $/lb net weight, respectively).

	Year	Quantity	Value	Price
Head and Gut	2014	4.80	81.92	7.73
	2015	5.38	92.07	7.77
	2016	6.29	94.99	6.85
	2017	5.64	91.86	7.39
	2018	5.01	75.59	6.84
Fillet	2014	0.88	25.53	13.23
	2015	1.11	34.82	14.21
	2016	1.23	39.30	14.50
	2017	1.40	42.05	13.65
	2018	1.16	33.17	12.92
Other Products	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
	2018	0.33	1.73	2.39
All Products	2014	6.18	109.92	8.06
	2015	9.54	133.76	6.36
	2016	8.19	138.91	7.69
	2017	7.50	136.64	8.27
	2018	6.50	110.50	7.71

Notes: Landings, values and prices for catch from all Alaska commercial fisheries (including CDQ). 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 H8: Number of vessels catching Pacific halibut commercially off Alaska and median vessel length by region and vessel length class, 2014-2018.

		Gulf of Alaska		Bering Sea and Aleutian Islands		All Alaska	
	Year	Vessels	Median Length	Vessels	Median Length	Vessels	Median Length
<20	2014	23	18	16	18	38	18
	2015	16	18	12	18	27	18
	2016	19	17	10	18	28	18
	2017	13	18	9	18	22	18
	2018	13	17	7	18	20	18
20-29	2014	115	25	49	26	164	26
	2015	101	25	26	27	127	25
	2016	102	25	27	28	129	25
	2017	92	25	26	28	118	25
	2018	79	26	24	28	103	27
30-39	2014	262	34	35	32	286	34
	2015	249	34	28	32	268	34
	2016	238	34	29	32	259	33
	2017	245	33	35	32	270	33
	2018	238	34	36	32	258	33
40-49	2014	273	43	13	46	277	43
	2015	255	43	14	47	259	43
	2016	251	43	14	47	257	43
	2017	249	44	15	47	253	44
	2018	244	44	16	47	249	44
50-59	2014	175	55	27	57	179	55
	2015	182	55	31	58	188	55
	2016	182	55	30	58	185	55
	2017	174	55	28	58	174	55
	2018	169	55	27	58	172	55
≥60	2014	47	70	17	76	50	71
	2015	44	70	19	76	48	72
	2016	45	70	17	76	47	72
	2017	43	70	17	76	46	72
	2018	44	71	17	76	47	72

Notes: Excludes vessels in the Annette Island commercial Pacific halibut fishery. "*" 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 H9: Total vessel days fishing Pacific halibut commercially off Alaska by area, 2014-2018.

Year	Gulf Of Alaska	Bering Sea And Aleutian Islands	All Alaska
2014	12,842	2,894	15,520
2015	12,549	2,744	15,059
2016	12,748	2,800	15,343
2017	13,390	2,797	15,793
2018	12,997	2,666	15,326

Notes: Excludes vessels in the Annette Island commercial Pacific halibut fishery. "*" 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 H10: Crew days fishing Pacific halibut commercially off Alaska by month and area, 2014-2018.

	Year	Mar-Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Gulf of Alaska	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	10,297	10,087	4,964	3,566	5,887	5,078	3,358	627
	2017	10,399	9,558	5,886	3,704	5,677	6,574	4,923	793
	2018	8,758	8,440	5,843	4,093	6,327	6,868	4,878	1,112
Bering Sea and Aleutian Islands	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	2,091	1,891	2,857	1,540	1,104	192
	2018	455	1,301	1,456	2,044	3,000	1,766	700	123
All Alaska	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	10,729	11,373	6,845	5,642	8,417	6,584	4,098	695
	2017	10,672	10,775	7,851	5,455	7,996	7,824	5,718	985
	2018	9,121	9,514	7,135	6,024	8,899	8,419	5,551	1,185

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 and to enusre confidentiality it is combined with April. "*" 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.

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 (such as a change in TAC), 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 the composition of species within product types and the composition of product type for a given species, and in the ex-vessel market, they show composition of species harvested by a given gear type and the compistion of gear types used to harvest a 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 2015 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 and i enumerates species, products, or gear types depending on the index. 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.

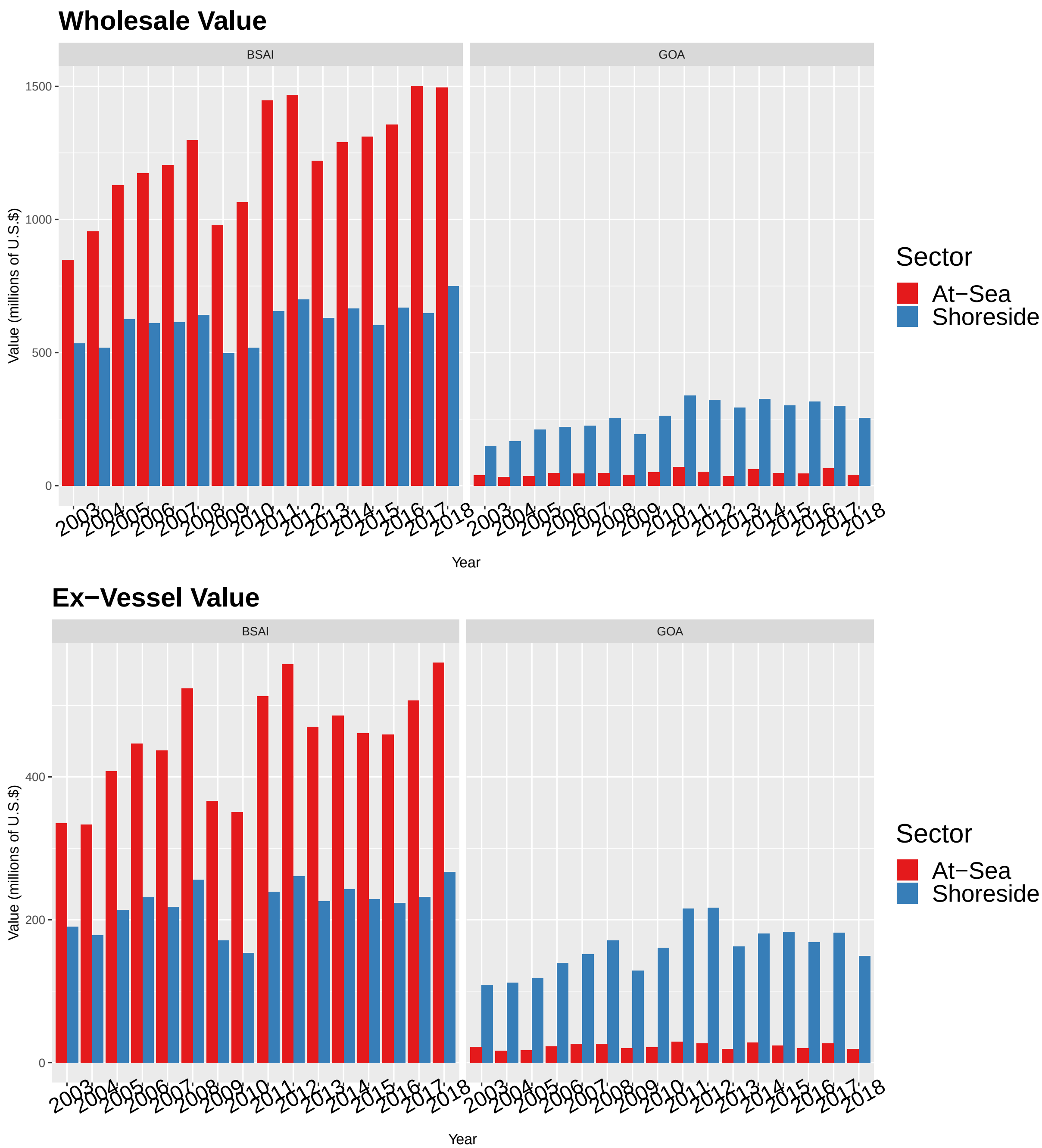

Figure 5.1: Wholesale and ex-vessel value by region and sector 2003-2018.
Source: NMFS Alaska Region's Catch-accounting system (CAS) and Weekly Production Report (WPR) estimates; Alaska Department of Fish and Game (ADF&G) Commercial Operator's Annual Report (COAR), National Marine Fisheries Service. P.O. Box 15700, Seattle, WA 98115-0070.

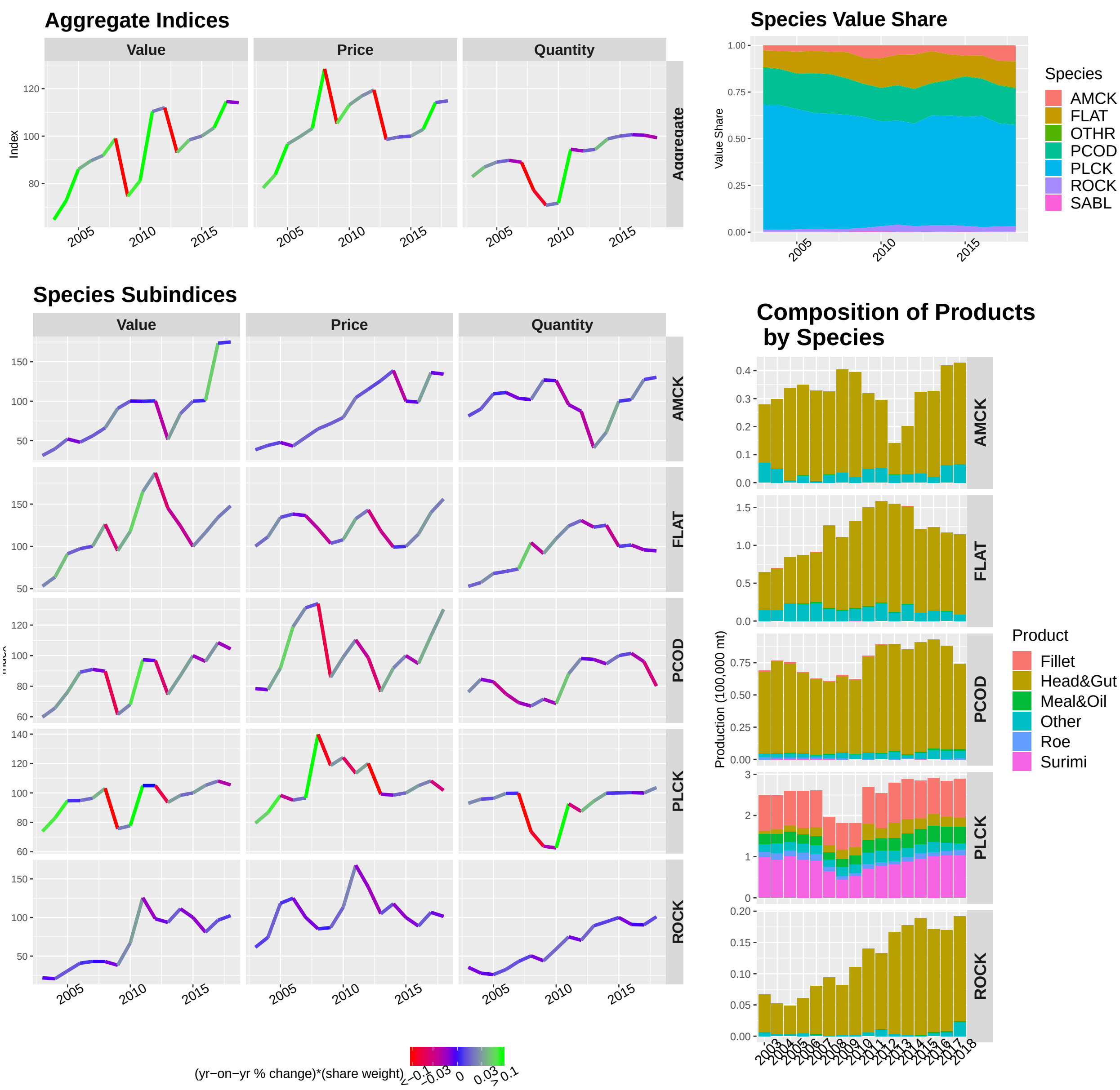

Figure 5.2: BSAI at-sea wholesale market: species decomposition 2003-2018 (Index 2015 = 100). **Notes:** Index values for 2013-2018, notes and source information for the indices are on Table 5.1. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

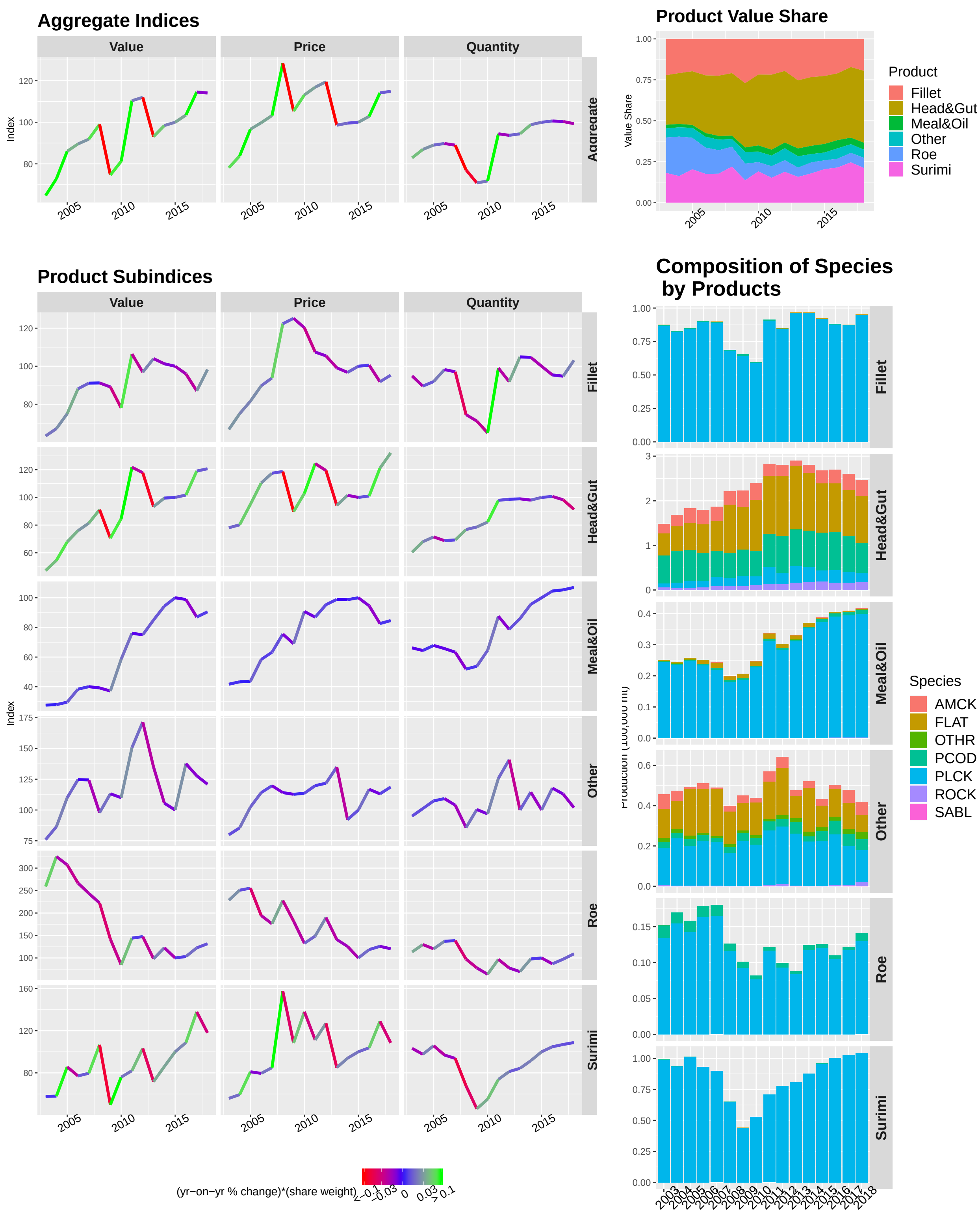

Figure 5.3: BSAI at-sea wholesale market: product decomposition 2003-2018 (Index 2015 = 100). **Notes:** Index values for 2013-2018, notes and source information for the indices are on Table 5.2. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

Figure 5.4: BSAI shoreside wholesale market: species decomposition 2003-2018 (Index 2015 = 100). **Notes:** Index values for 2013-2018, 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.

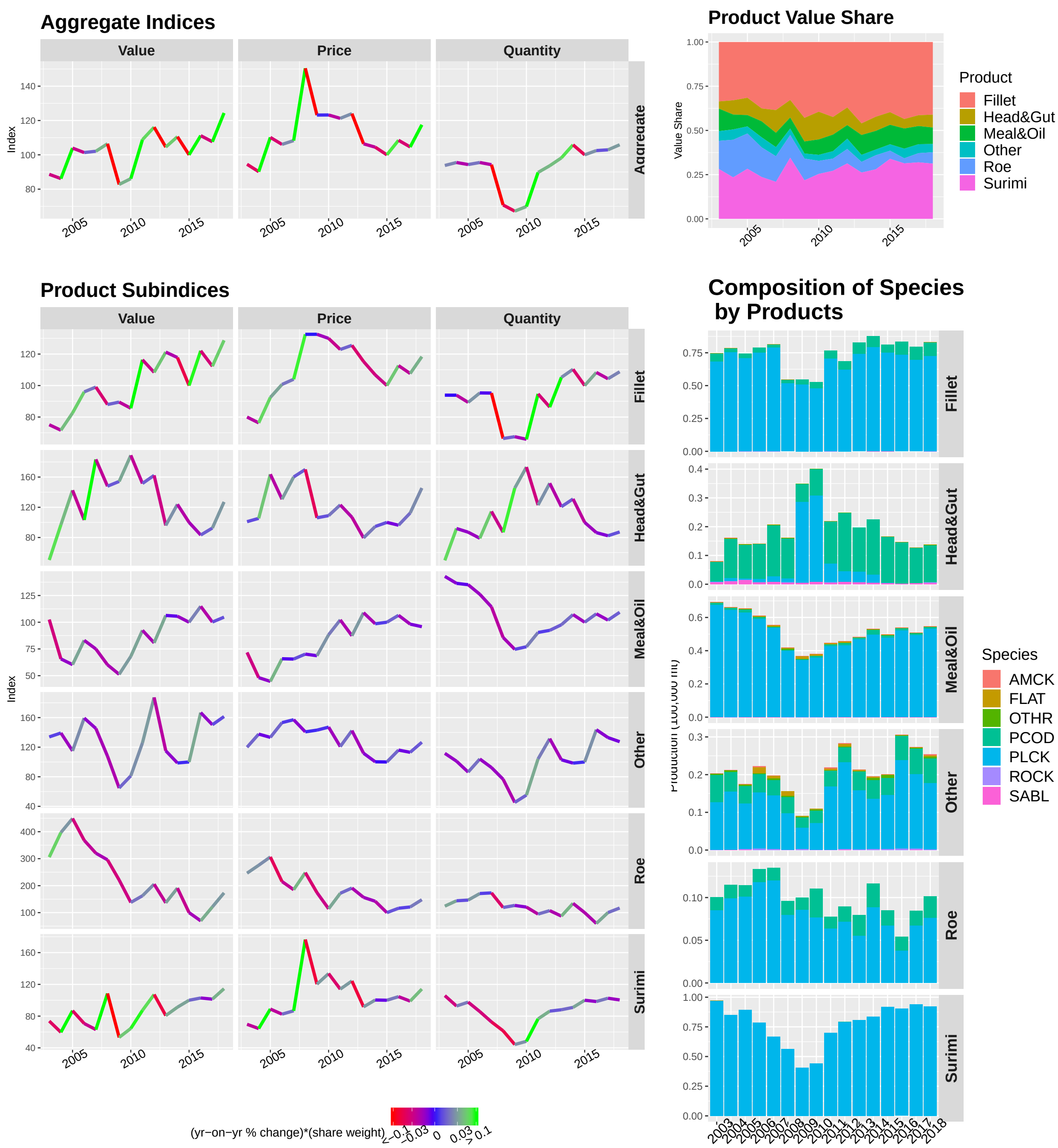

Figure 5.5: BSAI shoreside wholesale market: product decomposition 2003-2018 (Index 2015 = 100). **Notes:** Index values for 2013-2018, notes and source information for the indices are on Table 5.4. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

Figure 5.6: BSAI shoreside ex-vessel market: species decomposition 2003-2018 (Index 2015 = 100). **Notes:** Index values for 2013-2018, 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 2003-2018 (Index 2015 = 100). **Notes:** Index values for 2013-2018, 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.

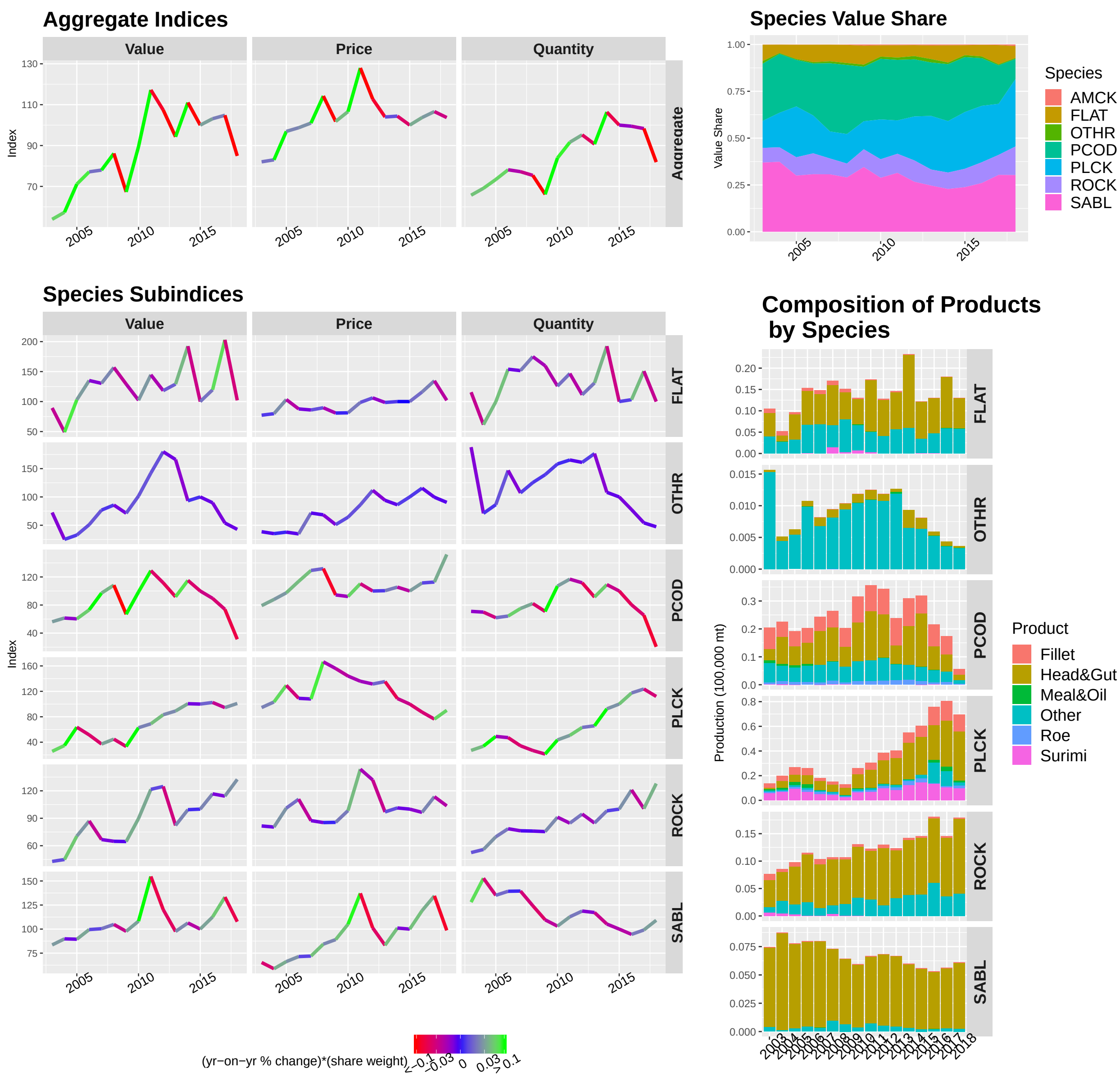

Figure 5.8: GOA wholesale market: species decomposition 2003-2018 (Index 2015 = 100).
Notes: Index values for 2013-2018, notes and source information for the indices are on Table 5.7. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

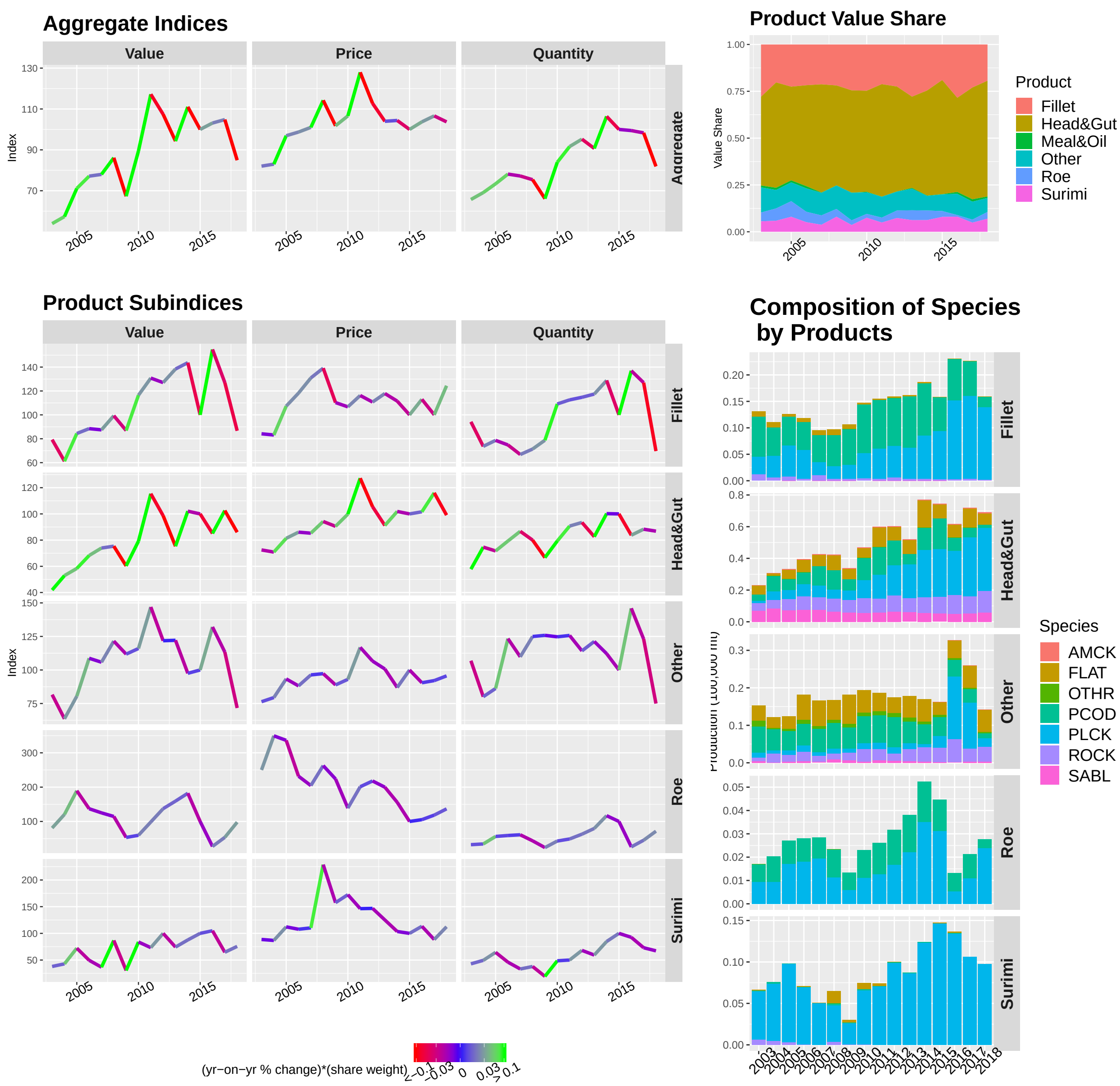

Figure 5.9: GOA wholesale market: product decomposition 2003-2018 (Index 2015 = 100). **Notes:** Index values for 2013-2018, notes and source information for the indices are on Table 5.8. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

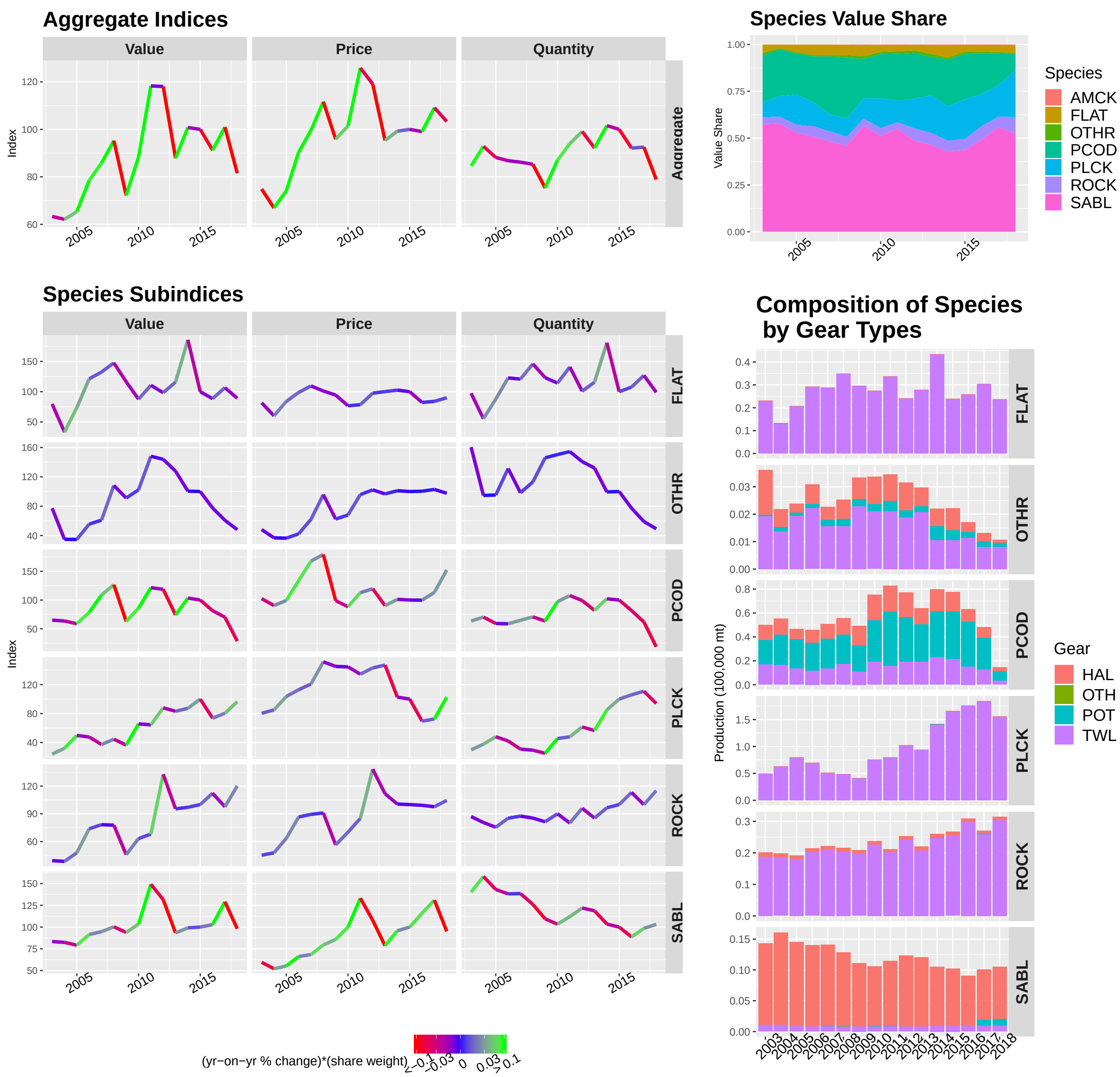

Figure 5.10: GOA ex-vessel market: species decomposition 2003-2018 (Index 2015 = 100). **Notes:** Index values for 2013-2018, notes and source information for the indices are on Table 5.9. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

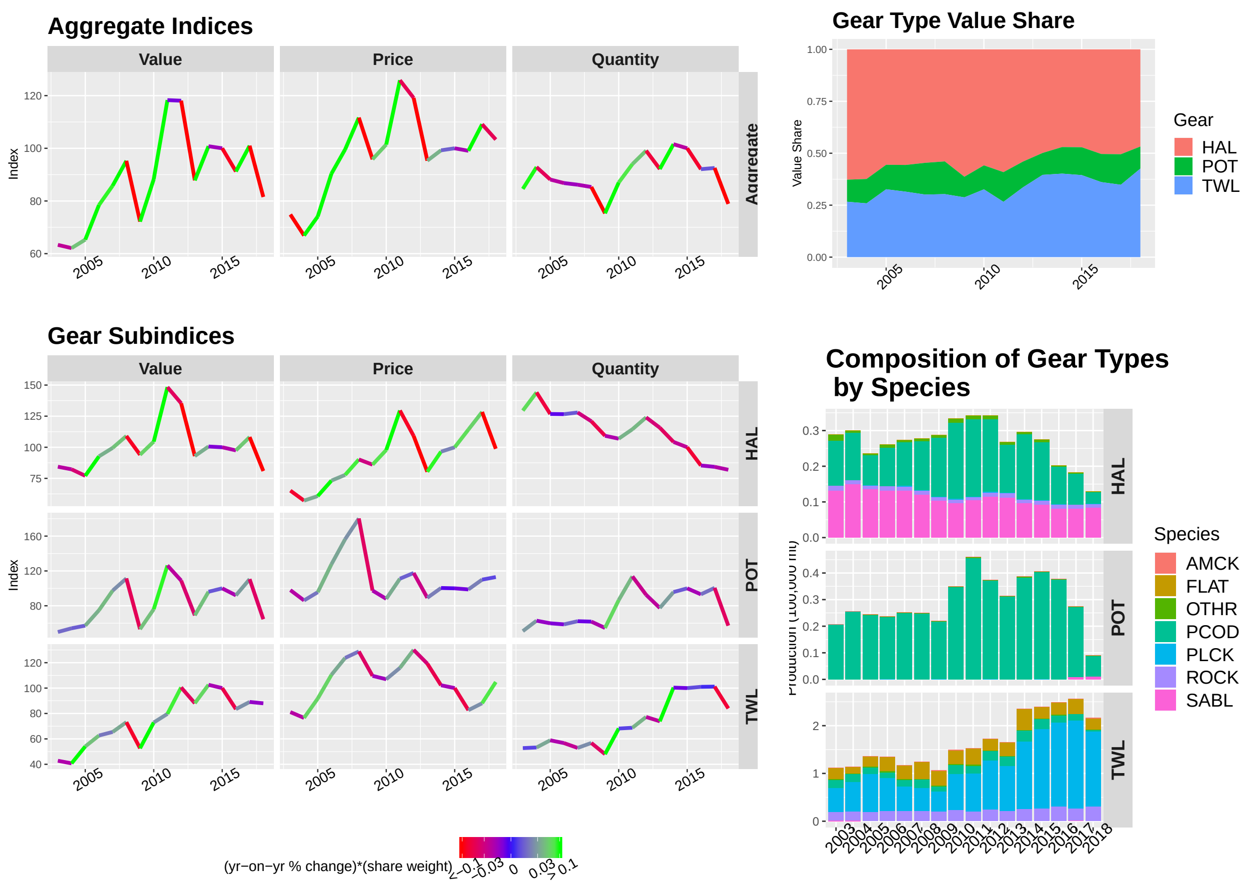

Figure 5.11: GOA ex-vessel market: gear decomposition 2003-2018 (Index 2015 = 100).
Notes: Index values for 2013-2018, notes and source information for the indices are on Table 5.10. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

Table 5.1: Species indices and value share for the BSAI at-sea first-wholesale market 2013-2018.

Species	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	93.10	98.43	100.00	103.49	114.57	114.09
Aggregate	Price	98.59	99.59	100.00	102.86	114.15	114.87
Aggregate	Quantity	94.44	98.83	100.00	100.62	100.36	99.32
AMCK	Value	51.64	84.27	100.00	100.97	173.52	174.97
AMCK	Price	126.10	138.81	100.00	98.87	136.24	134.33
AMCK	Quantity	40.95	60.71	100.00	102.12	127.36	130.26
AMCK	Value Share	0.03	0.05	0.06	0.05	0.08	0.09
FLAT	Value	145.17	124.12	100.00	116.51	134.38	147.84
FLAT	Price	118.30	99.26	100.00	114.58	140.07	156.02
FLAT	Quantity	122.72	125.05	100.00	101.69	95.94	94.76
FLAT	Value Share	0.17	0.14	0.11	0.12	0.13	0.14
PCOD	Value	74.69	86.99	100.00	96.25	108.53	104.41
PCOD	Price	76.57	91.91	100.00	94.80	112.97	130.32
PCOD	Quantity	97.54	94.65	100.00	101.53	96.07	80.12
PCOD	Value Share	0.17	0.19	0.21	0.20	0.20	0.19
PLCK	Value	93.54	98.35	100.00	105.15	108.08	105.45
PLCK	Price	99.10	98.54	100.00	104.93	108.15	101.73
PLCK	Quantity	94.38	99.80	100.00	100.21	99.94	103.65
PLCK	Value Share	0.59	0.59	0.59	0.60	0.55	0.54
ROCK	Value	93.60	111.28	100.00	80.94	96.51	102.43
ROCK	Price	104.91	117.81	100.00	88.93	106.67	101.44
ROCK	Quantity	89.22	94.46	100.00	91.01	90.48	100.98
ROCK	Value Share	0.03	0.04	0.03	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 2013-2018.

Product	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	93.10	98.43	100.00	103.49	114.57	114.09
Aggregate	Price	98.59	99.59	100.00	102.86	114.15	114.87
Aggregate	Quantity	94.44	98.83	100.00	100.62	100.36	99.32
Fillet	Value	104.01	101.29	100.00	95.98	87.01	98.29
Fillet	Price	99.16	96.76	100.00	100.57	91.82	95.31
Fillet	Quantity	104.88	104.68	100.00	95.43	94.77	103.13
Fillet	Value Share	0.25	0.23	0.23	0.21	0.17	0.20
Head&Gut	Value	93.29	99.52	100.00	101.71	119.03	120.71
Head&Gut	Price	94.26	101.51	100.00	101.01	121.12	132.17
Head&Gut	Quantity	98.97	98.04	100.00	100.69	98.28	91.33
Head&Gut	Value Share	0.42	0.42	0.41	0.41	0.43	0.44
Meal&Oil	Value	84.98	94.33	100.00	98.85	87.00	90.50
Meal&Oil	Price	98.89	98.72	100.00	94.57	82.60	84.61
Meal&Oil	Quantity	85.94	95.56	100.00	104.52	105.33	106.96
Meal&Oil	Value Share	0.05	0.05	0.05	0.05	0.04	0.04
Other	Value	134.88	105.56	100.00	137.63	127.77	120.92
Other	Price	134.91	92.17	100.00	116.83	113.12	118.68
Other	Quantity	99.97	114.52	100.00	117.80	112.96	101.89
Other	Value Share	0.07	0.05	0.05	0.06	0.05	0.05
Roe	Value	98.24	122.88	100.00	103.20	122.50	131.65
Roe	Price	141.09	125.71	100.00	118.69	125.89	120.50
Roe	Quantity	69.63	97.75	100.00	86.95	97.31	109.25
Roe	Value Share	0.06	0.07	0.05	0.05	0.06	0.06
Surimi	Value	71.67	86.00	100.00	108.76	137.90	117.98
Surimi	Price	85.02	93.93	100.00	103.81	128.95	108.45
Surimi	Quantity	84.30	91.56	100.00	104.77	106.94	108.78
Surimi	Value Share	0.16	0.18	0.20	0.22	0.25	0.21

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 2013-2018.

Species	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	104.52	110.56	100.00	111.17	107.63	124.38
Aggregate	Price	106.41	104.47	100.00	108.48	104.58	117.49
Aggregate	Quantity	98.22	105.84	100.00	102.48	102.92	105.86
PCOD	Value	110.87	127.87	100.00	139.47	153.64	195.17
PCOD	Price	93.42	98.24	100.00	108.96	124.23	151.33
PCOD	Quantity	118.69	130.16	100.00	128.00	123.67	128.97
PCOD	Value Share	0.15	0.16	0.14	0.18	0.20	0.22
PLCK	Value	103.16	107.67	100.00	107.22	100.15	113.03
PLCK	Price	109.46	105.92	100.00	108.37	100.44	111.01
PLCK	Quantity	94.24	101.65	100.00	98.94	99.71	101.82
PLCK	Value Share	0.83	0.82	0.84	0.81	0.78	0.76
SABL	Value	159.43	128.22	100.00	79.25	119.21	87.60
SABL	Price	85.14	90.22	100.00	106.94	98.66	75.98
SABL	Quantity	187.26	142.12	100.00	74.10	120.83	115.29
SABL	Value Share	0.02	0.01	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 2013-2018.

Product	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	104.52	110.56	100.00	111.17	107.63	124.38
Aggregate	Price	106.41	104.47	100.00	108.48	104.58	117.49
Aggregate	Quantity	98.22	105.84	100.00	102.48	102.92	105.86
Fillet	Value	121.26	117.79	100.00	122.08	112.28	128.71
Fillet	Price	115.26	106.77	100.00	112.68	107.64	118.35
Fillet	Quantity	105.20	110.32	100.00	108.34	104.31	108.76
Fillet	Value Share	0.46	0.42	0.40	0.44	0.41	0.41
Head&Gut	Value	96.01	123.92	100.00	83.27	92.55	127.08
Head&Gut	Price	79.48	94.60	100.00	96.28	112.46	145.49
Head&Gut	Quantity	120.79	131.00	100.00	86.49	82.30	87.34
Head&Gut	Value Share	0.07	0.08	0.07	0.05	0.06	0.07
Meal&Oil	Value	106.34	105.61	100.00	114.89	100.16	104.75
Meal&Oil	Price	108.92	98.55	100.00	106.50	98.23	95.84
Meal&Oil	Quantity	97.63	107.17	100.00	107.88	101.97	109.30
Meal&Oil	Value Share	0.11	0.11	0.11	0.11	0.10	0.09
Other	Value	115.12	98.65	100.00	166.75	150.34	161.42
Other	Price	111.78	100.23	100.00	116.08	113.06	126.65
Other	Quantity	102.99	98.42	100.00	143.65	132.97	127.45
Other	Value Share	0.04	0.03	0.04	0.05	0.05	0.05
Roe	Value	136.49	190.98	100.00	69.56	121.34	173.17
Roe	Price	156.55	142.12	100.00	116.30	120.98	147.93
Roe	Quantity	87.18	134.38	100.00	59.81	100.30	117.06
Roe	Value Share	0.06	0.08	0.05	0.03	0.05	0.06
Surimi	Value	80.67	91.25	100.00	102.83	101.39	114.55
Surimi	Price	91.64	100.30	100.00	104.52	98.88	114.10
Surimi	Quantity	88.02	90.98	100.00	98.38	102.54	100.40
Surimi	Value Share	0.26	0.28	0.34	0.31	0.32	0.31

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 2013-2018.

Species	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	98.89	106.07	100.00	97.61	101.34	116.80
Aggregate	Price	98.73	103.75	100.00	92.77	94.44	108.44
Aggregate	Quantity	100.17	102.24	100.00	105.22	107.30	107.70
PCOD	Value	107.69	131.09	100.00	130.16	156.52	189.29
PCOD	Price	97.92	109.69	100.00	104.84	124.65	156.69
PCOD	Quantity	109.97	119.51	100.00	124.15	125.57	120.80
PCOD	Value Share	0.16	0.18	0.15	0.20	0.23	0.24
PLCK	Value	96.21	99.72	100.00	92.14	90.51	104.16
PLCK	Price	99.88	102.33	100.00	90.01	87.69	99.65
PLCK	Quantity	96.32	97.46	100.00	102.37	103.21	104.52
PLCK	Value Share	0.81	0.78	0.83	0.78	0.74	0.74
SABL	Value	161.66	189.74	100.00	90.71	149.43	78.99
SABL	Price	76.29	107.56	100.00	107.76	106.94	58.26
SABL	Quantity	211.89	176.41	100.00	84.18	139.73	135.59
SABL	Value Share	0.03	0.03	0.02	0.02	0.03	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 5.6: Gear indices and value share for the BSAI shoreside ex-vessel market 2013-2018.

Gear	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	98.89	106.07	100.00	97.61	101.34	116.80
Aggregate	Price	98.73	103.75	100.00	92.77	94.44	108.44
Aggregate	Quantity	100.17	102.24	100.00	105.22	107.30	107.70
HAL	Value	122.97	174.21	100.00	59.46	44.64	54.73
HAL	Price	79.92	107.12	100.00	107.20	107.82	69.43
HAL	Quantity	153.88	162.63	100.00	55.46	41.40	78.83
HAL	Value Share	0.02	0.02	0.02	0.01	0.01	0.01
POT	Value	95.04	134.34	100.00	138.18	192.58	213.59
POT	Price	91.28	107.81	100.00	104.18	122.41	141.98
POT	Quantity	104.12	124.61	100.00	132.64	157.33	150.44
POT	Value Share	0.08	0.10	0.08	0.12	0.16	0.15
TWL	Value	98.84	102.37	100.00	94.56	94.00	109.05
TWL	Price	100.04	103.26	100.00	91.40	90.98	104.75
TWL	Quantity	98.80	99.13	100.00	103.46	103.32	104.10
TWL	Value Share	0.90	0.87	0.90	0.87	0.84	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 2013-2018.

Species	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	94.30	111.04	100.00	103.12	104.81	84.94
Aggregate	Price	103.97	104.38	100.00	103.70	106.62	103.70
Aggregate	Quantity	90.70	106.38	100.00	99.45	98.30	81.91
FLAT	Value	129.11	192.36	100.00	119.66	202.94	102.13
FLAT	Price	98.47	100.00	100.00	115.98	134.64	102.09
FLAT	Quantity	131.11	192.36	100.00	103.18	150.74	100.04
FLAT	Value Share	0.07	0.09	0.05	0.06	0.10	0.06
OTHR	Value	166.03	93.19	100.00	89.69	53.99	42.74
OTHR	Price	94.05	86.14	100.00	115.55	99.53	90.38
OTHR	Quantity	176.54	108.18	100.00	77.62	54.25	47.28
OTHR	Value Share	0.02	0.01	0.01	0.01	0.01	0.01
PCOD	Value	91.73	115.14	100.00	89.53	73.82	31.22
PCOD	Price	100.44	105.52	100.00	111.43	112.77	152.02
PCOD	Quantity	91.33	109.11	100.00	80.35	65.46	20.53
PCOD	Value Share	0.29	0.30	0.29	0.25	0.21	0.11
PLCK	Value	89.08	100.55	100.00	102.54	94.43	100.97
PLCK	Price	135.37	108.74	100.00	87.32	76.34	90.15
PLCK	Quantity	65.80	92.47	100.00	117.43	123.70	112.01
PLCK	Value Share	0.29	0.27	0.30	0.30	0.27	0.36
ROCK	Value	82.18	99.39	100.00	116.71	114.24	132.51
ROCK	Price	96.92	101.30	100.00	96.46	113.60	103.57
ROCK	Quantity	84.79	98.11	100.00	120.98	100.56	127.94
ROCK	Value Share	0.09	0.09	0.10	0.11	0.11	0.15
SABL	Value	97.53	106.39	100.00	112.59	133.27	107.73
SABL	Price	83.20	101.08	100.00	119.15	134.50	98.70
SABL	Quantity	117.23	105.26	100.00	94.49	99.08	109.16
SABL	Value Share	0.25	0.23	0.24	0.26	0.30	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 2013-2018.

Product	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	94.30	111.04	100.00	103.12	104.81	84.94
Aggregate	Price	103.97	104.38	100.00	103.70	106.62	103.70
Aggregate	Quantity	90.70	106.38	100.00	99.45	98.30	81.91
Fillet	Value	138.39	143.69	100.00	154.77	127.01	86.70
Fillet	Price	117.86	111.54	100.00	113.02	100.05	124.37
Fillet	Quantity	117.41	128.83	100.00	136.95	126.95	69.71
Fillet	Value Share	0.28	0.25	0.19	0.28	0.23	0.19
Head&Gut	Value	75.31	102.08	100.00	85.09	102.54	86.01
Head&Gut	Price	91.17	101.87	100.00	101.62	116.09	99.07
Head&Gut	Quantity	82.61	100.20	100.00	83.74	88.33	86.82
Head&Gut	Value Share	0.49	0.56	0.61	0.50	0.60	0.62
Other	Value	122.13	97.53	100.00	132.05	113.36	71.69
Other	Price	100.72	86.94	100.00	90.47	92.09	95.60
Other	Quantity	121.25	112.18	100.00	145.95	123.10	75.00
Other	Value Share	0.12	0.08	0.09	0.11	0.10	0.07
Roe	Value	159.26	182.23	100.00	27.29	53.71	97.89
Roe	Price	199.85	155.85	100.00	105.29	118.52	136.69
Roe	Quantity	79.69	116.93	100.00	25.92	45.32	71.61
Roe	Value Share	0.05	0.05	0.03	0.01	0.02	0.04
Surimi	Value	74.26	87.70	100.00	104.88	64.59	75.58
Surimi	Price	125.09	103.49	100.00	113.28	88.41	112.38
Surimi	Quantity	59.36	84.74	100.00	92.58	73.07	67.26
Surimi	Value Share	0.06	0.06	0.08	0.08	0.05	0.07

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 2013-2018.

Species	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	87.83	100.79	100.00	91.21	100.97	81.53
Aggregate	Price	95.32	99.24	100.00	99.06	109.12	103.33
Aggregate	Quantity	92.15	101.56	100.00	92.08	92.53	78.90
FLAT	Value	115.96	185.71	100.00	88.46	106.72	89.14
FLAT	Price	100.16	102.64	100.00	82.20	84.03	89.95
FLAT	Quantity	115.78	180.93	100.00	107.62	127.00	99.10
FLAT	Value Share	0.05	0.07	0.04	0.03	0.04	0.04
OTHR	Value	127.78	100.58	100.00	77.59	60.81	48.03
OTHR	Price	96.75	101.12	100.00	100.44	102.87	97.61
OTHR	Quantity	132.06	99.47	100.00	77.25	59.11	49.20
OTHR	Value Share	0.02	0.01	0.01	0.01	0.01	0.01
PCOD	Value	74.04	103.50	100.00	81.48	70.24	28.59
PCOD	Price	90.26	101.26	100.00	99.75	113.39	152.18
PCOD	Quantity	82.04	102.21	100.00	81.69	61.95	18.79
PCOD	Value Share	0.21	0.25	0.24	0.22	0.17	0.09
PLCK	Value	83.19	87.29	100.00	73.62	80.39	96.35
PLCK	Price	147.08	102.72	100.00	69.51	72.51	102.64
PLCK	Quantity	56.56	84.97	100.00	105.91	110.87	93.87
PLCK	Value Share	0.20	0.18	0.21	0.17	0.17	0.25
ROCK	Value	95.40	97.07	100.00	112.30	97.57	120.25
ROCK	Price	111.71	100.56	100.00	99.24	97.67	104.51
ROCK	Quantity	85.40	96.53	100.00	113.16	99.90	115.05
ROCK	Value Share	0.06	0.06	0.06	0.07	0.06	0.09
SABL	Value	93.29	99.12	100.00	102.80	129.10	98.11
SABL	Price	78.56	95.79	100.00	115.93	130.98	95.15
SABL	Quantity	118.74	103.48	100.00	88.67	98.56	103.12
SABL	Value Share	0.46	0.43	0.44	0.49	0.56	0.52

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 2013-2018.

Gear	Index Type	2013	2014	2015	2016	2017	2018
Aggregate	Value	87.83	100.79	100.00	91.21	100.97	81.53
Aggregate	Price	95.32	99.24	100.00	99.06	109.12	103.33
Aggregate	Quantity	92.15	101.56	100.00	92.08	92.53	78.90
HAL	Value	92.96	100.60	100.00	97.51	108.19	80.93
HAL	Price	80.32	96.46	100.00	114.23	128.38	98.81
HAL	Quantity	115.73	104.30	100.00	85.36	84.27	81.91
HAL	Value Share	0.50	0.47	0.47	0.50	0.50	0.47
POT	Value	69.06	96.09	100.00	91.97	110.56	64.59
POT	Price	89.14	100.40	100.00	98.76	109.99	112.97
POT	Quantity	77.47	95.71	100.00	93.12	100.52	57.17
POT	Value Share	0.11	0.13	0.13	0.14	0.15	0.11
TWL	Value	88.09	102.60	100.00	83.45	89.08	88.01
TWL	Price	119.24	102.23	100.00	82.63	88.07	104.77
TWL	Quantity	73.88	100.36	100.00	100.99	101.15	84.00
TWL	Value Share	0.40	0.40	0.39	0.36	0.35	0.43

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 12, 17, 28, and 33) are available is 2018. 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 2019), the most recent COAR data available was for the previous year, 2018. To provide recent information, current (i.e., 2019) 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 2019. Ex-vessel prices estimates are based on unadjusted prices[1] on fish tickets through the month of Oct. 2019. First-wholesale price estimates are based on export prices through the month of Aug. 2019, estimated global catch, and exchange rates for 2019. In addition to the nowcasts, ex-vessel and first-wholesale prices are projected out over the next 2 years (2020-2021). 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 12, 17, 28, and 33 in Section 4 of this document. With the notable exception that first-wholesale estimates are made for all of 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 customs district of origin. Export data were constrained to exports originating from the states of Washington and Alaska which tended to provide a better estimate of first-wholesale prices. Ex-vessel price estimates are only for the shoreside sectors.

Tables 6.1 and 6.2 summarize the price projections for the six years spanning 2016-2021. Prices between 2016-2018 are realized (actual) prices. The summary data provided for the years 2019-2021 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, 2019, 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 2019-2021. 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.	2016	2017	2018	2019	2020	2021
pollock	BSAI	trawl	mean	0.139	0.137	0.156	0.166	0.159	0.164
pollock	BSAI	trawl	conf.int.90				[0.16,0.17]	[0.12,0.21]	[0.11,0.23]
pollock	GOA	trawl	mean	0.083	0.087	0.123	0.127	0.126	0.126
pollock	GOA	trawl	conf.int.90				[0.12,0.13]	[0.09,0.17]	[0.08,0.19]
pacific cod	BSAI	trawl	mean	0.249	0.296	0.384	0.38	0.381	0.392
pacific cod	BSAI	trawl	conf.int.90				[0.38,0.38]	[0.27,0.54]	[0.23,0.63]
pacific cod	BSAI	fixed	mean	0.278	0.332	0.41	0.432	0.429	0.436
pacific cod	BSAI	fixed	conf.int.90				[0.43,0.44]	[0.29,0.62]	[0.25,0.7]
pacific cod	GOA	trawl	mean	0.27	0.329	0.412	0.448	0.423	0.428
pacific cod	GOA	trawl	conf.int.90				[0.44,0.46]	[0.31,0.57]	[0.26,0.67]
pacific cod	GOA	fixed	mean	0.302	0.336	0.465	0.505	0.482	0.482
pacific cod	GOA	fixed	conf.int.90				[0.5,0.51]	[0.35,0.65]	[0.3,0.74]
sablefish	GOA	fixed	mean	4.743	5.314	3.929	3.237	3.805	4.219
sablefish	GOA	fixed	conf.int.90				[3.15,3.33]	[2.85,4.95]	[2.87,5.92]

Table 6.1: Groundfish ex-vessel price projection summary

Species	Product	stat.	2016	2017	2018	2019	2020	2021
pollock	surimi	mean	1.179	1.302	1.257	1.4	1.32	1.351
pollock	surimi	conf.int.90				[1.35,1.45]	[0.96,1.8]	[0.95,1.9]
pollock	roe	mean	2.791	2.818	2.778	1.884	1.913	2.27
pollock	roe	conf.int.90				[1.38,2.38]	[1.05,3.32]	[0.93,5.2]
pollock	fillet	mean	1.314	1.141	1.288	1.283	1.244	1.274
pollock	fillet	conf.int.90				[1.23,1.34]	[0.99,1.55]	[0.93,1.73]
pollock	deep-skin fillet	mean	1.639	1.494	1.489	1.536	1.541	1.552
pollock	deep-skin fillet	conf.int.90				[1.49,1.58]	[1.3,1.79]	[1.24,1.92]
pollock	head and gut	mean	0.581	0.435	0.472	0.484	0.441	0.44
pollock	head and gut	conf.int.90				[0.42,0.54]	[0.34,0.56]	[0.33,0.57]
pacific cod	fillet	mean	3.34	3.484	4.159	4.107	4.089	4.155
pacific cod	fillet	conf.int.90				[3.88,4.34]	[3.29,5.01]	[3.09,5.49]
pacific cod	head and gut	mean	1.288	1.569	1.866	1.71	1.742	1.78
pacific cod	head and gut	conf.int.90				[1.64,1.78]	[1.32,2.27]	[1.23,2.53]
sablefish	head and gut	mean	8.159	8.86	6.482	6.169	7.197	7.753
sablefish	head and gut	conf.int.90				[5.75,6.6]	[5.57,9.27]	[5.45,10.9]
yellowfin (bsai)	head and gut	mean	0.553	0.657	0.817	0.762	0.76	0.768
yellowfin (bsai)	head and gut	conf.int.90				[0.7,0.82]	[0.59,0.96]	[0.55,1.05]
rock sole (bsai)	head and gut with roe	mean	0.995	1.241	1.503	1.283	1.251	1.251
rock sole (bsai)	head and gut with roe	conf.int.90				[1.23,1.34]	[0.93,1.67]	[0.85,1.83]
rock sole (bsai)	head and gut	mean	0.561	0.655	0.831	0.543	0.61	0.593
rock sole (bsai)	head and gut	conf.int.90				[0.48,0.61]	[0.4,0.9]	[0.37,0.93]
arrowtooth	head and gut	mean	0.809	1.125	0.738	0.736	0.953	0.965
arrowtooth	head and gut	conf.int.90				[0.61,0.85]	[0.64,1.39]	[0.64,1.41]
atka mackerel	head and gut	mean	1.036	1.469	1.412	1.318	1.335	1.364
atka mackerel	head and gut	conf.int.90				[1.18,1.45]	[0.88,1.97]	[0.79,2.31]
rockfish	head and gut	mean	0.973	1.183	1.141	1.01	1.013	1.047
rockfish	head and gut	conf.int.90				[0.93,1.1]	[0.76,1.34]	[0.69,1.58]

Table 6.2: Groundfish wholesale 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 2019 prices based on currently available (as of Oct. 2019) 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 (2019) were nowcast using export prices which are available with a minimal time lag of up to three months. Export prices through August 2019 were available for the current nowcasts. Export prices were obtained from the NMFS Science and Technology trade database. Nowcast models also incorporate 2019 exchange rate data and global catch estimates when they were determined to increase predictability. Global catch estimates for 2019 were obtained from the 2019 International Groundfish Forum. The data were used in a regression to estimate 2019 annual unit value first-wholesale prices of major species and product forms calculated from the COAR and published in Tables 17 and 33 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.

Nowcasts of 2019 ex-vessel prices 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 October 2019. These data were obtained through the Alaska Fisheries Information Network (AKFIN) from the V_ELLR_SLOG_PRODUCT database. 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 2019 annual unit value ex-vessel prices calculated from the COAR and published in Tables 12 and 28 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 annual COAR based ex-vessel prices was strong for the species and gear types presented.

Price projections for the years 2020-2021 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. Only a small component of the future prices (2020-2021) 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

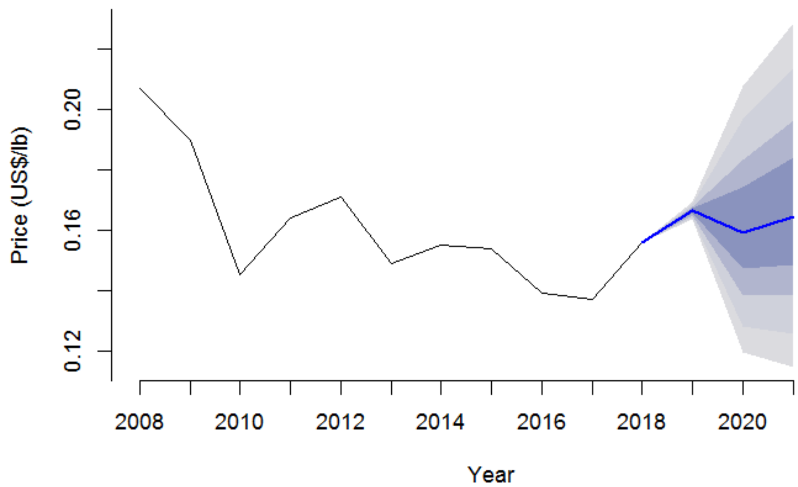

Figure 6.1: Pollock BSAI trawl ex-vessel price projections and confidence bounds

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%
2019	0.164	0.164	0.165	0.166	0.166	0.166	0.167	0.168	0.169	0.169
2020	0.119	0.128	0.138	0.147	0.159	0.161	0.174	0.183	0.197	0.208
2021	0.114	0.126	0.139	0.148	0.164	0.166	0.184	0.196	0.214	0.229

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.	2020	2021	Long-run
18.07	18.07	18.07	18.07

Pollock accounted for 73% of the ex-vessel value for the BSAI catcher vessels (CV) in 2018 and is targeted using trawl gear. BSAI trawl CV pollock retained catch increased 1% in 2018, correspondingly with the TAC. The realized ex-vessel price of BSAI trawl pollock increased 14% to \$0.156/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of \$0.146/lb to \$0.154/lb with a median of \$0.150/lb, placing the realized price two-tenths of a cent above the projected range. This year's price projections for the 2019 BSAI trawl pollock ex-vessel price have a median of \$0.166/lb with 95% confidence bounds of \$0.163/lb to \$0.170/lb. (Figure 6.1). These estimates imply that a price increase in 2019 is likely. Catch data through Sept. 2019 show a 2.1% decrease in the year-over-year BSAI trawl CV pollock catch. BSAI trawl pollock ex-vessel price projections for 2020 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 range of potential increases or decreases are plausible.

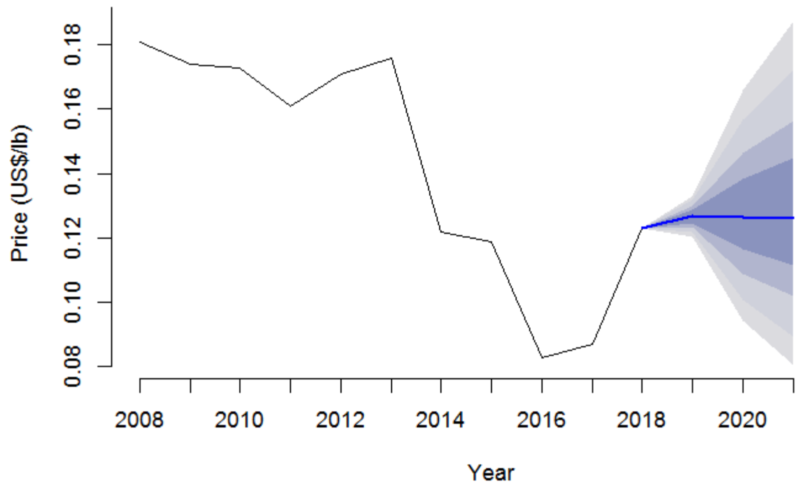

Figure 6.2: Pollock GOA trawl ex-vessel price projections and confidence bounds

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%
2019	0.120	0.122	0.123	0.125	0.127	0.127	0.129	0.130	0.132	0.133
2020	0.094	0.101	0.109	0.117	0.126	0.128	0.139	0.146	0.157	0.166
2021	0.080	0.089	0.102	0.112	0.126	0.128	0.145	0.156	0.172	0.187

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.	2020	2021	Long-run
18.36	18.46	18.87	16.23

Pollock accounted for 28% of the ex-vessel value for the GOA catcher vessels (CV) in 2018 and is targeted using trawl gear. GOA trawl CV pollock retained catch decreased 15% in 2018. The realized ex-vessel price of GOA trawl pollock increased 41% to $0.123/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of $.107/lb to $0.125/lb with a median of $0.116/lb, placing the realized price within the projected range. This year's price projections for the 2019 GOA trawl pollock ex-vessel price have a median of $0.127/lb with 95% confidence bounds of $0.119/lb to $0.134/lb. (Figure 6.2). These estimates imply that the price 2019 will likely remain relatively stable, perhaps increasing slightly, though marginal price decreases are also within the projected range. Catch data through Sept. 2019 show a 22% decrease in the year-over-year GOA trawl CV pollock catch. GOA trawl pollock ex-vessel price projections for 2020 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 range of potential increases or decreases are plausible.

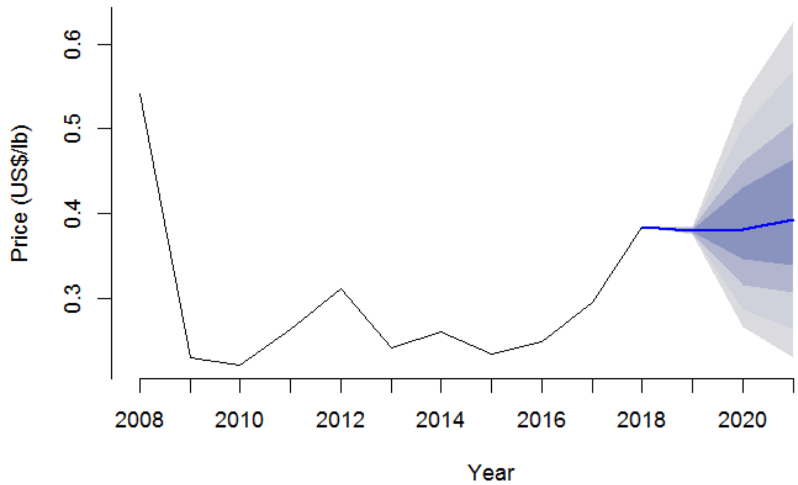

Figure 6.3: Pacific cod BSAI trawl ex-vessel price projections and confidence bounds

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%
2019	0.375	0.376	0.377	0.378	0.380	0.380	0.381	0.382	0.383	0.384
2020	0.267	0.287	0.316	0.346	0.381	0.387	0.430	0.461	0.501	0.538
2021	0.231	0.263	0.307	0.339	0.392	0.400	0.465	0.507	0.569	0.627

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.	2020	2021	Long-run
24.37	23.46	24.92	25.15

6.4.2 Pacific Cod Ex-vessel Prices

Pacific cod accounted for 22% of the ex-vessel value for the BSAI catcher vessels in 2018 and catches from trawl gear accounted for 40% of the BSAI Pacific cod value. BSAI trawl CV Pacific cod retained catch decreased 12% in 2018. The realized ex-vessel price of BSAI trawl Pacific cod increased 30% to $0.384/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of $0.365/lb to $0.375/lb with a median of $0.370/lb, placing the realized price above the projected range. This year's price projections for the 2019 BSAI trawl Pacific cod ex-vessel price have a median of $0.380/lb with 95% confidence bounds of $0.374/lb to $0.385/lb. (Figure 6.3). These estimates imply that prices in 2019 will likely remain stable with potential for marginal increases or decreases. Catch data through Sept. 2019 show a 16% decrease in the year-over-year BSAI trawl Pacific cod catch. BSAI trawl Pacific cod ex-vessel price projections for 2020 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 range of potential increases or decreases are plausible.

Pacific cod accounted for 22% of the ex-vessel value for the BSAI catcher vessels in 2018 and catches from fixed gear accounted for 60% of the BSAI Pacific cod value. BSAI fixed gear Pacific cod

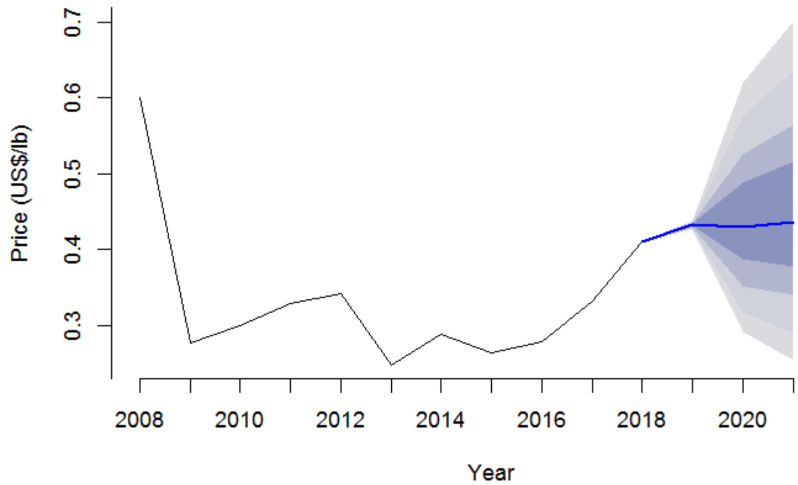

Figure 6.4: Pacific cod BSAI fixed gear ex-vessel price projections and confidence bounds

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%
2019	0.426	0.428	0.429	0.430	0.432	0.432	0.434	0.435	0.436	0.438
2020	0.291	0.317	0.352	0.387	0.429	0.437	0.488	0.526	0.576	0.619
2021	0.254	0.290	0.340	0.377	0.436	0.444	0.515	0.564	0.636	0.701

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.	2020	2021	Long-run
24.34	24.58	24.77	25.31

retained catch decreased 0.2% in 2018. The realized ex-vessel price of BSAI fixed gear Pacific cod increased 23% to $0.410/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of $0.399/lb to $0.413/lb with a median of $0.406/lb, placing the realized price within the projected range. This year's price projections for the 2019 BSAI fixed gear Pacific cod ex-vessel price have a median of $0.432/lb with 95% confidence bounds of $0.425/lb to $0.439/lb. (Figure 6.4). These estimates imply that a price increase in 2019 is likely. Catch data through Sept. 2019 show a 10.5% increase in the year-over-year BSAI fixed gear Pacific cod catch. BSAI fixed gear Pacific cod ex-vessel price projections for 2020 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 range of potential increases or decreases are plausible.

Pacific cod accounted for 8% of the ex-vessel value for the GOA catcher vessels (CV) in 2018 and catches from trawl gear accounted for 22% of the GOA Pacific cod value. GOA trawl Pacific cod retained catch decreased 73% in 2018. The realized ex-vessel price of GOA trawl Pacific cod increased 25% to $0.412/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of $0.385/lb to $0.402/lb with a median of $0.393/lb, placing the realized price above the projected range. This year's price projections for the 2019 GOA trawl

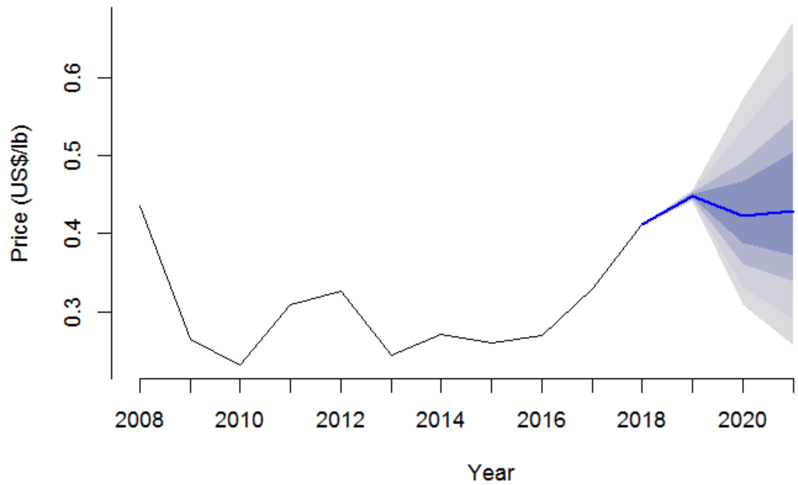

Figure 6.5: Pacific cod GOA trawl ex-vessel price projections and confidence bounds

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%
2019	0.441	0.443	0.445	0.446	0.448	0.448	0.451	0.452	0.454	0.456
2020	0.309	0.330	0.361	0.389	0.423	0.427	0.467	0.493	0.534	0.573
2021	0.256	0.290	0.338	0.373	0.428	0.435	0.505	0.547	0.613	0.672

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.	2020	2021	Long-run
20.04	19.97	20.04	20.11

Pacific cod ex-vessel price have a median of $0.448/lb with 95% confidence bounds of $0.440/lb to $0.457/lb. (Figure 6.5). These estimates imply that a price increase in 2019 is likely. Catch data through Sept. 2019 show a 25% increase in the year-over-year GOA trawl CV Pacific cod catch. GOA trawl Pacific cod ex-vessel price projections for 2020 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 range of potential increases or decreases are plausible.

Pacific cod accounted for 8% of the ex-vessel value for the GOA catcher vessels in 2018 and catches from fixed gear accounted for 78% of the GOA Pacific cod value. GOA fixed gear Pacific cod retained catch decreased 69% in 2018 The realized ex-vessel price of GOA fixed gear Pacific cod increased 38% to $0.465/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of $0.440/lb to $0.455/lb with a median of $0.447/lb, placing the realized price above the projected range. This year's price projections for the 2019 GOA fixed gear Pacific cod ex-vessel price have a median of $0.505/lb with 95% confidence bounds of $0.499/lb to $0.511/lb. (Figure 6.6). These estimates imply that a price increase in 2019 is likely. Catch data through Sept. 2019 show a 7.8% increase in the year-over-year GOA fixed gear Pacific cod catch. GOA fixed gear Pacific cod ex-vessel price projections for 2020 and beyond based on historical trends indicate that expected prices do not exhibit a significant trend but may show some mean

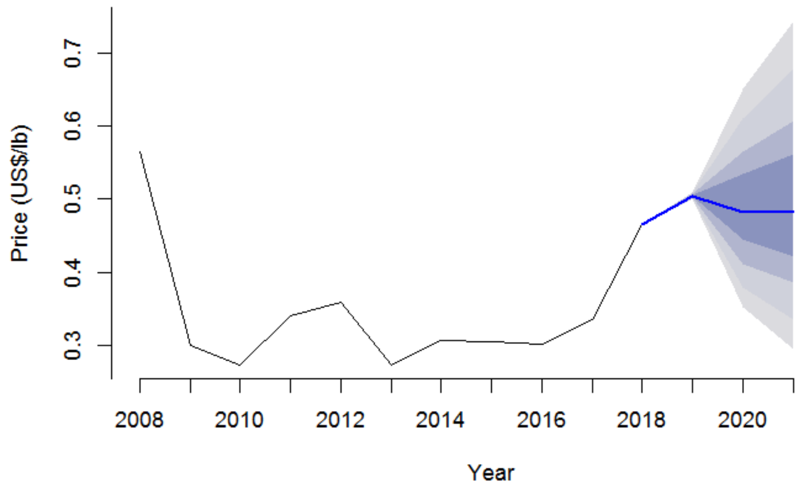

Figure 6.6: Pacific cod GOA fixed gear ex-vessel price projections and confidence bounds

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%
2019	0.500	0.501	0.502	0.503	0.505	0.505	0.506	0.507	0.509	0.510
2020	0.352	0.380	0.411	0.445	0.482	0.489	0.534	0.565	0.610	0.651
2021	0.295	0.335	0.386	0.422	0.482	0.490	0.562	0.606	0.677	0.743

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.	2020	2021	Long-run
19.82	19.84	19.85	19.94

reversion in 2020, because of the substantial volatility a range of potential increases or decreases are plausible.

6.4.3 Sablefish Ex-vessel Prices

Sablefish accounted for 54% of the ex-vessel value for the GOA catcher vessels in 2018 and is targeted primarily using fixed gear. GOA fixed gear sablefish retained catch increased 5% in 2018. The realized ex-vessel price of GOA fixed gear sablefish decreased 26% to $3.929/lb. Price projections from last year's report indicated an decrease as well and had 95% confidence bounds of $3.901/lb to $4.109/lb with a median of $4.004/lb, placing the realized price within the projected range. This year's price projections for the 2019 GOA fixed gear sablefish ex-vessel price have a median of $3.237/lb with 95% confidence bounds of $3.127/lb to $3.346/lb. (Figure 6.7). These estimates imply that a price decrease in 2019 is likely. Catch data through Sept. 2019 show a 5% decrease in the year-over-year GOA fixed gear sablefish catch. GOA fixed gear sablefish ex-vessel price projections for 2020 and beyond based on historical trends indicate that expected prices may show

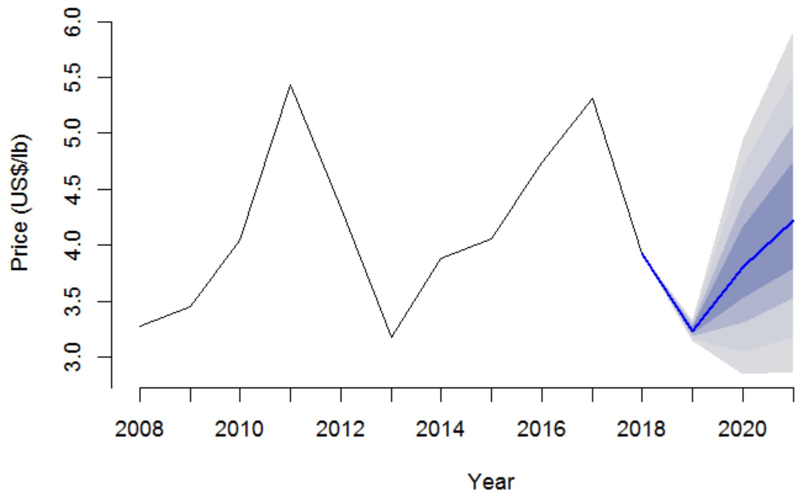

Figure 6.7: Sablefish GOA fixed gear ex-vessel price projections and confidence bounds

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%
2019	3.146	3.166	3.190	3.208	3.237	3.237	3.267	3.284	3.308	3.329
2020	2.847	3.045	3.307	3.532	3.805	3.858	4.165	4.393	4.709	4.949
2021	2.873	3.179	3.531	3.796	4.219	4.268	4.758	5.079	5.521	5.916

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.	2020	2021	Long-run
17.98	18.12	18.07	17.75

mean reversion by increasing. Because of the substantial volatility a range of potential increases or decreases are plausible.

6.5. First-Wholesale Product Price Projections

6.5.1 Alaska Pollock

In the North Pacific FMP groundfish fisheries 59% of the wholesale value came from Alaska pollock in 2018 (Tables 16 and 32). 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

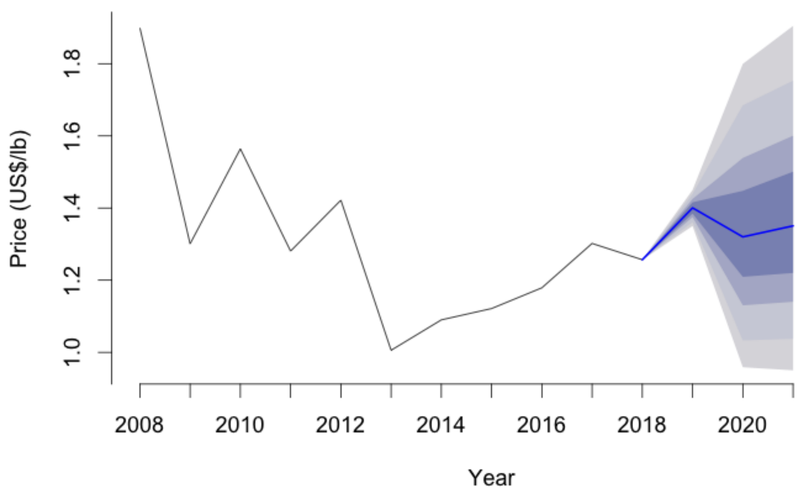

Figure 6.8: Pollock surimi wholesale price projections and confidence bounds

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%
2019	1.35	1.36	1.37	1.38	1.40	1.40	1.42	1.43	1.44	1.45
2020	0.96	1.03	1.13	1.21	1.32	1.32	1.45	1.54	1.68	1.80
2021	0.95	1.04	1.14	1.22	1.35	1.35	1.50	1.60	1.75	1.90

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.	2020	2021	Long-run
20.29	20.29	20.29	20.29

The production of pollock surimi decreased 0.5% in 2018 and the first-wholesale price decreased 4% to $1.245/lb. The price decrease was consistent with the decrease estimated last year and was inside last year's estimated 95% confidence bounds for the 2018 price which were $1.235/lb and $1.357/lb with a median of $1.296/lb. The current first-wholesale surimi 2019 price projection 95% confidence bounds are $1.350/lb and $1.448/lb with a median of $1.396/lb (Figure 6.8; Table 6.10). Surimi export prices tend to provide a reasonably good prediction of the state of surimi prices. These estimates imply that a price increase in 2019 is likely. Production data through Oct. 19, 2019 show a 4.6% decrease in year-over-year surimi production. Projections of surimi prices for 2020 and beyond indicate that based on historical patterns may fluctuate with no expected trend up or down. 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

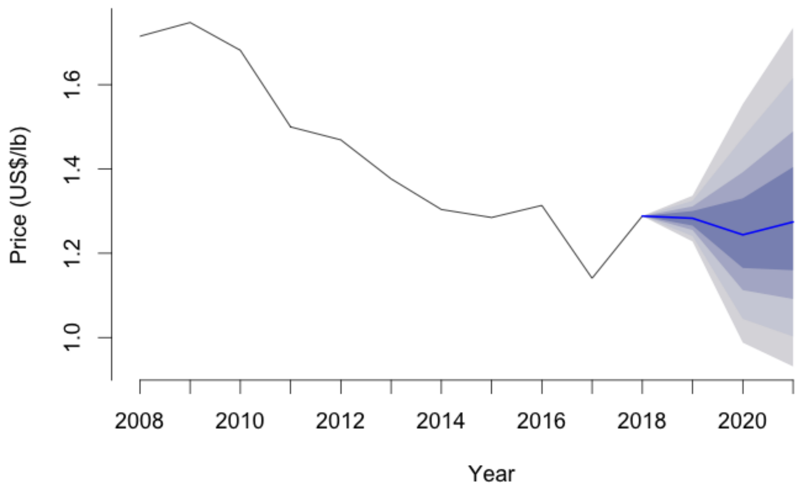

Figure 6.9: Pollock fillet wholesale price projections and confidence bounds

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%
2019	1.23	1.24	1.26	1.27	1.28	1.28	1.30	1.31	1.32	1.34
2020	0.99	1.04	1.11	1.17	1.24	1.25	1.33	1.39	1.47	1.55
2021	0.93	1.00	1.09	1.16	1.27	1.28	1.40	1.49	1.62	1.73

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.	2020	2021	Long-run
14.38	14.38	14.38	14.38

The production of pollock fillets increased 9% in 2018 and the price increased 13% to $1.288/lb. The price increase was consistent with the projected increase from last year but was above last year's estimated confidence bounds which had a median of $1.224/lb and 95% confidence bounds of $1.179/lb and $1.268/lb. Current projections for the 2019 fillet price have 95% confidence bounds of $1.226/lb to $1.349/lb with a median of to $1.286/lb (Figure 6.9). These estimates imply that prices are likely to remain stable in 2019 with the potential for a marginal increase or decrease falling within the projected range. Production data through Oct. 19, 2019 show that year-over-year fillet production is up 8.5% in 2019. Projections of fillet prices for 2020 and beyond indicate that based on historical patterns expected prices do not exhibit a significant trend or potential mean reversion. Volatility projections indicate that there is no expected change in the future volatility. Because of the substantial volatility a range of potential increases or decreases are plausible.

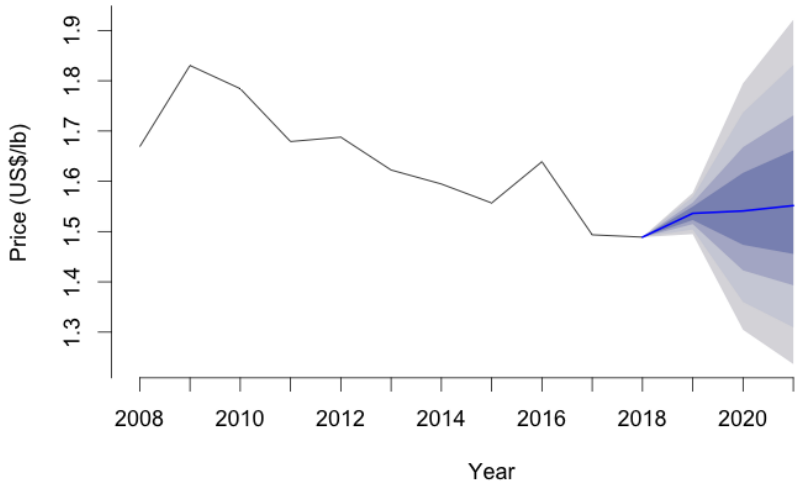

Figure 6.10: Pollock deep-skin fillet wholesale price projections and confidence bounds

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%
2019	1.49	1.50	1.51	1.52	1.54	1.54	1.55	1.56	1.57	1.58
2020	1.30	1.36	1.42	1.47	1.54	1.55	1.62	1.67	1.74	1.79
2021	1.24	1.31	1.39	1.46	1.55	1.56	1.66	1.73	1.83	1.92

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.	2020	2021	Long-run
10.15	10.15	10.15	10.15

The volume of deep-skin fillets produced decreased 3.5% and prices increased 1% to $1.504/lb in 2018. The price increase was consistent with the projected increase from last year and was inside last year’s estimated 95% confidence bounds of $1.499/lb to $1.587/lb with a median of $1.542/lb. Current estimates for the 2019 deep-skin fillet price have 95% confidence bounds of $1.498/lb to $1.584/lb with a median estimate of $1.540/lb (Figure 6.10). These estimates imply that it is somewhat likely the price 2019 will increase, though no or little price change is also within the projected range. Production data through Oct. 19. 2018 indicate an 1.5% increase in year-over-year production. Projections of deep-skin fillet prices for 2020 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 range of potential increases or decreases are plausible. Volatility estimates indicate that expected return volatility is consistent with the historical average.

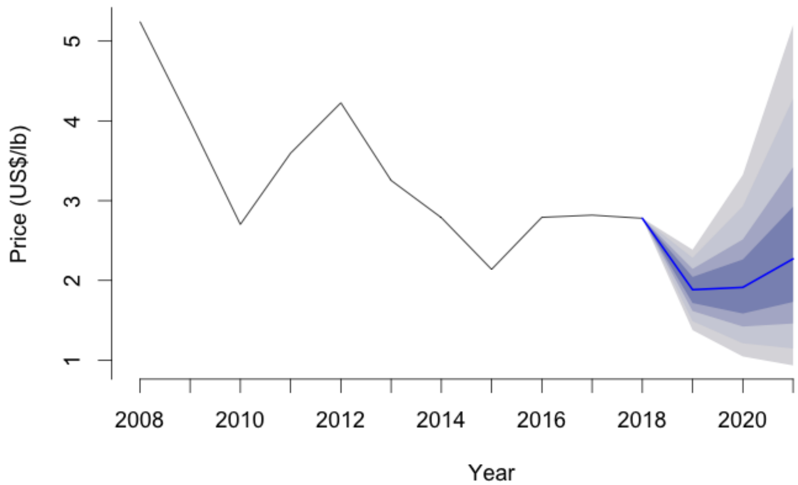

Figure 6.11: Pollock roe wholesale price projections and confidence bounds

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%
2019	1.38	1.49	1.62	1.72	1.88	1.88	2.04	2.14	2.28	2.38
2020	1.05	1.21	1.42	1.59	1.91	1.89	2.26	2.51	2.93	3.32
2021	0.93	1.15	1.46	1.73	2.27	2.25	2.92	3.42	4.28	5.20

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.	2020	2021	Long-run
22.25	32.05	40.86	22.31

Pollock Roe First-Wholesale Prices

Pollock roe production increased 18% in 2018 and prices decreased 1.3% to $2.781/lb. Last year's projection predicted a marginal increase in price for 2018, however the realized price of $2.781/lb was within the range of prices projected which had 95% confidence bounds of $2.757/lb and $3.477/lb and a median of $3.119/lb. The first-wholesale pollock roe price is projected to decrease in 2019 with a median estimate of $1.886/lb and 95% confidence bounds of $1.324/lb and $2.287/lb (Figure 6.11). These estimates imply that a decrease in roe prices for 2019 is likely. Export prices through mid-2019 show 2019 roe prices at a low of $2.47/lb. Projections of roe prices for 2020 and beyond indicate that based on historical patterns prices may trend back up reverting back towards recent levels. Production data through Oct. 19, 2019 indicate that production is up 29% year-over-year. Because of the substantial volatility a range of potential increases or decreases are plausible. There is considerable volatility in pollock roe returns which is projected to increase.

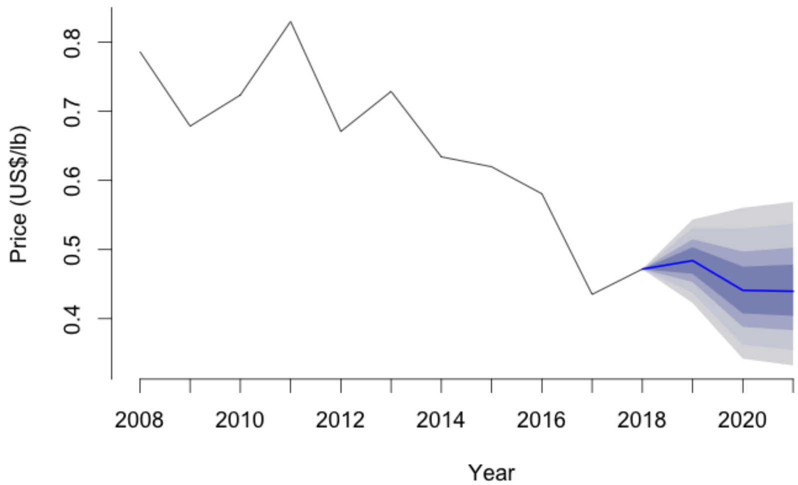

Figure 6.12: Pollock head and gut wholesale price projections and confidence bounds

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%
2019	0.42	0.44	0.45	0.47	0.48	0.48	0.50	0.51	0.53	0.54
2020	0.34	0.36	0.39	0.41	0.44	0.44	0.48	0.50	0.53	0.56
2021	0.33	0.36	0.38	0.40	0.44	0.44	0.48	0.50	0.54	0.57

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.

Pollock head and gut wholesale return volatility projections

Hist. Avg.	2020	2021	Long-run
13.59	13.47	13.60	12.99

Pollock H&G First-Wholesale Prices

Pollock head and gut production decreased 0.5% in 2018 and prices increased 8.4% to $0.472/lb. The price increase was consistent with the projected increase from last year and was inside last year’s estimated 95% confidence bounds of $0.442/lb to $0.645/lb with a median of $0.544/lb. The projected first-wholesale pollock H&G price in 2019 has a median estimate of $0.481/lb and 95% confidence bounds of $0.413/lb and $0.542/lb (Figure 6.12). These estimates imply that prices in 2019 will likely remain stable with potential for increases or decreases. Production data through Oct. 19, 2018 indicate that 2019 H&G production is down 28% 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 price projections. Because of the substantial volatility a range of potential increases or decreases are plausible.

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 16 and 32).

Pacific Cod H&G First-Wholesale Prices

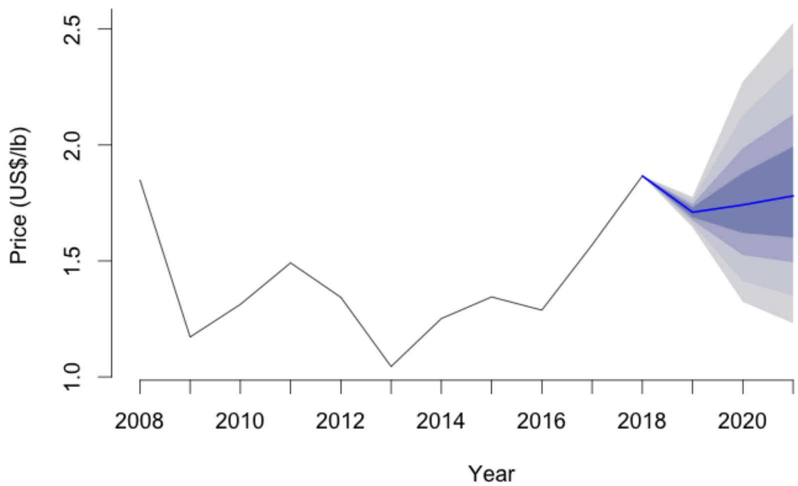

Figure 6.13: Pacific cod head and gut wholesale price projections and confidence bounds

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%
2019	1.64	1.66	1.68	1.69	1.71	1.71	1.73	1.74	1.76	1.78
2020	1.32	1.41	1.53	1.62	1.74	1.75	1.88	1.99	2.13	2.27
2021	1.23	1.35	1.49	1.60	1.78	1.79	1.99	2.13	2.34	2.53

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.	2020	2021	Long-run
17.20	17.06	17.20	17.36

Production of Pacific cod H&G decreased 18% in 2018 and realized prices increased 19% to $1.870/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of $1.568/lb to $1.710/lb with a median of $1.638/lb, placing the realized price above the projected range. The 2019 price projections indicate a decrease in H&G prices for 2019 with an estimated median price of $1.703/lb and 95% confidence bounds ranging from $1.651/lb to $1.771/lb. (Figure 6.13). These estimates indicate that price decrease in 2019 is likely. Production data through Oct. 19, 2019 show a 6.6% reduction in the year-over-year production of H&G. Projections of cod H&G prices for 2020 and beyond indicate that based on historical patterns prices may trend back up reverting back towards 2018 levels, but also confidence bounds show a wide range of potential future prices. Volatility projections indicate that there is little expected change in the future volatility.

Pacific Cod Fillet First-Wholesale Prices

Production of Pacific cod fillets decreased 25% in 2018 as prices rose 21% to $4.212/lb. Price projections from last year's report indicated an increase as well and had 95% confidence bounds of

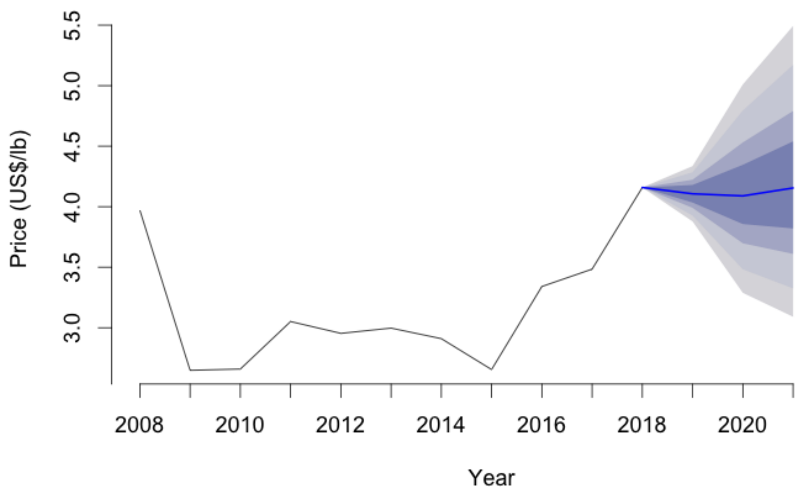

Figure 6.14: Pacific cod fillet wholesale price projections and confidence bounds

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%
2019	3.88	3.93	3.99	4.03	4.11	4.11	4.18	4.22	4.28	4.34
2020	3.29	3.48	3.70	3.86	4.09	4.10	4.35	4.53	4.79	5.01
2021	3.09	3.33	3.61	3.82	4.15	4.17	4.54	4.79	5.17	5.49

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.	2020	2021	Long-run
14.14	12.95	14.26	14.88

$3.632/lb to $3.987/lb with a median of $3.810/lb, placing the realized price above the projected range. The current projections for the 2019 first-wholesale cod fillet have 95% confidence bounds of $3.901/lb and $4.333/lb with a median of $4.118/lb (Figure 6.14). These estimates indicate that prices may decrease slightly but will likely remain stable with the potential for a marginal price increase or decrease falling within the projected range. Production data through Oct. 19, 2019 show a 16% reduction in the year-over-year production of fillets. Fillet price projections for 2020 and beyond do not display a trend, but also confidence bounds show a wide range of potential future prices reflecting the 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 product form at the first-wholesale level, comprising approximately 97% of the value from sablefish products. Sablefish H&G production in 2018 increased 10.6%, correspondingly with the sablefish TAC. The realized price of sablefish H&G in 2018 decreased 27% to $6.483/lb. Price projections from last year's report indicated a decrease as well and had 95% confidence bounds of $7.338/lb to $8.282/lb with a median of $7.810/lb, placing the realized price below the projected range. This year's price projections for the 2019

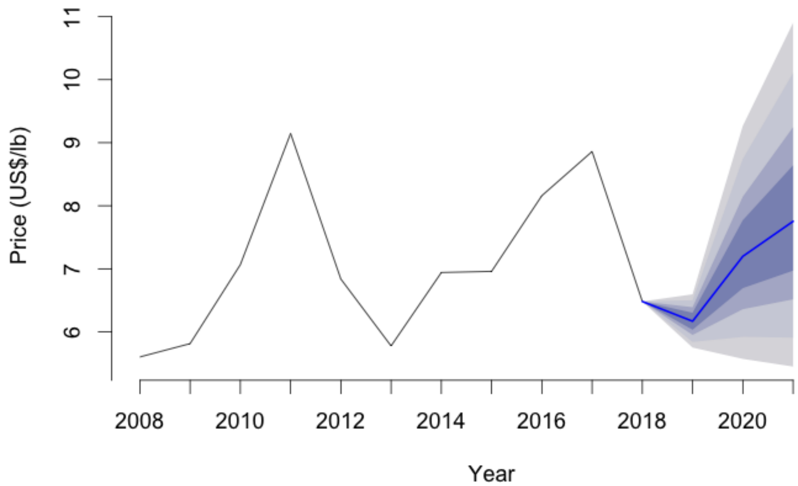

Figure 6.15: Sablefish head and gut ex-vessel price projections and confidence bounds

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%
2019	5.75	5.84	5.95	6.03	6.17	6.17	6.30	6.39	6.50	6.60
2020	5.57	5.92	6.36	6.69	7.20	7.21	7.77	8.14	8.74	9.27
2021	5.45	5.91	6.52	6.97	7.75	7.77	8.64	9.25	10.10	10.90

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.	2020	2021	Long-run
14.26	15.80	17.16	13.40

first-wholesale sablefish H&G price have 95% confidence bounds of $5.721/lb to $6.560/lb with a median of $6.158/lb (Figure 6.15). These estimates imply that a price decrease in 2019 is somewhat likely, however the 2018 price falls within the projected bounds indicating the possibility that prices may remain stable. Production data through Oct. 19, 2019 show 5% decrease in the year-over-year production of sablefish H&G. Projections of sablefish H&G prices for 2020 and beyond indicate that based on historical patterns prices may trend back up reverting back towards recent levels, but also confidence bounds show a wide range of potential future prices. Volatility projections indicate an increase in future 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. The Atka mackerel first-wholesale H&G production increased 3.1% in 2018 and price decreased 4% to $1.412/lb. Price projections from last year's report had 95% confidence bounds of $1.132/lb and $1.536/lb with a median of $1.336/lb, placing the realized price within the projected range. Current projections for the 2019 Atka mackerel H&G price have 95% confidence bounds of $1.196/lb to $1.456/lb with a median of $1.324/lb (Figure 6.15). These estimates imply that a price decrease

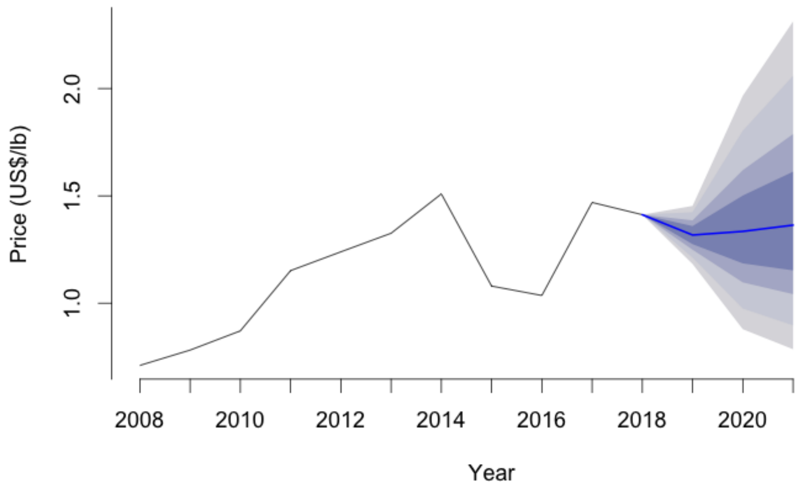

Figure 6.16: Atka mackerel head and gut wholesale price projections and confidence bounds

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%
2019	1.18	1.21	1.25	1.28	1.32	1.32	1.36	1.39	1.42	1.45
2020	0.88	0.98	1.10	1.19	1.33	1.34	1.50	1.62	1.80	1.97
2021	0.79	0.90	1.04	1.15	1.36	1.37	1.61	1.79	2.06	2.31

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.	2020	2021	Long-run
25.38	25.24	25.20	25.69

in 2019 is somewhat likely, however the 2018 price falls within the projected bounds indicating the possibility that prices may remain stable. Production data through Oct. 19, 2019 show a 0.8% increase in the year-over-year production of H&G. Atka mackerel H&G price projections for 2020 and beyond based on historical trends indicate that expected prices do not exhibit a trend or potential mean reversion. Because of the substantial volatility a range of potential increases or decreases are plausible. Volatility projections indicate future volatility levels will remain stable.

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 substantial quantities in the BSAI. The market shares for other flatfish fisheries are comparatively smaller. Flatfish are primarily processed into the head-and-gut product form.

Yellowfin Sole H&G First-Wholesale Prices

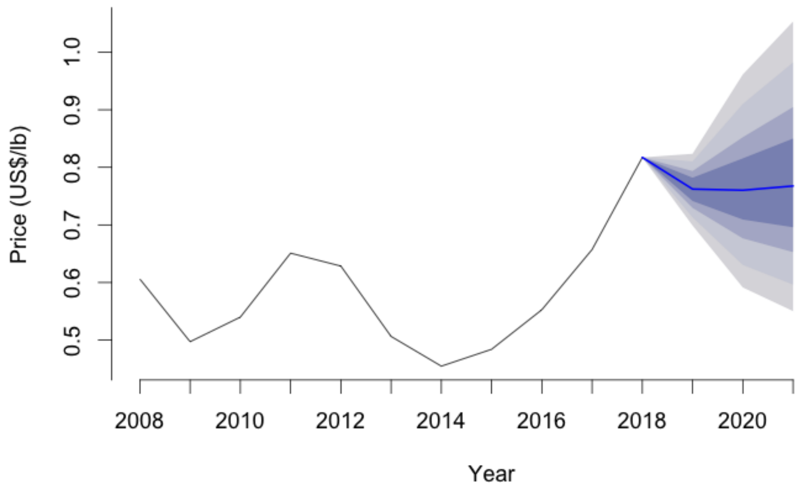

Figure 6.17: Yellowfin (BSAI) head and gut wholesale price projections and confidence bounds

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%
2019	0.70	0.71	0.73	0.74	0.76	0.76	0.78	0.79	0.81	0.82
2020	0.59	0.63	0.68	0.71	0.76	0.76	0.82	0.85	0.91	0.96
2021	0.55	0.60	0.65	0.70	0.77	0.77	0.85	0.90	0.98	1.05

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.	2020	2021	Long-run
14.05	14.44	13.86	14.16

The yellowfin sole first-wholesale H&G production increased 2.7% in 2018 and the first-wholesale price increased 24% to $0.817/lb. This price was above the price projection from last year's report that estimated that prices would decrease with 95% confidence bounds of $0.601/lb and $0.679/lb and a median of $0.640/lb. This year's projection for 2019 yellowfin sole H&G prices estimate a median price of $0.761/lb with 95% confidence bounds of $0.707/lb and $0.828/lb (Figure 6.17). These estimates imply that a price decrease in 2019 is somewhat likely, however the 2018 price falls within the projected bounds indicating the possibility that prices may remain stable. Production data through Oct. 19, 2019 show 4.1% increase in the year-over-year production of H&G. Yellowfin sole H&G price projections for 2020 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 range of potential increases or decreases are plausible. Volatility projections indicate a decrease in future volatility.

Rock Sole H&G First-Wholesale Prices

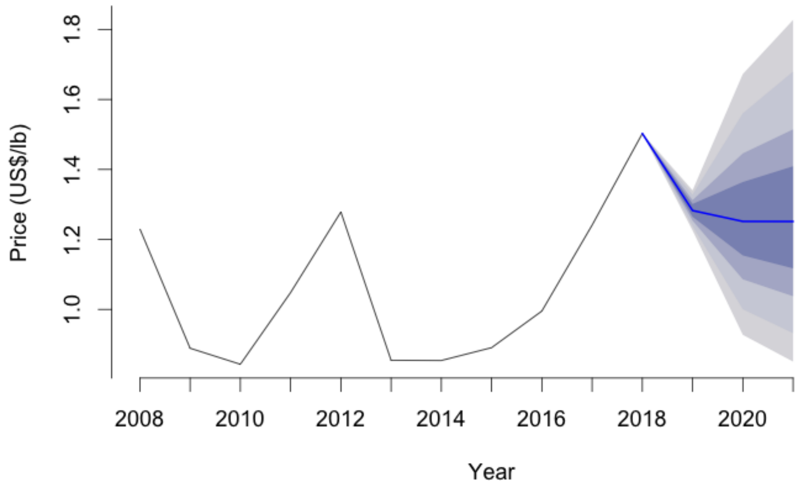

Figure 6.18: Rock sole (BSAI) head and gut with roe wholesale price projections and confidence bounds

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%
2019	1.23	1.24	1.25	1.26	1.28	1.28	1.30	1.31	1.33	1.34
2020	0.93	1.00	1.09	1.15	1.25	1.26	1.36	1.45	1.56	1.67
2021	0.85	0.93	1.04	1.12	1.25	1.25	1.41	1.51	1.68	1.83

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.	2020	2021	Long-run
18.22	18.39	18.26	18.20

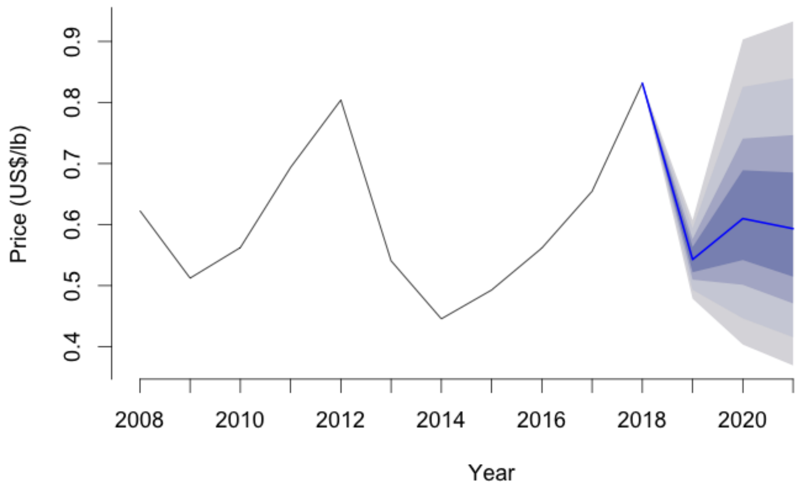

Figure 6.19: Rock sole (BSAI) head and gut wholesale price projections and confidence bounds

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%
2019	0.48	0.49	0.51	0.52	0.54	0.54	0.56	0.58	0.59	0.61
2020	0.40	0.45	0.50	0.54	0.61	0.61	0.69	0.74	0.83	0.90
2021	0.37	0.42	0.47	0.51	0.59	0.59	0.69	0.75	0.84	0.93

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.

Rock sole (BSAI) head and gut wholesale return volatility projections

Hist. Avg.	2020	2021	Long-run
23.01	24.94	24.48	23.34

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 36.6% in 2018 and the price increased 21% to $1.503/lb. Price projections from last year's report indicated a decrease which had 95% confidence bounds of $1.125/lb and $1.254/lb with a median of $1.189/lb, placing the realized price above the projected range. This year's projection for the 2019 rock sole H&G with roe price has a median of $1.283/lb with 95% confidence bounds of $1.225/lb and $1.333/lb (Figure 6.18) indicating that it's highly likely that prices will decrease. Production data through Oct. 19, 2019 show a 32.4% decrease in the year-over-year production of H&G with roe. The price projection for 2020 and beyond does not exhibit a trend. Because of the substantial volatility a range of potential increases or decreases are plausible.

The first-wholesale production of rock sole H&G (without roe) decreased 13% in 2018 and the price increased 27% to $0.831/lb. Price projections from last year's report indicated a decrease which had 95% confidence bounds of $0.495/lb and $0.609/lb with a median of $0.552/lb, placing the realized price above the projected range. This year's projections estimate the 2019 rock sole H&G

(without roe) median price will decrease with a median estimate of \$0.544/lb with confidence bounds ranging from \$0.480/lb to \$0.619/lb (Figure 6.19). Production data through Oct. 19, 2019 show a 11.2% decrease in the year-over-year production of H&G for 2019. The price projection for 2020 and beyond does not exhibit a trend and fluctuate around the current level.

Arrowtooth Flounder H&G First-Wholesale Prices

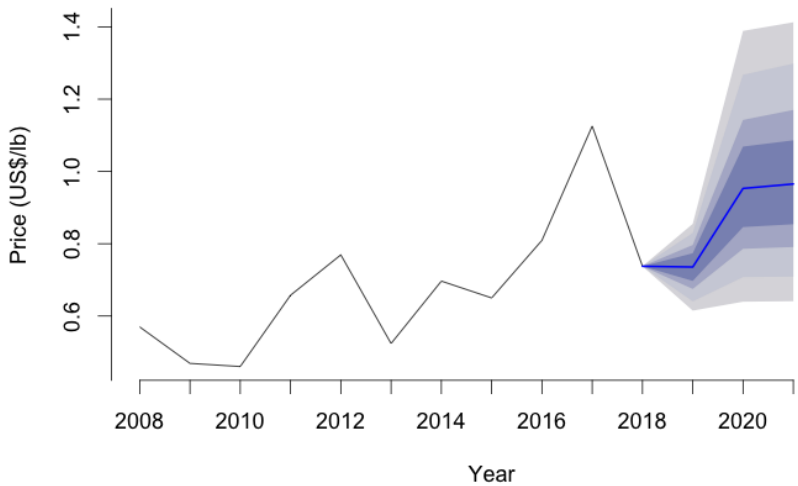

Figure 6.20: Arrowtooth head and gut wholesale price projections and confidence bounds

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%
2019	0.61	0.64	0.68	0.70	0.74	0.74	0.77	0.80	0.83	0.85
2020	0.64	0.71	0.79	0.85	0.95	0.95	1.07	1.14	1.27	1.39
2021	0.64	0.71	0.79	0.85	0.97	0.96	1.09	1.17	1.30	1.41

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.	2020	2021	Long-run
24.18	22.22	22.56	30.64

Arrowtooth flounder are primarily produced into the head-and-gut product form. The first-wholesale production of arrowtooth H&G decreased 38% in 2018 and the price decreased 35% to \$0.733/lb. This value was within last year's estimated 95% confidence bounds of \$0.677/lb and \$0.905/lb, and a median \$0.794/lb. This year's price projections for the 2019 arrowtooth H&G price have 95% confidence bounds of \$0.613/lb and \$0.854/lb with median of \$0.746/lb (Figure 6.20). These estimates indicate that prices will likely remain stable with potential for a marginal price increase or decrease falling within the projected range. Production data through Oct. 19, 2019 show 63% increase in the year-over-year production of H&G for 2019. Projections for 2020 and beyond indicate an increase with a return to the pre-2019 trend. Because of the substantial volatility a range of potential increases or decreases are plausible. 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 product form.

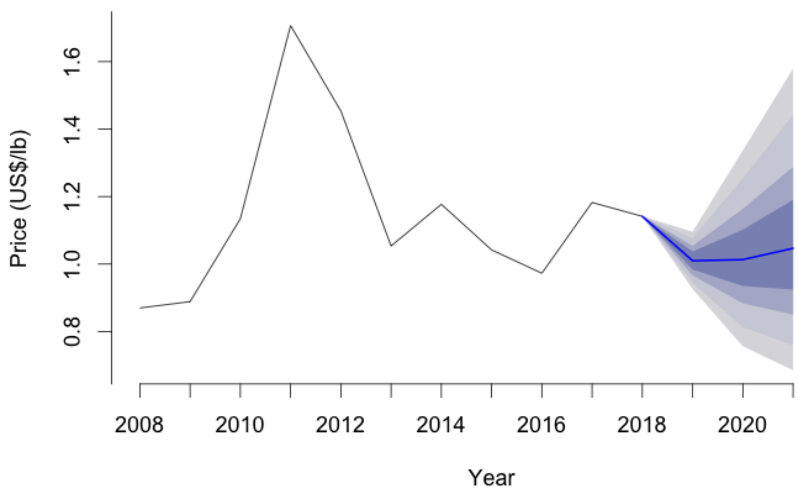

Figure 6.21: Rockfish head and gut wholesale price projections and confidence bounds

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%
2019	0.93	0.94	0.97	0.98	1.01	1.01	1.04	1.05	1.08	1.10
2020	0.76	0.81	0.88	0.94	1.01	1.02	1.10	1.16	1.25	1.34
2021	0.69	0.76	0.85	0.92	1.05	1.05	1.19	1.29	1.44	1.58

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.	2020	2021	Long-run
17.12	17.69	18.03	18.52

First-wholesale rockfish H&G prices decreased 3% to $1.141/lb in 2018 (Figure 6.21). This value was within the last year's 95% confidence bounds of $0.936/lb and $1.165/lb. Projections for the 2019 price have 95% confidence bounds of $0.942/lb and $1.071/lb with a median of $1.007/lb indicating that 2019 prices are expected to decrease.

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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 Alaska 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").

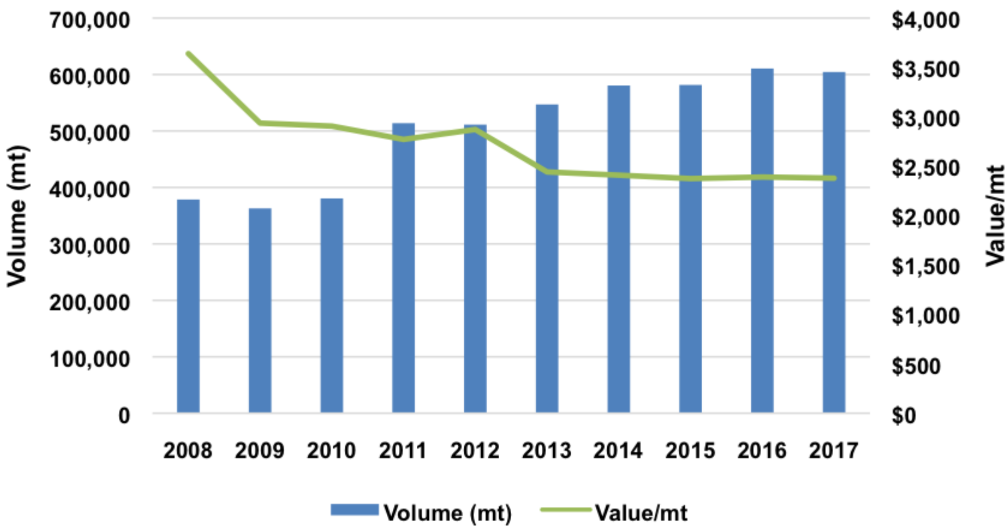

Figure 7.1: First wholesale volume and value for Alaska pollock, 2008-2017

	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.

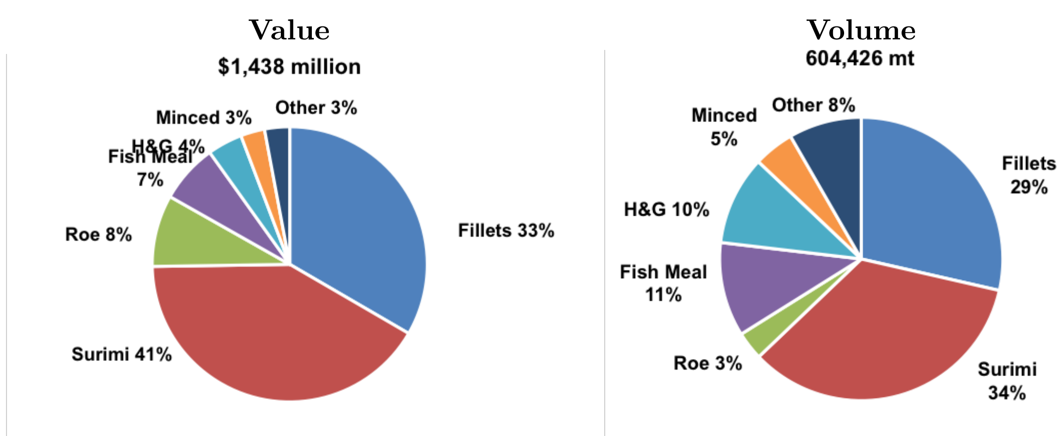

Figure 7.2: Alaska pollock first wholesale production volume and value, by product type, 2017

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.

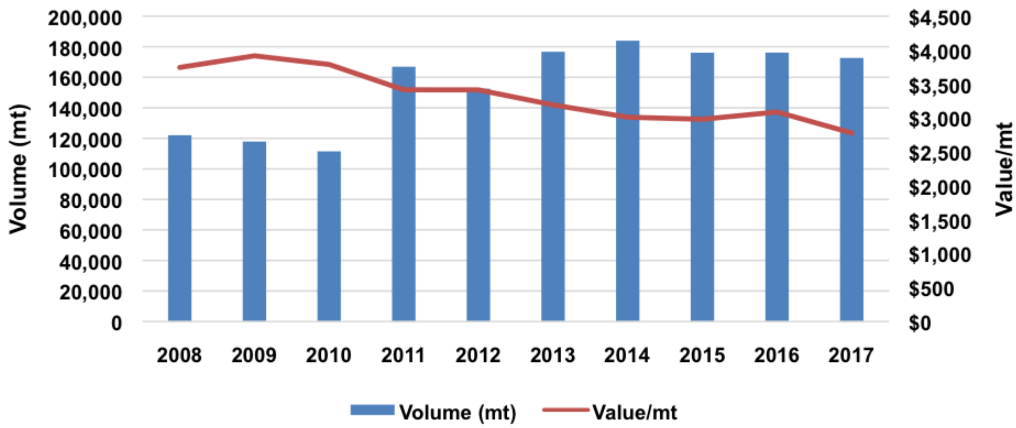

Figure 7.3: First wholesale volume and value for Alaska pollock fillets, 2008-2017

	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 Alaska 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

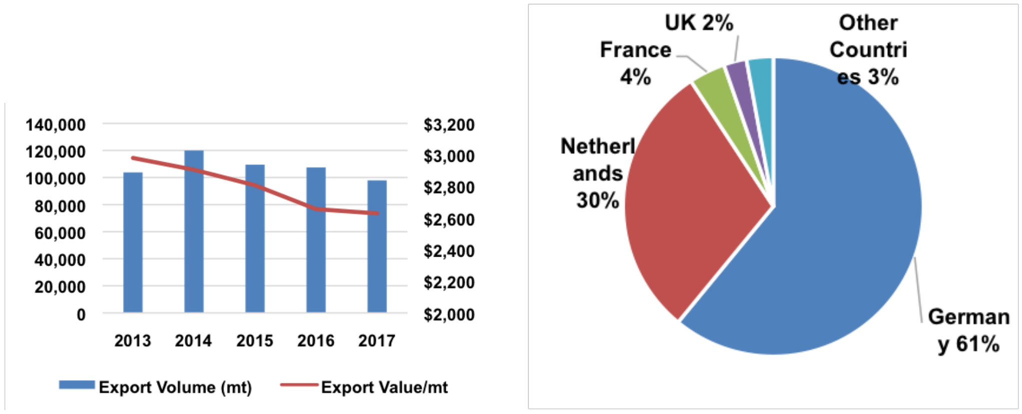

Figure 7.4: Exports of Alaska pollock fillets to major european markets, 2013-2017.

	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.

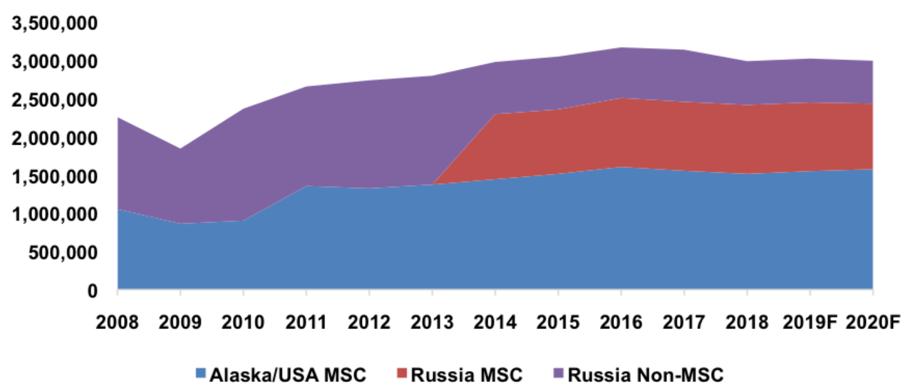

Figure 7.5: Russian and Alaska pollock harvests, 2008-2018 and 2019-2020 forecasts
Source: FAO, NOAA OST, AKFIN, Groundfish Forum, NPFMC TACs, and McDowell Group estimates.

[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

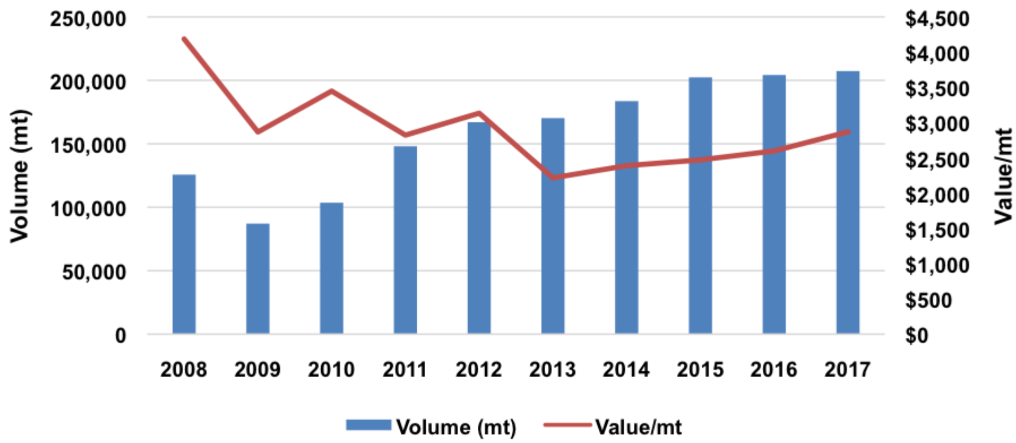

Figure 7.6: Wholesale production volume and value for Alaska pollock surimi, 2008-2017.

	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 Alaska 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-to-drop/

[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.

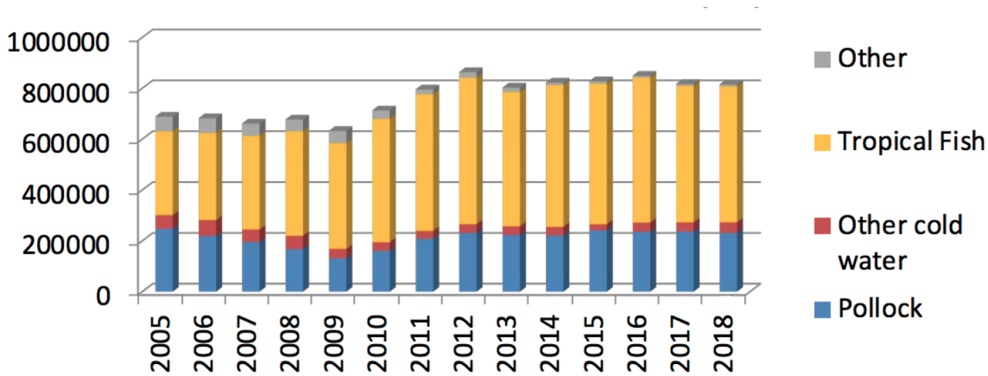

Figure 7.7: Global surimi production (mt), by source species, 2005-2018
Source: Future Seafood Group (via Undercurrent News). 2018 is an estimate.

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-to-drop/

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.

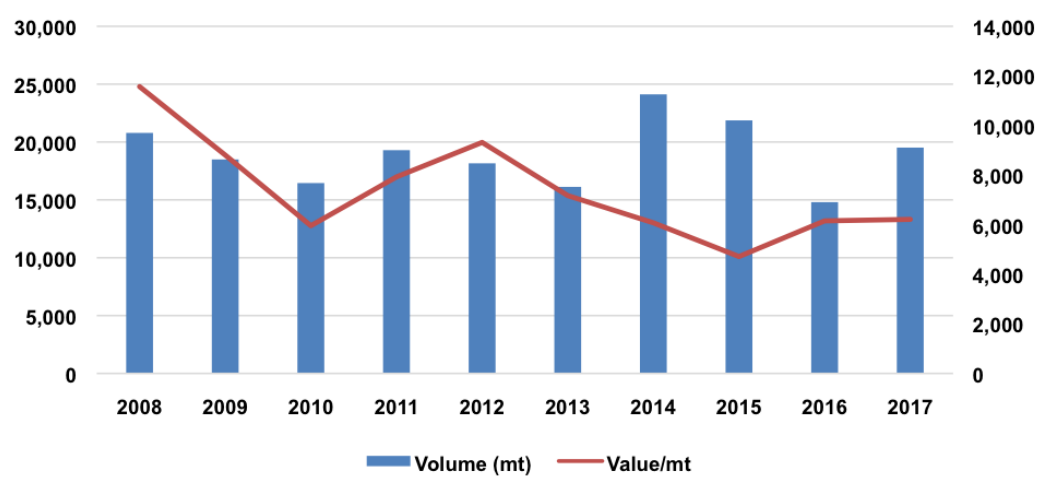

Figure 7.8: Wholesale production volume and value/mt for Alaska pollock roe, 2008-2017.

	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 Alaska 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.

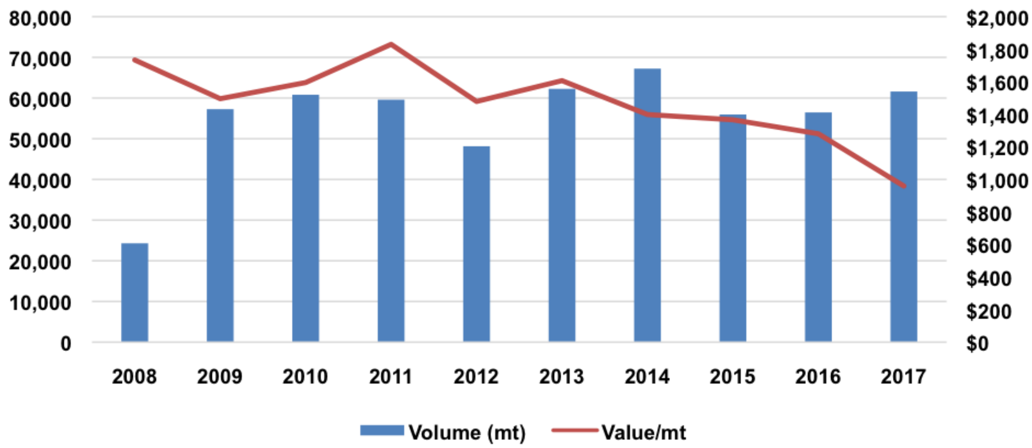

Figure 7.9: Wholesale production volume and value for H&G Alaska pollock, 2008-2017.

	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: Alaska 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 1st 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.

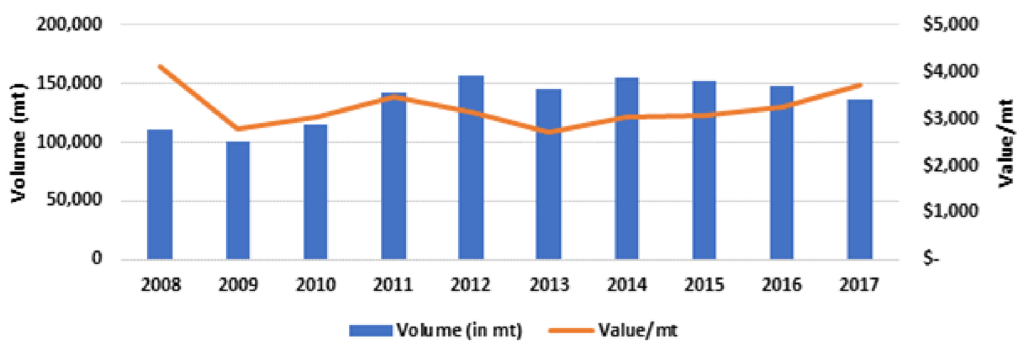

Figure 7.10: First wholesale volume and value/mt for Alaska Pacific cod, 2008-2017.

	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.

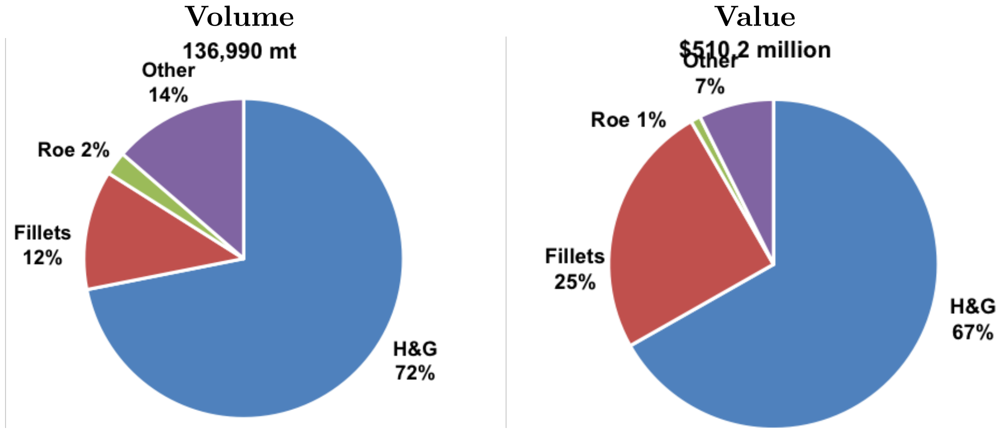

Figure 7.11: Volume and value of Pacific cod wholesale production in Alaska, by product type, 2017. **Source:** AKFIN.

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

[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.

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.

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.

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

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.

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.

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.

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 7.18: 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.

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 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.

[11] ASMI Seafood Export Database

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.

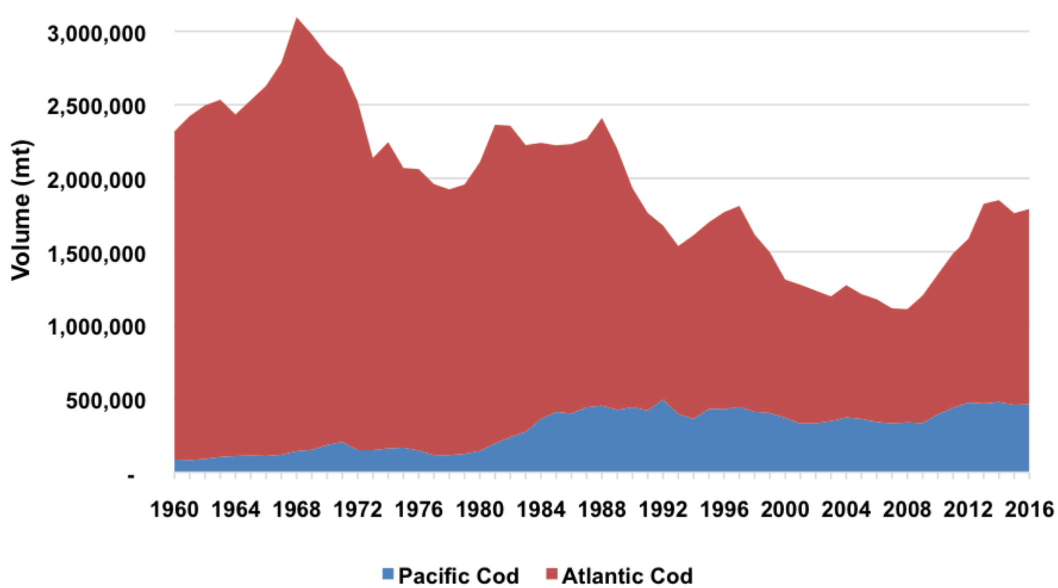

Figure 7.12: Global supply of Pacific and Atlantic cod (mt), 1960-2016

Source: FAO.

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.

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).

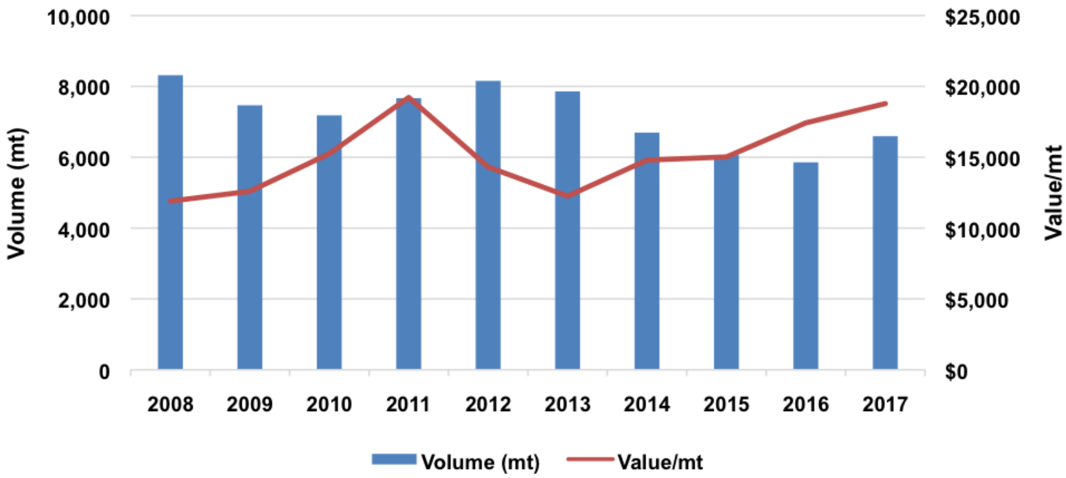

Figure 7.13: First wholesale volume and value of Alaska sablefish, 2008-2017.

	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.

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

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

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.

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.

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).

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]

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.

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.

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

[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.

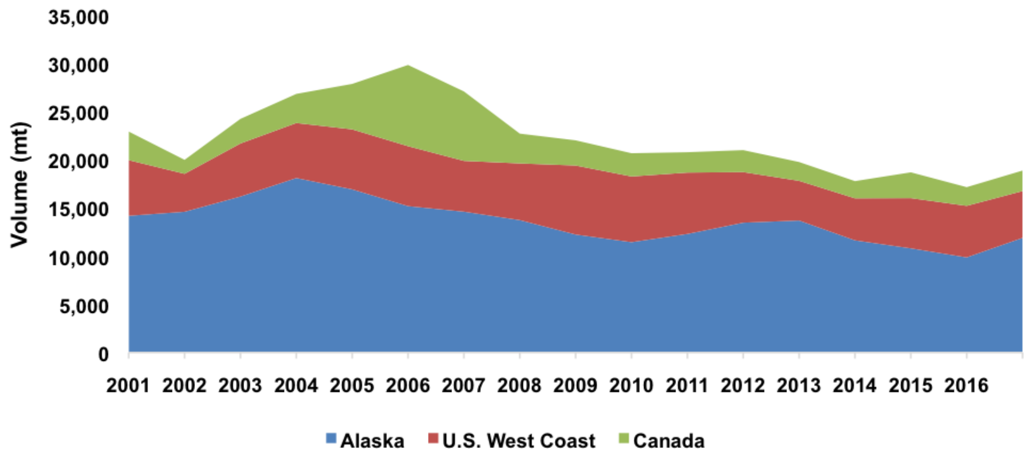

Figure 7.14: Global supply of Sablefish, in metric tons, 2001-2016.
Source: FAO; NMFS OST; AKFIN Production Database.

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 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.

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

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

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			

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.

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.			

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.

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 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.

[16]Per seafood industry representative, 2018.

[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.

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.

[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. In addition to administrative reporting requirements and annual AFA Cooperative and Incentive Plan Agreement (IPA) reports, the Council initiated an annual Economic Data Report (EDR) requirement for AFA entities.

The purpose of this section of the Economic SAFE is to report updated results from EDR data collected for the 2012-2018 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 Amendment 91 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:

[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.

- Understand the effects and impacts of the Amendment 91 IPAs, the higher and lower PSC hard caps, and the performance standard;
- 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

[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.

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 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,

[4] See **77 FR 5389** (February 3, 2012) for details.

[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.

PSMFC staff provides phone support to submitters and monitors form completion and data quality; where data anomalies are identified, PSMFC contacts the submitter to confirm data corrections as appropriate. All A91 EDR data collection procedures for the 2012-2018 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 2018 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).*

[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.

6. *Please describe how any area closures or restrictions for the purpose of reducing Chinook salmon bycatch affected where and how you fished.*

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 Status Report. 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 and 2018 fishing years. An informal review of survey data from the most recent two years was performed to identify notable responses that characterized the pollock fishery during 2017 and 2018 as distinct from previous 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 2018 include:

- Compared to previous years, the largest share of vessels reported that IPAs impacted their fishing strategy. Many skippers commented that they spent more time avoiding salmon this year, with several noting they traveled father and had to catch less valuable fish.
- The 2018 A Season started off very badly but improved. Interestingly, some skippers commented that the Chinook were wide-spread but others said they were more concentrated. Several skippers commented on the constant stress of Chinook avoidance.
- Many skippers made the general statement that they always work to avoid salmon.
- Most respondents commented that weather in 2018 was typical of a low-ice year. Many people mentioned the lack of ice and an increase of storms and several people commented that the weather did not impact the salmon avoidance practices.

Notable findings from the vessel master survey for 2017 include:

- There were few notable differences in reported experiences compared to those reported previously 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 (CVs) and catcher-processors (CPs) active in the 2012-2018 Bering Sea AFA pollock fishery are summarized in Table 8.3 below.

The fuel use results indicate a slight increase in average hourly fuel consumption rates among CVs during 2018, to 75 gallons per hour (gph) while fishing and 51 gph while transiting (both within the range of variation observed in previous years of reporting). Average fuel consumption rates among CPs have been much more variable over the 2012 to 2018 period, with consumption rates for fishing and transiting activity reported for 2016 both rising to the highest levels reported for the sector prior to that year, to 297 gph and 282 gph, respectively. During 2018, fuel consumption rates reported for the CP sector were virtually unchanged from 2017, at 279 gph on average for fishing activity (approximately equal to the average over the sector's rates reported for 2012 through 2015, and reduced from the average rate reported in 2016 by 6%), and 287 gph on average while transiting. The average CP transiting rate reported in 2017 and 2018 are the highest values reported to-date, and exceed the contemporaneous averages for CP fuel consumption rate during fishing activity, contrary to the pattern observed for CVs and for CPs prior to 2017.

Annual fuel cost for both sectors increased substantially during 2018 as a result of increased cost per gallon, compounded by increased fuel consumption in the case of the catcher vessel sector. In the CP sector, the average quantity of fuel purchased during 2018 declined slightly to 1.56 million gallons per vessel, still substantially higher than annual fuel quantities reported prior to 2016, while average fuel cost reported for the year increased by 22% from 2017, to $4.0 million. Annual fuel quantities and costs during 2018 saw larger relative increases in the CV sector, with average gallons per vessel increasing from 2017 by 16% to 139 thousand gallons, and cost per vessel increasing by 44% to $389 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, a 17% difference averaging over results reported for 2012 to 2018. In 2018, average fuel price in the catcher vessel sector increased24% from the previous year to $2.79 per gallon, compared to a 20% increase in the CP sector to $2.57 per gallon.

8.6. References

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Table 8.1: Amendment 91 - EDR Submissions

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
2018	13	81	13	20	0	61	0	0

Notes: 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.

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.

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
2018	14	80	15	96

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)	$4,581 (648)
CP	2013	15	290 (70)	249 (83)	1,171 (318)	$4,492 (1,139)
CP	2014	15	277 (61)	249 (79)	1,396 (395)	$5,020 (1,278)
CP	2015	14	284 (40)	270 (82)	1,438 (368)	$3,423 (744)
CP	2016	14	297 (32)	282 (85)	1,393 (378)	$2,645 (750)
CP	2017	14	279 (29)	289 (64)	1,569 (375)	$3,371 (745)
CP	2018	14	279 (33)	287 (53)	1,559 (336)	$4,014 (858)
CV	2012	90	75 (38)	51 (30)	160 (99)	$694 (425)
CV	2013	87	73 (33)	50 (28)	149 (87)	$628 (365)
CV	2014	85	74 (34)	51 (27)	143 (74)	$574 (297)
CV	2015	83	76 (36)	52 (29)	131 (52)	$383 (158)
CV	2016	87	75 (34)	51 (27)	116 (45)	$237 (89)
CV	2017	84	74 (34)	50 (27)	120 (53)	$270 (113)
CV	2018	80	75 (35)	51 (27)	139 (65)	$389 (186)

Notes: All dollar values are inflation-adjusted to 2018-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 2018, 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; 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 Amendment 80 vessel owners and Quota Share (QS) permit holders, providing detailed data on vessel and QS-entity earnings, employment, QS lease transfers, operating costs and expenses, 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, the EDR data collection program has collected annual economic census data, with the most recent available data representing results from the 2018 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 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

[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 Northy Pacific Fishery Mnagement 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.

implementation of the program in 2008, and 21 CPs participated in the program that year. Over the first 11 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 2018, 17 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. In the initial year of the program, 16 vessels/LLP licenses formed a single cooperative (identified as the Best Use Cooperative, renamed Alaska Seafood Cooperative in 2010), with an additional seven vessels operating in the limited-access fishery. The Alaska Groundfish Cooperative formed in 2011 from the eight vessels that operated in the limited-access fishery during 2009-2010, increasing to nine member vessels in 2013-2014, and six during 2016-2017. In 2018, the Amendment 80 cooperatives consolidated into the Alaska Seafood Cooperative, with a membership of 20 vessels/LLP licenses.

To describe the economic condition and performance of the fleet under the rationalization program and subsequent changes in fishery management, statistics reported below are intended to indicate the status and trends in a variety of economic indicators and metrics. The reported statistics provide a general overview of economic conditions and 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. The reader is 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 2018 equivalent U.S. dollars, consistent with inflation-adjusted data presented in other sections of the Groundfish Economic Status Report. Due to the small number of reporting entities comprising the Amendment 80 sector, some statistical 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"). As a general convention, fleet- or sector-level aggregate values are calculated as the sum total over all vessel- or entity-level reported values for a given data item. Vessel-level median values (calculated over reported non-zero values) are reported to represent the "average" vessel; 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 most statistical values reported in the following tables are derived from fewer than 20 observations for a given statistical value, and the underlying data may be 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 2008-2018. There was no change between 2017 and 2018 in the composition of the 19-vessel fleet Amendment 80-qualified vessels active in EEZ fisheries in the Bering Sea/Aleutian Islands (BSAI) and Gulf of Alaska (GOA). With the exception of the most recent two years and the three years from 2013 to 2015, overall fleet composition has been in constant flux since 2008, with entry and/or exit of one or two vessels from the active fleet each year. 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, replaced 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 from 18 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 in Table 9.1 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 the previous year to 18,152 tons (+4.6%), while fleet aggregate length overall (LOA) decreased slightly to 3,443 feet. A slight decrease in fleet-aggregate fuel capacity from 1.95 to 1.94 million gallons is the only change from 2017 in physical metrics of vessel capacity reported for 2018. As of the publication of this report, additional entry of new and replacement vessels to the Amendment 80 fleet are pending, including the F/T America's Finest (owned and operated by Fishermen's Finest, Inc.), and are not reflected in statistics reported below.

By all available metrics, physical production capacity of processing plants in the Amendment 80 fleet have shown a marked increase in each of the last 4 years. Consistent with significant capital improvement in the existing fleet over the last 6 years, including the FCA vessels under new ownership as of 2017 and entry of new and replacement vessels beginning in 2016 (see subsection 9.4.4 below), production throughput capacity and onboard frozen storage indicators reported in Tables 9.2 and 9.3 for the recent period confirm substantial expansion of aggregate production capacity of the fleet.

[3]NTSB, 2017. https://www.ntsb.gov/investigations/AccidentReports/Reports/MAB1726.pdf

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)	
		Total	Median	Total	Median	Total	Median	Total	Median	Total	Median	Total	Median
2008	22	17,483	806	9,449	403	3,760	177	826	39	54,650	2,385	1.99	77,920
2009	21	15,482	560	8,723	380	3,546	169	784	38	48,300	2,250	1.82	76,840
2010	20	15,285	775	8,589	403	3,424	177	758	39	47,475	2,385	1.78	77,920
2011	20	15,285	775	8,568	403	3,434	177	748	39	47,400	2,385	1.77	77,920
2012	20	15,880	775	8,712	403	3,434	177	761	40	47,400	2,385	1.82	77,920
2013	18	15,495	1,008	8,451	506	3,218	185	706	40	45,075	2,560	1.77	89,077
2014	18	15,495	1,008	8,451	506	3,218	185	706	40	45,075	2,560	1.77	89,077
2015	18	15,897	1,026	8,403	506	3,218	185	706	40	45,075	2,560	1.77	89,077
2016	19	17,362	1,027	9,399	586	3,449	185	751	40	47,625	2,550	1.93	99,154
2017	19	18,152	1,027	9,543	586	3,443	185	758	40	48,025	2,550	1.95	99,154
2018	19	18,152	1,027	9,543	586	3,443	185	758	40	48,025	2,550	1.94	99,154

Source: Amendment 80 Economic Data Reports.

Over the active fleet of 19 vessels, total processing lines increased to 31 in 2017, an average of 1.6 per vessel, although most vessels continue to have only one processing line (as indicated by the median value Table 9.2, which has been constant since 2008). Fleet aggregate processing line throughput capacity for whole-fish product increased to 79.2 metric tons per hour (t/hr)[4] in 2016 (declining slightly from that level in 2017 and 2018), compared to an annual average of 59 t/hr over the 2008-2014 period. Median whole-fish throughput has consistently trended upward over the last 5 years, peaking at 4.5 t/hr in 2017 (with a slight decline to 4.3 t/hr in 2018), compared to a fairly constant 3.3 t/hr from 2008 to 2013. More recently, line throughput over all head and gut product types types[5] showed a marked increase beginning in 2017, to a fleet aggregate of 103.9 t/hr (median 4.8 t/hr), compared to a range of 80 - 90 t/hr prior to 2017. Notably, although not as directly indicative of physical production capacity, the number of distinct species and product types reported by active vessels have followed a similar trend, increasing in recent years, with 33 distinct species processed and 57 distinct species-product types produced across the fleet representing the highest variety of outputs reported since the program began.

Cold-handling capacity is commonly cited as principal limiting factor in overall production capacity on Amendment 80 CP's, and the recent increasing trend in associated metrics is similar to that shown in processing line capacity. Product chilling (i.e. plate freezer) throughput and on-board frozen storage metrics are reported in Table 9.3. Fleet-aggregate freezer throughput capacity, which ranged between 59 and 67 t/hr on an annual basis prior to 2016, increased to 72.8 t/hr in 2017, and declined to 70.3 t/hr in 2018. Fleet-aggregate cold storage capacity, which ranged between 7,100 and 7,700 t over the 2009 to 2015 period, increased to 8,439 t in 2017 and remained at nearly that level in 2018. Median cold storage capacity has remained constant over the last 3 years at 356 t.

[4]Note that all annual fleet-aggregate throughput statistics in the following discussion (and referenced tables) represent the summed value over all reported vessel-level volume-per-hour values for the year.

[5]Head and gut (H&G) product types include the following product code and descriptions, as defined by the State of Alaska (SOA) in eLandings and Commercial Operators Annual Report (COAR) specifications: 06 - H&G with roe, 07 - H&G western cut, 08 - H&G eastern cut, and 10 - H&G tail removed. Production capacity in the EDR is reported by species and product type use according to SOA standard codes. In a addition to code 01 - Whole fish, small quantities of other product types are produced by A80 vessels, including 11 - Kirimi, and various ancillary product types, but do not appear in EDR processing capacity records.

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	Total	Median	Total	Median	Total	Median	Total	Median	Total	Median
2008	22	32	1	23	12	46	18	62.06	3.33	90.72	3.63
2009	21	31	1	26	12	47	17	61.37	3.33	81.86	3.63
2010	20	30	1	25	12	46	18	64.55	3.32	81.21	3.85
2011	19	29	1	27	12	44	17	61.59	3.31	79.07	3.92
2012	19	29	1	23	12	49	16	50.27	3.22	90.82	4.43
2013	18	28	1	21	12	37	16	48.64	3.32	88.83	4.62
2014	18	28	1	22	12	41	16	56.69	3.88	87.31	4.30
2015	18	28	1	28	13	53	18	74.21	4.04	82.20	4.18
2016	19	30	1	26	13	48	19	79.19	4.16	87.63	4.20
2017	19	31	1	33	13	55	18	78.94	4.53	103.85	4.81
2018	19	31	1	33	13	57	18	78.17	4.33	102.49	4.67

Notes:

Source: Amendment 80 Economic Data Reports.

Table 9.3: Amendment 80 Fleet - Aggregate and Median Vessel Freezer Capacity

	Vessels	Freezer Hold Capacity (t)		Maximum Freezing Capacity (t/hr)	
Year		Total	Median	Total	Median
2008	22	8,227.42	317.51	62.98	2.77
2009	21	7,693.25	317.51	58.83	2.68
2010	20	7,576.07	317.51	60.01	2.89
2011	20	7,076.30	308.76	64.21	3.64
2012	20	7,558.92	317.51	67.08	3.90
2013	18	7,345.19	336.57	64.28	3.92
2014	18	7,345.19	336.57	64.28	3.92
2015	18	7,345.07	336.57	64.06	3.92
2016	19	8,171.14	355.62	69.94	3.92
2017	19	8,438.92	355.62	72.81	4.04
2018	19	8,400.12	355.62	70.31	4.04

Source: Amendment 80 Economic Data Reports.

Fuel consumption statistics for the Amendment 80 fleet show some indications of increasing fuel efficiency associated with recent entry of replacement Amendment 80 vessels and capital improvement in existing vessel capital stock discussed above. 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. Median reported hourly fuel use rates vary by activity (highest during steaming loaded and lowest while steaming empty) and 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 (which were unchanged from 2017 to 2018), median fuel consumption rates declined across all operational modes in 2017 for the first time since 2009, declining to 95 gph steaming empty, 110 gph while steaming loaded, and 101 gph while fishing and processing; 2018 saw a partial reversal, with use rate increased to 105 gph during fishing and processing and 98 gph steaming empty.

Table 9.5 shows aggregate and vessel median annual fuel consumption (gallons) by operational mode, and annual total over all activity. Total fleet fuel consumption peaked at 14.3 million gallons in 2016, declined in 2017 to 13.3 million gallons, and increased to 13.7 million in 2018. Fuel use in fishing and processing activity (typically 70-80% of total fuel use) during 2018 increased to 10.8 million gallons. However, as the most intensive fishing season to date for the fleet, with 5,062 active vessel days on fishing grounds (see Table 9.6), this averages to 2,140 gallons per vessel-day, the lowest rate to date, compared to an average over the 2008-2017 period of 2,285 gallons per vessel-day. 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 2008-2018, representing counts of days during which the vessel undertook fishing and

Table 9.4: Amendment 80 Fleet - Median Vessel Fuel Consumption Rates by Vessel Activity

Year	Vessels	Fishing/ Processing (gal/hr) Median	Steaming Loaded (gal/hr) Median	Steaming Empty (gal/hr) 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
2018	19	105	108	98

Source: Amendment 80 Economic Data Reports.

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		Total (million Gal)	Median (1000 Gal)	Total (million Gal)	Median (1000 Gal)	Total (million Gal)	Median (1000 Gal)	Total (million Gal)	Median (1000 Gal)
2008	22	10.78	522	1.04	52	1.76	70	13.57	644
2009	21	9.27	449	1.04	61	1.77	81	12.09	591
2010	20	9.73	485	1.45	66	1.46	68	12.65	619
2011	20	10.16	457	1.74	85	1.44	63	13.34	606
2012	20	9.26	445	1.31	70	1.64	89	12.21	603
2013	18	9.70	520	1.20	67	1.50	79	12.40	667
2014	18	10.09	551	1.19	63	1.52	88	12.79	702
2015	18	10.03	543	1.19	74	1.64	79	12.86	695
2016	19	11.11	585	1.21	73	1.98	72	14.30	730
2017	19	10.59	511	1.20	61	1.52	56	13.31	629
2018	19	10.84	578	1.33	79	1.49	59	13.65	717

Source: Amendment 80 Economic Data Reports.

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 2008-2018 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.[6]

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 3,935 vessel-days processing across 19 vessels during 2018, the most intensive year of fishing and processing activity reported in A80 fisheries to-date. From 2013 to 2018, median vessel-days fishing and processing have fluctuated between 200 to 213, most recently declining to 203 vessel-days in 2018. Vessel 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, and increasing to 12 vessels in 2018. The period beginning 2015 has represented the most intensive fleet-level activity in non-A80 fisheries reported to date, with fleet total vessel days fishing peaking at 867 days in 2017, and declining slightly in 2018 to 856. In median terms, days fishing in non-A80 fisheries during 2018 increased to 65, the highest reported to-date. Prior to 2016, aggregate vessel-days fishing and days processing in non-A80 fisheries tracked closely, but in the three most recent years, in addition to seeing the highest historical level of fleet processing activity in these fisheries, aggregate and median vessel-days processing increased relative to days fishing. The relative increase in processing days beginning in 2016 is the result of a segment (between 4 to 6 vessels[7]) of the fleet operating as motherships in the BSAI. Statistics reported for raw fish purchasing costs reported in Tables 9.9 and 9.10 provide some metric of this trend, however, a more detailed analysis is pending development for a future edition of this report.

As noted above, all 2008 through 2018 vessel counts and activity days statistics shown for all non-A80 fisheries in Table 9.6 are inclusive of activity in GOA trawl fisheries, and 2015 to 2018 results reported separately for GOA fisheries represent a subset of the information included in the statistics reported for the latter. The relatively small increase in Amendment 80 fleet activity in GOA fisheries during 2017 subsided in 2018, with 8 vessels active in the GOA, and fleet aggregate vessel-days fishing and processing declining to 291.

Across the active fleet of 19 vessels during 2018, 1,431 vessel-days included transiting and/or offloading and 59 days on a median basis, and days inactive (in-port or inactive at sea) during 2018 totaled 1,077 across the fleet and 55 days at median, both reflecting increased fleet active operation on the fishing grounds during 2018.

[6] 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.

[7] this does not include F/T America's Finest, which operated as a mothership during 2018, but was not yet approved for a federal fishing permit or other regulatory requirements for entry to the Amendment 80 sector.

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	2018
Amendment 80 Fisheries		Active vessels	22	21	20	20	19	18	18	18	19	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	3,932
		Median vessel	185	181	182	175	178	200	209	210	202	208	203
	Days Processing	Fleet total	4,117	3,774	3,747	3,454	3,425	3,559	3,615	3,633	3,747	3,757	3,935
		Median vessel	196	181	189	173	185	200	213	210	202	208	203
All Non-A80 Fisheries		Active vessels	11	11	14	17	17	12	12	11	11	10	12
	Days Fishing	Fleet total	456	261	535	812	735	648	818	826	802	867	856
		Median vessel	25	20	30	32	30	28	27	41	58	47	65
	Days Processing	Fleet total	455	259	534	819	730	649	818	880	1,032	1,094	1,127
		Median vessel	26	20	30	32	30	28	27	41	78	115	70
GOA Fisheries		Active vessels	-	-	-	-	-	-	-	7	8	9	8
	Days Fishing	Fleet total	-	-	-	-	-	-	-	402	339	422	291
		Median vessel	-	-	-	-	-	-	-	41	32	31	32
	Days Processing	Fleet total	-	-	-	-	-	-	-	402	339	422	291
		Median vessel	-	-	-	-	-	-	-	41	32	31	32
Non-Fishing and Inactive		Vessels	22	21	20	20	20	18	18	18	19	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	1,431
		Median vessel	58	72	77	80	69	80	65	69	69	68	59
	Days Inactive	Fleet total	1,980	2,355	1,928	1,857	2,089	1,466	1,301	1,298	1,319	1,373	1,077
		Median vessel	94	100	81	78	98	74	73	75	61	69	55

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 2018 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), and estimated wholesale value of finished processed volume (aggregate and per-t values in $US adjusted to 2018-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 increased total retained catch by 7 thousand t compared to 2017 to 328 thousand t in 2018, with discard volume of 22.9 thousand t and discard rate (discard as percentage of total catch) of 7.0%, both increased from the historically low bycatch levels of 2017 and the first increase since 2015. 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) slightly increased in 2018 to 242 thousand t (from 239 thousand t in 2017), while discard within Amendment 80 program fisheries increased from 2.9 thousand t to 3.1 thousand t, increasing slightly as a rate to 1.3% of total catch. Total retained catch of all other species in the BSAI in 2018 increased by 10 thousand t to 63 thousand t (up 19% from 2017), with total discard increasing by 44% to 18.5 thousand t, a rate if 29% of total catch, from 24% in 2017. Total retained catch in GOA fisheries declined by 22% to 22.8 thousand t in 2018, with discard volume and rate both substantially reduced, to 1.3 thousand t (less than half of 2017 discard volume), and 5.7%, the lowest discard rate among Amendment 80 vessels active in GOA fisheries since the beginning of the management program.

Production and value information displayed in Table 9.7 indicate that, from 2008 to 2018, 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 first wholesale value varying between $303 million and $476 million over the period. [8] Aggregate finished volume of the fleet over all Alaska fisheries during 2018 declined slightly from 2017 to 201 thousand t while aggregate gross wholesale value increased slightly to $457 million. On a median vessel basis, 2018 production volume over all Alaska fisheries increased by 7% from the previous year to 10.8 thousand t while median wholesale value was approximately constant at $22.8 million. For Amendment 80 program fisheries, aggregate finished volume and value for the fleet in 2018 were 155 thousand t (down 2% from 2017), and $372 million (up 8%), representing 77% of production volume and 81% of gross revenue value over all Alaska production for the fleet. On a median basis, production volume in Amendment 80 program fisheries remained constant at 7.3 thousand t in 2018, while first wholesale value increased by 28% to $17.4 million.

GOA fisheries typically contribute a relatively small proportion of total production and value for the Amendment 80 fleet, averaging approximately 7% of finished volume and 9% 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 11-year period,

[8] Note that Table 9.8 below also reports aggregate first wholesale statistics for the Amendment 80 sector, which are differentiated from statistics reported in Table 9.7 in that the former represent volume and value of product sales completed during the calendar year as reported in Amendment 80 Economic Data Reports. In contrast, 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 in timing between production output, sales, and fluctuating inventories, as well as other sources of variation.

with finished volume increasing to 21.3 thousand t, accounting for nearly 10% of aggregate finished volume for the fleet as a whole (although only 10 of 18 vessels were active during 2014 in GOA fisheries), and $47.4 million accounting for 13% of fleet-aggregate wholesale value. Fleet-aggregate volume and value of GOA production declined during the next two years, increased in 2017 to 16.9 thousand t and $46 million in first wholesale value, and declined in 2018 to 12.6 thousand t and $46 million in first wholesale value (reduced by 25% and 32% from 2017). 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 11-year period) increased by 13% to 33 thousand t for 2018, while first wholesale value declined by 7% to $54 million.

As a gross indicator of market conditions and value for finished product from the Amendment 80 sector, weighted average value per t calculated over all finished production by species-area group shown in Table 9.7 indicate a five-year trend of increasing value per unit for Amendment 80 target species as a group, increasing from the 11-year low of $1641 per t in 6 to $2401 per t in 2018, the highest value since the fisheries were rationalized in 2008. Average per-unit value of fleet production from other species-area targets have not exhibited a similar trend, and 2018 saw declines in average value of Gulf of Alaska production, down 10% to $2458 per t, and down 17% to $1631 per t for finished production from secondary targets in the BSAI. Further analysis of production, prices, and market conditions for individual species, Amendment 80 target species and others, are provided elsewhere in the Economic Status 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	$ 286.02	$ 1,878	13.01	0.30	3.06 %	6.89	$ 12.38
	2009	21	239.66	12.80	5.34 %	140.54	$ 231.42	$ 1,647	12.22	0.51	4.95 %	7.52	$ 11.43
	2010	20	257.57	12.68	4.92 %	154.95	$ 281.57	$ 1,817	13.96	0.44	3.40 %	8.43	$ 13.94
	2011	20	262.29	6.51	2.48 %	163.61	$ 363.18	$ 2,220	14.34	0.17	1.91 %	8.56	$ 17.17
	2012	20	265.04	6.82	2.57 %	167.18	$ 363.31	$ 2,173	14.55	0.23	2.35 %	8.96	$ 17.31
	2013	18	260.43	6.79	2.61 %	159.85	$ 262.29	$ 1,641	15.03	0.31	2.27 %	8.32	$ 13.01
	2014	18	254.97	3.17	1.24 %	158.17	$ 268.43	$ 1,697	13.94	0.15	1.19 %	8.53	$ 11.84
	2015	18	248.00	3.08	1.24 %	153.65	$ 261.68	$ 1,703	12.84	0.18	1.19 %	7.57	$ 10.86
	2016	19	253.93	3.98	1.57 %	158.99	$ 272.84	$ 1,716	13.68	0.15	1.13 %	8.15	$ 12.15
	2017	19	238.78	2.93	1.23 %	158.31	$ 343.31	$ 2,169	12.25	0.13	0.87 %	7.29	$ 13.61
	2018	19	241.76	3.12	1.29 %	154.99	$ 372.17	$ 2,401	12.05	0.16	1.46 %	7.33	$ 17.41
BSAI - All other species	2008	22	44.81	25.83	57.63 %	22.28	$ 40.72	$ 1,828	1.82	1.27	69.47 %	0.92	$ 1.61
	2009	21	55.43	20.94	37.78 %	29.67	$ 47.83	$ 1,612	2.30	1.00	49.87 %	1.23	$ 1.60
	2010	20	63.18	20.49	32.43 %	34.29	$ 51.99	$ 1,516	2.38	0.96	45.38 %	1.27	$ 1.75
	2011	20	62.11	17.45	28.10 %	34.77	$ 67.79	$ 1,950	3.16	0.80	26.97 %	1.71	$ 3.08
	2012	20	60.34	13.51	22.39 %	34.05	$ 72.22	$ 2,121	3.17	0.63	22.70 %	1.82	$ 3.28
	2013	18	70.85	20.27	28.61 %	37.90	$ 58.85	$ 1,553	3.97	1.17	29.80 %	2.18	$ 3.50
	2014	18	73.94	23.83	32.22 %	38.75	$ 60.84	$ 1,570	3.94	1.22	31.23 %	2.12	$ 3.26
	2015	18	59.78	14.88	24.90 %	32.96	$ 47.30	$ 1,435	3.66	0.79	25.53 %	1.96	$ 2.59
	2016	19	60.12	14.84	24.68 %	31.77	$ 61.17	$ 1,925	3.33	0.77	27.29 %	1.64	$ 2.14
	2017	19	53.02	12.89	24.32 %	29.36	$ 57.82	$ 1,969	3.09	0.60	23.21 %	1.53	$ 2.15
	2018	19	63.04	18.51	29.37 %	33.10	$ 54.00	$ 1,631	3.41	0.87	27.65 %	1.88	$ 2.80
GOA - All species	2008	12	20.54	3.76	18.29 %	11.10	$ 25.00	$ 2,252	1.88	0.29	15.04 %	0.93	$ 2.05
	2009	17	20.19	6.09	30.15 %	10.95	$ 23.39	$ 2,136	0.99	0.17	24.20 %	0.42	$ 0.99
	2010	16	21.36	5.25	24.60 %	12.15	$ 30.64	$ 2,522	0.91	0.24	17.80 %	0.49	$ 1.29
	2011	16	24.34	4.42	18.17 %	13.85	$ 44.76	$ 3,232	0.75	0.19	15.52 %	0.39	$ 1.53
	2012	16	24.20	3.40	14.06 %	13.21	$ 37.56	$ 2,843	0.67	0.07	12.87 %	0.38	$ 1.24
	2013	13	20.46	3.61	17.64 %	11.71	$ 24.90	$ 2,126	0.98	0.15	10.27 %	0.54	$ 1.41
	2014	10	39.19	2.96	7.56 %	21.34	$ 47.41	$ 2,222	2.11	0.13	5.79 %	1.13	$ 3.39
	2015	9	27.05	2.53	9.36 %	15.29	$ 32.61	$ 2,133	2.14	0.23	5.65 %	1.88	$ 4.50
	2016	13	22.29	1.61	7.24 %	12.74	$ 30.76	$ 2,414	0.70	0.02	2.21 %	0.37	$ 0.73
	2017	10	29.43	2.70	9.17 %	16.90	$ 45.99	$ 2,721	2.58	0.06	2.83 %	1.38	$ 4.09
	2018	8	22.82	1.29	5.66 %	12.64	$ 31.08	$ 2,459	2.61	0.09	4.81 %	1.49	$ 3.90

Continued on next page.

Table 9.7: Continued

	Year	Fleet Aggregate: Vessels	Retained Catch (1000t)	Discard (1000t)	Discard Rate	Finished Weight (1000t)	Wholesale Value ($million)	Weighted Average Price ($/t)	Median Vessel: 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	$ 351.74	$ 1,894	15.76	1.63	12.22 %	8.26	$ 15.14
	2009	21	315.29	39.83	12.63 %	181.15	$ 302.64	$ 1,671	16.12	1.70	11.31 %	9.18	$ 13.99
	2010	20	342.11	38.43	11.23 %	201.39	$ 364.21	$ 1,808	18.58	1.69	12.21 %	10.66	$ 17.28
	2011	20	348.74	28.39	8.14 %	212.23	$ 475.73	$ 2,242	18.88	1.43	8.02 %	10.96	$ 23.71
	2012	20	349.58	23.74	6.79 %	214.44	$ 473.10	$ 2,206	18.57	1.21	7.78 %	10.55	$ 22.49
	2013	18	351.74	30.67	8.72 %	209.46	$ 346.04	$ 1,652	19.65	1.66	9.14 %	10.75	$ 17.13
	2014	18	368.11	29.96	8.14 %	218.25	$ 376.67	$ 1,726	20.07	1.38	7.58 %	11.79	$ 19.67
	2015	18	334.83	20.49	6.12 %	201.90	$ 341.59	$ 1,692	19.39	1.13	6.39 %	11.44	$ 17.34
	2016	19	336.34	20.44	6.08 %	203.50	$ 364.76	$ 1,792	19.40	1.07	6.41 %	10.80	$ 18.76
	2017	19	321.23	18.52	5.76 %	204.58	$ 447.12	$ 2,186	15.27	0.88	6.08 %	10.09	$ 22.84
	2018	19	327.62	22.92	7.00 %	200.73	$ 457.25	$ 2,278	16.97	1.13	5.80 %	10.76	$ 22.79

Notes: All dollar values are inflation-adjusted to 2018-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 11-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 revenues for the Amendment 80 sector (including all Amendment 80 LLP holders and QS entities), by revenue source. Fishery product sales clearly represent the principal source of revenue for the sector, with annual sales ranging from $372 million to $452 million in aggregate, and from $18 million to $22 million on a median-vessel basis. In comparison, fee-for-services revenue earned by vessels (e.g., charters, tendering, cargo transport) and royalties received from leasing QS and other fishery allocations both represent minor sources of revenue, and revenue from fishery permit sales reported in EDR data has been negligible. [9] Total reported volume of finished product sales for the sector during 2018 was 189 thousand t (a increase from 2017), producing gross first wholesale revenue of $446 million (increasing 1.6% and 3.4% from 2017, respectively, as a result of increasing value per-t for 2018). At the median vessel-level, total sales volume and revenue increased in 2018, with 10.3 thousand t sold and revenue of $24 million increasing 18% and 8% from 2017. 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.[10] The volume of QS lease activity during 2018 was markedly reduced compared to recent years, with six of the 19 reporting entities reporting lease royalties totaling $460 thousand from leases of 3,160 t of Amendment 80 QS allocation transferred, totaling over all QS types (species). [11]

[9] As of 2018, only one Amendment 80 entity has reported revenue from permanent sale of LLP license assets in an annual EDR (not shown in Table 9.8); other LLP sale transfers have occurred, but were associated with exit of the entity from the Amendment 80 sector and thus are not captured in EDR submissions that apply only to current sector entities.

[10] 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).

[11] 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

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

		LLPs	Total		Median	
	Year		Revenue ($million)	Volume (1,000t)	Revenue ($million)	Volume (1,000t)
Total Fishery Product Sales	2008	22	$ 326.32	176.85	$ 14.56	7.47
	2009	21	$ 276.97	168.31	$ 12.37	8.45
	2010	20	$ 342.07	183.48	$ 15.70	9.76
	2011	20	$ 451.27	196.97	$ 22.07	10.17
	2012	20	$ 433.12	198.31	$ 20.78	9.39
	2013	18	$ 334.97	195.42	$ 16.93	10.38
	2014	18	$ 368.85	202.93	$ 19.10	10.65
	2015	18	$ 328.57	188.63	$ 16.71	10.58
	2016	19	$ 351.64	188.98	$ 17.24	9.96
	2017	19	$ 431.32	192.33	$ 20.40	9.50
	2018	19	$ 446.17	189.32	$ 24.03	10.29
Quota Lease Royalties	2008	6	$ 0.47	2.38	$ 0.02	0.17
	2009	3	$ *	*	$ *	*
	2010	6	$ 0.12	0.66	$ 0.02	0.10
	2011	10	$ 0.99	8.70	$ 0.04	0.32
	2012	10	$ 1.39	11.18	$ 0.08	0.65
	2013	7	$ 1.30	11.40	$ 0.22	2.00
	2014	8	$ 1.47	18.28	$ 0.21	2.85
	2015	4	$ *	*	$ *	*
	2016	5	$ 0.78	20.32	$ 0.19	5.07
	2017	5	$ 0.46	11.59	$ 0.10	1.56
	2018	6	$ 0.35	3.16	$ 0.01	0.60
Other Income from Vessel Operations	2008	-	$ -	-	$ -	-
	2009	-	$ -	-	$ -	-
	2010	1	$ *	-	$ *	-
	2011	-	$ -	-	$ -	-
	2012	1	$ *	-	$ *	-
	2013	1	$ *	-	$ *	-
	2014	-	$ -	-	$ -	-
	2015	-	$ -	-	$ -	-
	2016	-	$ -	-	$ -	-
	2017	-	$ -	-	$ -	-
	2018	-	$ -	-	$ -	-

Notes: All dollar values are inflation-adjusted to 2018-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.

during 2018 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.

9.4.2 Operating expenses

Tables 9.9 and 9.10 summarize the annual expenses incurred by Amendment 80 CPs from 2008 to 2018 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 2018 totaled \$316 million, a slight increase from 2017, but substantially higher than the \$283 million annual average of aggregate expenses over the 2008-2017 period. As a category of operating 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 36% to 40% of total annual operating costs at the fleet level prior to 2017. Combined labor costs increased substantially during 2017 and 2018, increasing from an an average of \$107 million per year over the 2008 to 2016 period to \$138 million 2017 and \$139 million in 2018, and growing to an unprecedented 44% of total fleet operating costs for both years. The largest increases in 2017-2018 fleet-level labor costs were in direct wage costs for processing labor and for senior vessel staff (labeled "Other employees" in Tables 9.9 and 9.10; includes captains and other vessel officers, engineers, and excludes fishing crew). Processing labor cost increased by 41% between 2016 and 2017 to \$61 million, declining slightly to \$59 million in 2018, and representing 20% of fleet-total operating costs in both years (compared to an average of 17% prior to 2017). Senior crew labor costs also increased by 41% between 2016 and 2017, to \$46 million, and an additional 7% in 2018 to \$49 million, representing 15% of fleet-total operating costs (compared to an average of 12% prior to 2017). Fishing (deck) crew labor costs and other employment-related expenses also showed significant increases in the most recent two years but did not substantially increase as a proportion of total operating costs compared to the pre-2017 period, and aggregate fishing crew labor cost declined very slightly from the peak of \$17.87 million in 2017. 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 2018 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.

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 20% of total operating, 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 $32 million, and increased by 23% in 2018 to $39 million in aggregate, 12% as a proportion of total expenses, and increased by nearly 40% to $2.18 million on a median vessel basis. Repair and maintenance expenses for 2018 increased by 6% to $33 million across the fleet, representing nearly 11% of overall costs, and increased by 9% to $1.7 million on a median basis. Product freight and storage costs have varied widely over the 2008 to 2018 period, from $14 million to $39 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, and declining by 26% to $29 million at the fleet-level during 2018.[12] General administrative costs also grew substantially in 2017, increasing by 35% to $27 million, and by and additional 7% in 2018 to $29 million. 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 adjustment to recent structural changes within the Amendment 80 sector, notwithstanding any further changes in ownership structure and/or fleet composition, these elevated transitional costs appear to have tapered off somewhat in 2018 and may continue to 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.

[12] 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)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Labor	Labor Payment, Fishing Crew	2008	22	$ 16.98	$ 6.22	$ 5.31	2.81 %	96.02 %
		2009	21	$ 13.65	$ 5.86	$ 5.03	2.57 %	81.07 %
		2010	20	$ 14.84	$ 5.71	$ 4.43	2.76 %	80.87 %
		2011	20	$ 18.60	$ 5.85	$ 4.20	3.42 %	94.42 %
		2012	20	$ 17.78	$ 5.60	$ 4.19	3.41 %	89.67 %
		2013	18	$ 13.85	$ 5.35	$ 4.21	2.71 %	70.87 %
		2014	18	$ 14.99	$ 5.49	$ 4.14	2.85 %	73.88 %
		2015	18	$ 14.16	$ 5.27	$ 4.40	2.69 %	75.05 %
		2016	19	$ 14.12	$ 5.40	$ 4.10	2.51 %	74.71 %
		2017	19	$ 17.48	$ 5.70	$ 4.14	3.14 %	90.88 %
		2018	19	$ 17.47	$ 5.65	$ 4.00	2.98 %	92.26 %
	Labor Payment, Other Employees	2008	21	$ 30.11	$ 11.25	$ 9.53	5.28 %	172.45 %
		2009	21	$ 26.74	$ 11.48	$ 9.86	5.04 %	158.85 %
		2010	20	$ 31.66	$ 12.19	$ 9.46	5.89 %	172.56 %
		2011	20	$ 39.82	$ 12.53	$ 9.00	7.32 %	202.18 %
		2012	20	$ 40.71	$ 12.82	$ 9.59	7.81 %	205.27 %
		2013	18	$ 30.60	$ 11.81	$ 9.30	5.99 %	156.57 %
		2014	18	$ 32.20	$ 11.80	$ 8.89	6.11 %	158.66 %
		2015	18	$ 31.21	$ 11.62	$ 9.70	5.92 %	165.45 %
		2016	19	$ 31.59	$ 12.07	$ 9.16	5.62 %	167.15 %
		2017	19	$ 44.68	$ 14.58	$ 10.58	8.03 %	232.30 %
		2018	19	$ 47.76	$ 15.45	$ 10.93	8.16 %	252.28 %
	Labor Payment, Processing Employees	2008	22	$ 46.36	$ 16.98	$ 14.50	7.66 %	262.13 %
		2009	21	$ 40.34	$ 17.32	$ 14.88	7.60 %	239.69 %
		2010	20	$ 46.25	$ 17.80	$ 13.82	8.61 %	252.09 %
		2011	20	$ 56.64	$ 17.83	$ 12.80	10.41 %	287.58 %
		2012	20	$ 56.52	$ 17.80	$ 13.31	10.85 %	285.01 %
		2013	18	$ 42.32	$ 16.34	$ 12.86	8.29 %	216.56 %
		2014	18	$ 45.64	$ 16.73	$ 12.60	8.66 %	224.90 %
		2015	18	$ 40.98	$ 15.26	$ 12.74	7.77 %	217.26 %
		2016	19	$ 42.55	$ 16.26	$ 12.34	7.58 %	225.15 %
		2017	19	$ 60.05	$ 19.60	$ 14.22	10.80 %	312.21 %
		2018	19	$ 57.80	$ 18.70	$ 13.23	9.87 %	305.33 %
	Other Employment Related Costs	2008	22	$ 9.25	$ 3.39	$ 2.89	1.53 %	52.30 %
		2009	21	$ 8.76	$ 3.76	$ 3.23	1.65 %	52.06 %
		2010	20	$ 9.76	$ 3.76	$ 2.92	1.82 %	53.20 %
		2011	20	$ 13.01	$ 4.09	$ 2.94	2.39 %	66.04 %
		2012	20	$ 10.25	$ 3.23	$ 2.41	1.97 %	51.71 %
		2013	18	$ 10.89	$ 4.20	$ 3.31	2.13 %	55.71 %
		2014	18	$ 10.72	$ 3.93	$ 2.96	2.04 %	52.85 %
		2015	18	$ 11.37	$ 4.23	$ 3.54	2.16 %	60.29 %
		2016	19	$ 10.53	$ 4.02	$ 3.05	1.87 %	55.72 %
		2017	19	$ 12.65	$ 4.13	$ 2.99	2.27 %	65.75 %
		2018	19	$ 13.31	$ 4.30	$ 3.05	2.27 %	70.30 %

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Table 9.9: Continued

		Year	Vessels	Total Fleet Cost ($million)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Vessel	Fishing Gear	2008	19	$ 7.18	$ 2.90	$ 2.52	1.38 %	51.41 %
		2009	21	$ 9.97	$ 4.28	$ 3.68	1.88 %	59.25 %
		2010	20	$ 9.17	$ 3.53	$ 2.74	1.71 %	49.97 %
		2011	20	$ 10.06	$ 3.17	$ 2.27	1.85 %	51.07 %
		2012	19	$ 10.01	$ 3.17	$ 2.36	1.93 %	50.50 %
		2013	18	$ 8.98	$ 3.47	$ 2.73	1.76 %	45.97 %
		2014	18	$ 8.12	$ 2.98	$ 2.24	1.54 %	40.03 %
		2015	18	$ 9.45	$ 3.52	$ 2.94	1.79 %	50.10 %
		2016	14	$ 6.02	$ 2.84	$ 2.14	1.42 %	40.82 %
		2017	19	$ 8.73	$ 2.85	$ 2.07	1.57 %	45.37 %
		2018	19	$ 6.42	$ 2.08	$ 1.47	1.10 %	33.91 %
	Freight	2008	22	$ 1.59	$ 0.58	$ 0.50	0.26 %	8.98 %
		2009	21	$ 2.16	$ 0.93	$ 0.80	0.41 %	12.85 %
		2010	20	$ 1.75	$ 0.67	$ 0.52	0.33 %	9.53 %
		2011	20	$ 1.94	$ 0.61	$ 0.44	0.36 %	9.86 %
		2012	20	$ 1.94	$ 0.61	$ 0.46	0.37 %	9.78 %
		2013	18	$ 1.92	$ 0.74	$ 0.58	0.38 %	9.83 %
		2014	18	$ 2.42	$ 0.89	$ 0.67	0.46 %	11.94 %
		2015	18	$ 2.30	$ 0.85	$ 0.71	0.44 %	12.17 %
		2016	19	$ 1.76	$ 0.67	$ 0.51	0.31 %	9.34 %
		2017	17	$ 2.24	$ 0.81	$ 0.58	0.45 %	12.84 %
		2018	19	$ 3.05	$ 0.99	$ 0.70	0.52 %	16.13 %
	Lease Expenses	2008	1	$ *	$ *	$ *	* %	* %
		2009	5	$ 0.06	$ 0.08	$ 0.06	0.04 %	1.02 %
		2010	6	$ 0.15	$ 0.19	$ 0.13	0.08 %	2.39 %
		2011	7	$ 0.10	$ 0.13	$ 0.08	0.05 %	1.86 %
		2012	8	$ 0.12	$ 0.13	$ 0.08	0.06 %	1.82 %
		2013	6	$ 0.08	$ 0.11	$ 0.07	0.04 %	1.29 %
		2014	5	$ 0.11	$ 0.14	$ 0.10	0.07 %	1.91 %
		2015	5	$ 0.03	$ 0.05	$ 0.04	0.02 %	0.64 %
		2016	7	$ 0.08	$ 0.11	$ 0.08	0.04 %	1.33 %
		2017	9	$ 0.09	$ 0.07	$ 0.05	0.03 %	1.13 %
		2018	9	$ 0.09	$ 0.07	$ 0.04	0.03 %	1.07 %
	Repair and Maintenance	2008	22	$ 29.06	$ 10.65	$ 9.09	4.80 %	164.34 %
		2009	21	$ 32.33	$ 13.88	$ 11.93	6.09 %	192.07 %
		2010	20	$ 43.23	$ 16.64	$ 12.92	8.05 %	235.63 %
		2011	19	$ 37.86	$ 12.53	$ 8.99	7.23 %	200.97 %
		2012	20	$ 45.32	$ 14.27	$ 10.67	8.70 %	228.51 %
		2013	18	$ 37.52	$ 14.49	$ 11.40	7.35 %	191.98 %
		2014	18	$ 28.70	$ 10.52	$ 7.92	5.45 %	141.43 %
		2015	18	$ 32.53	$ 12.11	$ 10.11	6.17 %	172.47 %
		2016	19	$ 27.44	$ 10.49	$ 7.96	4.89 %	145.22 %
		2017	19	$ 30.98	$ 10.11	$ 7.33	5.57 %	161.06 %
		2018	19	$ 32.70	$ 10.58	$ 7.49	5.58 %	172.70 %

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Table 9.9: Continued

		Year	Vessels	Total Fleet Cost ($million)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Materials	Food and Provisions	2008	19	$ 7.16	$ 2.89	$ 2.52	1.37 %	51.25 %
		2009	18	$ 5.76	$ 2.78	$ 2.38	1.29 %	39.12 %
		2010	17	$ 5.25	$ 2.30	$ 1.79	1.16 %	33.35 %
		2011	17	$ 6.05	$ 2.13	$ 1.57	1.33 %	35.96 %
		2012	17	$ 6.00	$ 2.13	$ 1.63	1.39 %	35.30 %
		2013	15	$ 6.04	$ 2.69	$ 2.15	1.43 %	36.30 %
		2014	15	$ 6.36	$ 2.77	$ 2.03	1.47 %	36.62 %
		2015	15	$ 6.48	$ 2.81	$ 2.30	1.50 %	40.06 %
		2016	16	$ 6.87	$ 3.05	$ 2.23	1.45 %	41.90 %
		2017	14	$ 4.62	$ 2.02	$ 1.43	1.12 %	31.09 %
		2018	14	$ 4.36	$ 1.96	$ 1.33	1.00 %	30.62 %
	Fuel	2008	22	$ 52.09	$ 19.08	$ 16.29	8.61 %	294.54 %
		2009	21	$ 34.76	$ 14.92	$ 12.82	6.55 %	206.53 %
		2010	20	$ 39.51	$ 15.21	$ 11.80	7.35 %	215.33 %
		2011	20	$ 48.92	$ 15.39	$ 11.06	8.99 %	248.36 %
		2012	20	$ 50.28	$ 15.83	$ 11.84	9.65 %	253.52 %
		2013	18	$ 51.41	$ 19.85	$ 15.63	10.07 %	263.06 %
		2014	18	$ 50.92	$ 18.66	$ 14.05	9.66 %	250.91 %
		2015	18	$ 38.83	$ 14.46	$ 12.07	7.37 %	205.85 %
		2016	19	$ 31.01	$ 11.85	$ 8.99	5.52 %	164.09 %
		2017	19	$ 31.39	$ 10.24	$ 7.43	5.64 %	163.19 %
		2018	19	$ 38.48	$ 12.45	$ 8.81	6.57 %	203.23 %
	Lubrication and Fluids	2008	22	$ 3.14	$ 1.15	$ 0.98	0.52 %	17.76 %
		2009	21	$ 2.40	$ 1.03	$ 0.89	0.45 %	14.26 %
		2010	20	$ 5.98	$ 2.30	$ 1.78	1.11 %	32.57 %
		2011	20	$ 8.68	$ 2.73	$ 1.96	1.59 %	44.04 %
		2012	19	$ 2.53	$ 0.80	$ 0.60	0.49 %	12.77 %
		2013	18	$ 2.82	$ 1.09	$ 0.86	0.55 %	14.41 %
		2014	18	$ 2.48	$ 0.91	$ 0.69	0.47 %	12.24 %
		2015	18	$ 2.70	$ 1.00	$ 0.84	0.51 %	14.29 %
		2016	19	$ 2.34	$ 0.90	$ 0.68	0.42 %	12.41 %
		2017	19	$ 2.60	$ 0.85	$ 0.61	0.47 %	13.49 %
		2018	19	$ 2.41	$ 0.78	$ 0.55	0.41 %	12.71 %
	Product and Packaging Materials	2008	22	$ 4.88	$ 1.79	$ 1.53	0.81 %	27.58 %
		2009	21	$ 3.72	$ 1.60	$ 1.37	0.70 %	22.11 %
		2010	20	$ 4.35	$ 1.67	$ 1.30	0.81 %	23.70 %
		2011	20	$ 4.99	$ 1.57	$ 1.13	0.92 %	25.33 %
		2012	20	$ 5.43	$ 1.71	$ 1.28	1.04 %	27.39 %
		2013	18	$ 5.04	$ 1.95	$ 1.53	0.99 %	25.80 %
		2014	18	$ 5.60	$ 2.05	$ 1.54	1.06 %	27.57 %
		2015	18	$ 4.20	$ 1.57	$ 1.31	0.80 %	22.29 %
		2016	19	$ 4.53	$ 1.73	$ 1.31	0.81 %	23.96 %
		2017	19	$ 4.36	$ 1.42	$ 1.03	0.78 %	22.67 %
		2018	19	$ 4.16	$ 1.34	$ 0.95	0.71 %	21.96 %

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Table 9.9: Continued

		Year	Vessels	Total Fleet Cost ($million)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Materials	Raw Fish Purchases	2008	2	$ *	$ *	$ *	* %	* %
		2010	1	$ *	$ *	$ *	* %	* %
		2011	1	$ *	$ *	$ *	* %	* %
		2012	1	$ *	$ *	$ *	* %	* %
		2013	1	$ *	$ *	$ *	* %	* %
		2015	4	$ *	$ *	$ *	* %	* %
		2016	5	$ 3.54	$ 3.50	$ 2.62	2.26 %	47.28 %
		2017	5	$ 2.93	$ 2.74	$ 2.10	2.05 %	45.75 %
		2018	6	$ 2.58	$ 2.03	$ 1.48	1.49 %	34.60 %
Fees	Cooperative Costs	2008	16	$ 0.56	$ 0.26	$ 0.23	0.12 %	3.81 %
		2009	15	$ 1.23	$ 0.69	$ 0.61	0.30 %	9.66 %
		2010	14	$ 1.15	$ 0.57	$ 0.44	0.28 %	8.01 %
		2011	16	$ 1.41	$ 0.56	$ 0.41	0.31 %	8.91 %
		2012	16	$ 1.26	$ 0.53	$ 0.38	0.30 %	7.93 %
		2013	14	$ 1.14	$ 0.55	$ 0.44	0.28 %	7.28 %
		2014	14	$ 1.00	$ 0.48	$ 0.35	0.24 %	6.34 %
		2015	14	$ 1.52	$ 0.73	$ 0.62	0.36 %	10.19 %
		2016	15	$ 1.39	$ 0.69	$ 0.55	0.31 %	9.15 %
		2017	18	$ 1.26	$ 0.45	$ 0.33	0.24 %	7.15 %
		2018	19	$ 1.99	$ 0.64	$ 0.45	0.34 %	10.49 %
	Fish Tax	2008	22	$ 3.23	$ 1.18	$ 1.01	0.53 %	18.25 %
		2009	21	$ 3.43	$ 1.47	$ 1.26	0.65 %	20.35 %
		2010	20	$ 2.17	$ 0.84	$ 0.65	0.40 %	11.84 %
		2011	20	$ 2.29	$ 0.72	$ 0.52	0.42 %	11.63 %
		2012	20	$ 3.36	$ 1.06	$ 0.79	0.64 %	16.95 %
		2013	18	$ 3.39	$ 1.31	$ 1.03	0.66 %	17.33 %
		2014	18	$ 2.89	$ 1.06	$ 0.80	0.55 %	14.24 %
		2015	18	$ 3.17	$ 1.18	$ 0.98	0.60 %	16.79 %
		2016	19	$ 4.08	$ 1.56	$ 1.18	0.73 %	21.61 %
		2017	19	$ 3.94	$ 1.28	$ 0.93	0.71 %	20.47 %
		2018	19	$ 4.94	$ 1.60	$ 1.13	0.84 %	26.08 %
	Observer	2008	22	$ 4.94	$ 1.81	$ 1.54	0.82 %	27.91 %
		2009	21	$ 4.09	$ 1.76	$ 1.51	0.77 %	24.32 %
		2010	20	$ 4.15	$ 1.60	$ 1.24	0.77 %	22.61 %
		2011	20	$ 4.01	$ 1.26	$ 0.91	0.74 %	20.38 %
		2012	19	$ 3.92	$ 1.24	$ 0.92	0.75 %	19.76 %
		2013	18	$ 3.93	$ 1.52	$ 1.19	0.77 %	20.10 %
		2014	18	$ 4.02	$ 1.47	$ 1.11	0.76 %	19.80 %
		2015	18	$ 4.37	$ 1.63	$ 1.36	0.83 %	23.14 %
		2016	19	$ 4.36	$ 1.67	$ 1.26	0.78 %	23.07 %
		2017	19	$ 4.28	$ 1.40	$ 1.01	0.77 %	22.26 %
		2018	19	$ 4.37	$ 1.41	$ 1.00	0.75 %	23.09 %

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Table 9.9: Continued

		Year	Vessels	Total Fleet Cost ($million)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Fees	Quota Royalties	2008	2	$ *	$ *	$ *	* %	* %
		2009	4	$ *	$ *	$ *	* %	* %
		2010	2	$ *	$ *	$ *	* %	* %
		2011	8	$ 1.37	$ 0.82	$ 0.61	0.59 %	14.01 %
		2012	4	$ *	$ *	$ *	* %	* %
		2013	3	$ *	$ *	$ *	* %	* %
		2014	8	$ 1.07	$ 0.74	$ 0.56	0.43 %	10.05 %
		2015	7	$ 0.79	$ 0.73	$ 0.61	0.38 %	10.14 %
		2016	9	$ 0.39	$ 0.26	$ 0.21	0.14 %	3.59 %
		2017	5	$ 0.28	$ 0.30	$ 0.25	0.20 %	5.46 %
		2018	4	$ *	$ *	$ *	* %	* %
Overhead	Freight and Storage	2008	9	$ 17.61	$ 14.02	$ 13.49	7.19 %	258.29 %
		2009	10	$ 13.82	$ 11.28	$ 10.86	5.27 %	169.40 %
		2010	8	$ 15.91	$ 11.80	$ 10.14	7.10 %	181.99 %
		2011	4	$ *	$ *	$ *	* %	* %
		2012	4	$ *	$ *	$ *	* %	* %
		2013	4	$ *	$ *	$ *	* %	* %
		2014	7	$ 21.14	$ 17.05	$ 14.13	9.71 %	241.69 %
		2015	10	$ 31.78	$ 19.91	$ 18.20	10.75 %	288.06 %
		2016	10	$ 31.88	$ 20.46	$ 17.19	10.43 %	283.10 %
		2017	13	$ 37.86	$ 16.43	$ 12.57	10.07 %	273.31 %
		2018	10	$ 28.25	$ 14.00	$ 10.51	9.62 %	248.39 %
	General Administrative Cost	2008	22	$ 22.37	$ 8.20	$ 7.00	3.70 %	126.48 %
		2009	21	$ 17.37	$ 7.46	$ 6.41	3.27 %	103.20 %
		2010	16	$ 12.68	$ 5.78	$ 4.71	3.01 %	83.11 %
		2011	16	$ 29.53	$ 10.92	$ 8.09	6.80 %	178.51 %
		2012	20	$ 29.60	$ 9.32	$ 6.97	5.68 %	149.28 %
		2013	18	$ 13.99	$ 5.40	$ 4.25	2.74 %	71.57 %
		2014	16	$ 21.30	$ 8.30	$ 6.27	4.56 %	111.80 %
		2015	11	$ 18.01	$ 9.89	$ 8.72	5.74 %	149.00 %
		2016	11	$ 19.80	$ 10.93	$ 8.61	6.08 %	164.27 %
		2017	15	$ 26.73	$ 10.35	$ 7.97	6.17 %	173.85 %
		2018	15	$ 28.70	$ 11.04	$ 8.26	6.19 %	187.67 %
	Insurance	2008	22	$ 12.45	$ 4.56	$ 3.90	2.06 %	70.41 %
		2009	21	$ 12.29	$ 5.28	$ 4.54	2.32 %	73.05 %
		2010	20	$ 11.71	$ 4.51	$ 3.50	2.18 %	63.81 %
		2011	20	$ 14.86	$ 4.68	$ 3.36	2.73 %	75.47 %
		2012	20	$ 16.76	$ 5.28	$ 3.95	3.22 %	84.53 %
		2013	18	$ 9.86	$ 3.81	$ 3.00	1.93 %	50.47 %
		2014	17	$ 13.19	$ 5.10	$ 3.84	2.64 %	68.41 %
		2015	18	$ 12.87	$ 4.79	$ 4.00	2.44 %	68.22 %
		2016	19	$ 17.40	$ 6.65	$ 5.05	3.10 %	92.10 %
		2017	19	$ 9.31	$ 3.04	$ 2.20	1.67 %	48.42 %
		2018	19	$ 9.97	$ 3.23	$ 2.28	1.70 %	52.67 %

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Table 9.9: Continued

	Year	Vessels	Total Fleet Cost ($million)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
	2008	22	$ 272.93	$ 100.00	$ 85.38	45.11 %	1,543.30 %
	2009	21	$ 232.98	$ 100.00	$ 85.96	43.88 %	1,384.27 %
	2010	20	$ 259.83	$ 100.00	$ 77.62	48.37 %	1,416.13 %
	2011	20	$ 317.76	$ 100.00	$ 71.82	58.38 %	1,613.23 %
All Annual Expenses	2012	20	$ 317.60	$ 100.00	$ 74.79	60.95 %	1,601.51 %
	2013	18	$ 258.99	$ 100.00	$ 78.73	50.74 %	1,325.31 %
	2014	18	$ 272.87	$ 100.00	$ 75.32	51.79 %	1,344.65 %
	2015	18	$ 268.61	$ 100.00	$ 83.51	50.95 %	1,423.97 %
	2016	19	$ 261.69	$ 100.00	$ 75.91	46.60 %	1,384.77 %
	2017	19	$ 306.44	$ 100.00	$ 72.55	55.10 %	1,593.31 %
	2018	19	$ 309.15	$ 100.00	$ 70.77	52.79 %	1,632.95 %

Notes: All dollar values are inflation-adjusted to 2018-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)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Labor	Labor Payment, Fishing Crew	2008	22	$ 760	$ 6.20	$ 5.07	3.13 %	100.72 %
		2009	21	$ 685	$ 5.33	$ 4.78	3.01 %	77.46 %
		2010	20	$ 693	$ 5.53	$ 4.10	2.90 %	79.98 %
		2011	20	$ 956	$ 5.34	$ 3.52	3.29 %	83.78 %
		2012	20	$ 831	$ 5.62	$ 3.64	3.06 %	82.58 %
		2013	18	$ 696	$ 5.15	$ 4.18	2.54 %	67.03 %
		2014	18	$ 824	$ 5.05	$ 4.00	2.69 %	68.29 %
		2015	18	$ 747	$ 4.90	$ 4.57	2.56 %	77.76 %
		2016	19	$ 720	$ 5.37	$ 4.21	2.62 %	76.22 %
		2017	19	$ 873	$ 5.22	$ 4.30	3.00 %	93.29 %
		2018	19	$ 1,009	$ 5.38	$ 4.00	3.41 %	95.18 %
	Labor Payment, Other Employees	2008	21	$ 1,259	$ 10.57	$ 10.06	4.46 %	168.38 %
		2009	21	$ 1,135	$ 12.28	$ 11.64	4.86 %	168.51 %
		2010	20	$ 1,563	$ 13.36	$ 11.68	5.72 %	189.14 %
		2011	20	$ 2,093	$ 14.04	$ 10.64	7.00 %	210.59 %
		2012	20	$ 2,209	$ 13.68	$ 10.72	7.58 %	212.77 %
		2013	18	$ 1,734	$ 11.84	$ 10.28	5.97 %	167.05 %
		2014	18	$ 1,731	$ 12.49	$ 9.70	5.88 %	161.53 %
		2015	18	$ 1,553	$ 11.77	$ 10.50	5.00 %	168.24 %
		2016	19	$ 1,497	$ 13.27	$ 11.16	5.28 %	190.78 %
		2017	19	$ 1,973	$ 13.92	$ 10.81	6.79 %	225.18 %
		2018	19	$ 2,254	$ 15.65	$ 11.38	9.05 %	247.38 %
	Labor Payment, Processing Employees	2008	22	$ 2,109	$ 16.84	$ 14.73	8.72 %	265.54 %
		2009	21	$ 1,938	$ 16.16	$ 15.08	8.35 %	234.99 %
		2010	20	$ 2,073	$ 17.42	$ 13.77	8.74 %	256.81 %
		2011	20	$ 2,818	$ 18.09	$ 13.06	9.69 %	298.45 %
		2012	20	$ 2,786	$ 18.50	$ 14.23	9.75 %	298.73 %
		2013	18	$ 2,078	$ 15.46	$ 13.12	7.49 %	217.81 %
		2014	18	$ 2,356	$ 16.42	$ 12.59	7.78 %	229.70 %
		2015	18	$ 2,075	$ 14.74	$ 12.86	7.08 %	209.41 %
		2016	19	$ 2,091	$ 16.89	$ 12.77	7.56 %	220.18 %
		2017	19	$ 3,215	$ 18.86	$ 14.74	10.62 %	311.44 %
		2018	19	$ 3,141	$ 18.67	$ 13.52	9.65 %	304.69 %
	Other Employment Related Costs	2008	22	$ 290	$ 3.46	$ 2.64	1.04 %	54.85 %
		2009	21	$ 377	$ 3.89	$ 3.11	1.29 %	52.92 %
		2010	20	$ 448	$ 3.72	$ 2.89	1.78 %	50.68 %
		2011	20	$ 570	$ 3.67	$ 2.40	1.83 %	52.73 %
		2012	20	$ 542	$ 3.24	$ 2.22	1.93 %	47.35 %
		2013	18	$ 631	$ 4.14	$ 3.15	2.16 %	50.83 %
		2014	18	$ 580	$ 4.07	$ 2.94	2.14 %	51.66 %
		2015	18	$ 620	$ 4.40	$ 3.59	2.17 %	56.10 %
		2016	19	$ 577	$ 4.43	$ 3.15	2.03 %	54.63 %
		2017	19	$ 660	$ 4.52	$ 3.15	2.25 %	69.96 %
		2018	19	$ 676	$ 4.60	$ 3.19	2.25 %	71.70 %

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Table 9.10: Continued

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Vessel	Fishing Gear	2008	19	$ 300	$ 3.11	$ 2.82	1.11 %	51.85 %
		2009	21	$ 431	$ 3.89	$ 3.30	1.70 %	58.42 %
		2010	20	$ 452	$ 3.80	$ 2.76	1.70 %	55.42 %
		2011	20	$ 382	$ 2.42	$ 1.64	1.32 %	35.24 %
		2012	19	$ 413	$ 2.00	$ 1.41	1.55 %	31.36 %
		2013	18	$ 499	$ 3.51	$ 2.61	1.66 %	42.75 %
		2014	18	$ 412	$ 2.31	$ 2.02	1.35 %	32.85 %
		2015	18	$ 415	$ 2.95	$ 2.86	1.36 %	39.86 %
		2016	14	$ 361	$ 2.13	$ 1.83	1.22 %	30.80 %
		2017	19	$ 409	$ 2.03	$ 1.48	1.38 %	31.77 %
		2018	19	$ 305	$ 1.86	$ 1.32	1.07 %	29.61 %
	Freight	2008	22	$ 51	$ 0.50	$ 0.44	0.19 %	10.31 %
		2009	21	$ 59	$ 0.67	$ 0.69	0.29 %	10.65 %
		2010	20	$ 78	$ 0.64	$ 0.52	0.31 %	9.87 %
		2011	20	$ 68	$ 0.64	$ 0.44	0.25 %	10.03 %
		2012	20	$ 70	$ 0.57	$ 0.45	0.27 %	9.55 %
		2013	18	$ 90	$ 0.69	$ 0.54	0.38 %	9.38 %
		2014	18	$ 113	$ 0.78	$ 0.61	0.37 %	10.55 %
		2015	18	$ 114	$ 0.82	$ 0.56	0.43 %	10.45 %
		2016	19	$ 61	$ 0.80	$ 0.56	0.24 %	10.63 %
		2017	17	$ 112	$ 0.65	$ 0.40	0.35 %	10.26 %
		2018	19	$ 131	$ 0.78	$ 0.48	0.42 %	10.51 %
	Lease Expenses	2008	1	$ *	$ *	$ *	* %	* %
		2009	5	$ 5	$ 0.05	$ 0.05	0.02 %	0.58 %
		2010	6	$ 6	$ 0.05	$ 0.04	0.02 %	0.62 %
		2011	7	$ 7	$ 0.13	$ 0.09	0.03 %	1.98 %
		2012	8	$ 11	$ 0.13	$ 0.09	0.05 %	2.04 %
		2013	6	$ 8	$ 0.08	$ 0.05	0.03 %	0.96 %
		2014	5	$ 18	$ 0.13	$ 0.11	0.06 %	2.10 %
		2015	5	$ 3	$ 0.03	$ 0.02	0.01 %	0.35 %
		2016	7	$ 6	$ 0.08	$ 0.07	0.03 %	1.14 %
		2017	9	$ 9	$ 0.08	$ 0.04	0.03 %	0.92 %
		2018	9	$ 7	$ 0.04	$ 0.03	0.02 %	0.65 %
	Repair and Maintenance	2008	22	$ 1,029	$ 10.46	$ 9.54	4.43 %	167.03 %
		2009	21	$ 1,299	$ 13.41	$ 11.11	4.51 %	192.89 %
		2010	20	$ 1,881	$ 14.50	$ 10.37	6.73 %	177.95 %
		2011	19	$ 1,597	$ 11.53	$ 9.03	5.98 %	184.36 %
		2012	20	$ 1,857	$ 16.63	$ 10.91	6.76 %	242.95 %
		2013	18	$ 1,990	$ 15.02	$ 11.46	7.32 %	195.44 %
		2014	18	$ 1,573	$ 10.91	$ 8.17	5.51 %	151.61 %
		2015	18	$ 1,642	$ 9.19	$ 8.09	5.49 %	136.15 %
		2016	19	$ 1,040	$ 8.64	$ 6.66	3.19 %	127.21 %
		2017	19	$ 1,494	$ 8.16	$ 6.03	4.97 %	140.48 %
		2018	19	$ 1,627	$ 9.86	$ 6.94	5.85 %	167.72 %

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Table 9.10: Continued

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Materials	Food and Provisions	2008	19	$ 301	$ 2.69	$ 2.63	1.22 %	55.54 %
		2009	18	$ 301	$ 2.80	$ 2.66	1.16 %	39.19 %
		2010	17	$ 311	$ 2.59	$ 2.00	1.16 %	34.14 %
		2011	17	$ 375	$ 2.32	$ 1.60	1.28 %	34.49 %
		2012	17	$ 363	$ 1.99	$ 1.63	1.28 %	30.67 %
		2013	15	$ 359	$ 2.40	$ 2.01	1.29 %	31.06 %
		2014	15	$ 303	$ 2.51	$ 1.79	1.02 %	32.71 %
		2015	15	$ 349	$ 2.77	$ 2.34	1.21 %	35.17 %
		2016	16	$ 342	$ 3.03	$ 2.10	1.16 %	36.53 %
		2017	14	$ 330	$ 1.98	$ 1.53	1.13 %	32.87 %
		2018	14	$ 296	$ 2.15	$ 1.48	1.01 %	33.62 %
	Fuel	2008	22	$ 2,430	$ 20.57	$ 18.29	8.87 %	319.73 %
		2009	21	$ 1,667	$ 15.90	$ 14.23	6.41 %	218.28 %
		2010	20	$ 2,059	$ 16.82	$ 13.09	7.61 %	219.32 %
		2011	20	$ 2,332	$ 17.45	$ 11.47	8.27 %	234.29 %
		2012	20	$ 2,602	$ 15.97	$ 11.81	8.76 %	251.17 %
		2013	18	$ 2,898	$ 19.36	$ 17.10	9.81 %	267.38 %
		2014	18	$ 2,726	$ 19.05	$ 14.09	9.60 %	243.67 %
		2015	18	$ 1,913	$ 13.78	$ 12.14	7.18 %	190.41 %
		2016	19	$ 1,484	$ 11.48	$ 9.16	4.70 %	149.16 %
		2017	19	$ 1,540	$ 10.07	$ 7.63	5.77 %	157.01 %
		2018	19	$ 2,138	$ 12.49	$ 8.74	6.15 %	197.31 %
	Lubrication and Fluids	2008	22	$ 96	$ 0.91	$ 0.84	0.33 %	15.97 %
		2009	21	$ 117	$ 1.05	$ 0.80	0.42 %	13.90 %
		2010	20	$ 106	$ 0.90	$ 0.69	0.40 %	10.94 %
		2011	20	$ 122	$ 0.89	$ 0.60	0.46 %	13.03 %
		2012	19	$ 122	$ 0.67	$ 0.60	0.50 %	13.15 %
		2013	18	$ 142	$ 0.96	$ 0.85	0.50 %	13.92 %
		2014	18	$ 113	$ 0.85	$ 0.58	0.40 %	10.57 %
		2015	18	$ 123	$ 1.05	$ 0.83	0.46 %	13.83 %
		2016	19	$ 116	$ 0.87	$ 0.67	0.36 %	12.24 %
		2017	19	$ 137	$ 0.89	$ 0.55	0.47 %	14.04 %
		2018	19	$ 120	$ 0.65	$ 0.47	0.42 %	10.57 %
	Product and Packaging Materials	2008	22	$ 229	$ 1.74	$ 1.53	0.87 %	28.60 %
		2009	21	$ 166	$ 1.43	$ 1.32	0.63 %	21.42 %
		2010	20	$ 190	$ 1.54	$ 1.16	0.79 %	22.60 %
		2011	20	$ 274	$ 1.51	$ 1.12	0.90 %	22.55 %
		2012	20	$ 264	$ 1.64	$ 1.23	0.89 %	23.71 %
		2013	18	$ 233	$ 1.68	$ 1.36	0.94 %	22.19 %
		2014	18	$ 295	$ 1.80	$ 1.56	0.93 %	24.84 %
		2015	18	$ 205	$ 1.50	$ 1.30	0.69 %	19.63 %
		2016	19	$ 220	$ 1.74	$ 1.31	0.75 %	24.11 %
		2017	19	$ 226	$ 1.39	$ 1.08	0.72 %	22.13 %
		2018	19	$ 208	$ 1.31	$ 0.92	0.69 %	22.27 %

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Table 9.10: Continued

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Materials	Raw Fish Purchases	2008	2	$ *	$ *	$ *	* %	* %
		2010	1	$ *	$ *	$ *	* %	* %
		2011	1	$ *	$ *	$ *	* %	* %
		2012	1	$ *	$ *	$ *	* %	* %
		2013	1	$ *	$ *	$ *	* %	* %
		2015	4	$ *	$ *	$ *	* %	* %
		2016	5	$ 439	$ 2.02	$ 1.74	1.45 %	29.02 %
		2017	5	$ 626	$ 2.71	$ 1.92	2.12 %	45.48 %
		2018	6	$ 471	$ 2.13	$ 1.54	1.64 %	37.10 %
Fees	Cooperative Costs	2008	16	$ 30	$ 0.34	$ 0.25	0.11 %	4.22 %
		2009	15	$ 78	$ 0.79	$ 0.64	0.27 %	10.00 %
		2010	14	$ 81	$ 0.66	$ 0.51	0.33 %	8.95 %
		2011	16	$ 87	$ 0.58	$ 0.40	0.29 %	8.45 %
		2012	16	$ 87	$ 0.58	$ 0.44	0.35 %	8.84 %
		2013	14	$ 96	$ 0.59	$ 0.46	0.30 %	7.83 %
		2014	14	$ 70	$ 0.59	$ 0.43	0.24 %	7.87 %
		2015	14	$ 72	$ 0.59	$ 0.46	0.23 %	7.94 %
		2016	15	$ 76	$ 0.71	$ 0.53	0.26 %	9.19 %
		2017	18	$ 71	$ 0.43	$ 0.28	0.26 %	7.30 %
		2018	19	$ 111	$ 0.66	$ 0.45	0.34 %	10.87 %
	Fish Tax	2008	22	$ 151	$ 1.15	$ 1.05	0.58 %	20.56 %
		2009	21	$ 157	$ 1.42	$ 1.28	0.69 %	17.88 %
		2010	20	$ 91	$ 0.79	$ 0.66	0.32 %	11.59 %
		2011	20	$ 109	$ 0.79	$ 0.55	0.35 %	11.10 %
		2012	20	$ 149	$ 1.10	$ 0.83	0.63 %	17.23 %
		2013	18	$ 168	$ 1.36	$ 1.04	0.59 %	17.30 %
		2014	18	$ 159	$ 1.10	$ 0.86	0.55 %	14.63 %
		2015	18	$ 159	$ 1.20	$ 1.02	0.51 %	17.92 %
		2016	19	$ 224	$ 1.84	$ 1.20	0.79 %	22.97 %
		2017	19	$ 160	$ 1.31	$ 1.04	0.56 %	21.46 %
		2018	19	$ 202	$ 1.66	$ 1.17	0.67 %	26.48 %
	Observer	2008	22	$ 210	$ 1.57	$ 1.40	0.79 %	25.39 %
		2009	21	$ 195	$ 1.90	$ 1.60	0.78 %	24.75 %
		2010	20	$ 213	$ 1.75	$ 1.31	0.78 %	21.03 %
		2011	20	$ 213	$ 1.33	$ 0.90	0.72 %	21.07 %
		2012	19	$ 205	$ 1.19	$ 0.94	0.75 %	19.69 %
		2013	18	$ 218	$ 1.46	$ 1.23	0.75 %	20.80 %
		2014	18	$ 221	$ 1.53	$ 1.23	0.77 %	19.97 %
		2015	18	$ 233	$ 1.57	$ 1.40	0.79 %	21.54 %
		2016	19	$ 229	$ 1.58	$ 1.27	0.76 %	23.11 %
		2017	19	$ 227	$ 1.51	$ 1.05	0.73 %	21.87 %
		2018	19	$ 218	$ 1.58	$ 1.07	0.74 %	23.73 %

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Table 9.10: Continued

		Year	Vessels	Cost Per Vessel, Median ($1,000)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
Fees	Quota Royalties	2008	2	$ *	$ *	$ *	* %	* %
		2009	4	$ *	$ *	$ *	* %	* %
		2010	2	$ *	$ *	$ *	* %	* %
		2011	8	$ 78	$ 0.39	$ 0.29	0.25 %	5.96 %
		2012	4	$ *	$ *	$ *	* %	* %
		2013	3	$ *	$ *	$ *	* %	* %
		2014	8	$ 173	$ 0.75	$ 0.51	0.56 %	10.36 %
		2015	7	$ 12	$ 0.10	$ 0.09	0.04 %	1.32 %
		2016	9	$ 45	$ 0.18	$ 0.14	0.14 %	2.68 %
		2017	5	$ 32	$ 0.17	$ 0.14	0.11 %	2.68 %
		2018	4	$ *	$ *	$ *	* %	* %
Overhead	Freight and Storage	2008	9	$ 2,254	$ 14.38	$ 14.24	8.02 %	265.40 %
		2009	10	$ 280	$ 4.34	$ 4.66	1.05 %	73.13 %
		2010	8	$ 1,592	$ 8.40	$ 7.19	5.02 %	140.45 %
		2011	4	$ *	$ *	$ *	* %	* %
		2012	4	$ *	$ *	$ *	* %	* %
		2013	4	$ *	$ *	$ *	* %	* %
		2014	7	$ 3,083	$ 18.28	$ 16.53	9.54 %	288.63 %
		2015	10	$ 3,100	$ 20.04	$ 18.35	10.53 %	290.22 %
		2016	10	$ 2,916	$ 20.60	$ 17.02	9.92 %	285.84 %
		2017	13	$ 2,878	$ 16.13	$ 12.54	9.28 %	277.90 %
		2018	10	$ 3,129	$ 14.95	$ 11.56	11.16 %	264.70 %
	General Administrative Cost	2008	22	$ 503	$ 5.20	$ 4.75	2.00 %	86.15 %
		2009	21	$ 790	$ 8.78	$ 7.72	2.75 %	123.93 %
		2010	16	$ 806	$ 6.27	$ 4.42	3.37 %	78.73 %
		2011	16	$ 1,264	$ 5.90	$ 4.46	4.10 %	92.30 %
		2012	20	$ 777	$ 4.69	$ 3.91	3.14 %	74.01 %
		2013	18	$ 579	$ 4.68	$ 4.15	2.40 %	63.69 %
		2014	16	$ 1,324	$ 8.27	$ 7.18	4.34 %	111.77 %
		2015	11	$ 1,410	$ 9.62	$ 8.08	6.03 %	130.76 %
		2016	11	$ 1,833	$ 11.65	$ 8.42	6.62 %	167.58 %
		2017	15	$ 1,776	$ 10.34	$ 8.10	5.95 %	166.62 %
		2018	15	$ 1,797	$ 9.24	$ 7.12	6.44 %	171.43 %
	Insurance	2008	22	$ 519	$ 3.95	$ 3.87	1.83 %	70.23 %
		2009	21	$ 509	$ 5.41	$ 4.65	1.73 %	70.94 %
		2010	20	$ 547	$ 4.55	$ 3.34	2.01 %	57.64 %
		2011	20	$ 547	$ 3.59	$ 2.50	1.78 %	51.63 %
		2012	20	$ 622	$ 4.12	$ 3.05	2.35 %	60.74 %
		2013	18	$ 583	$ 3.87	$ 3.00	1.87 %	52.60 %
		2014	17	$ 732	$ 5.67	$ 3.62	2.55 %	71.86 %
		2015	18	$ 480	$ 3.82	$ 3.43	1.58 %	51.91 %
		2016	19	$ 447	$ 4.17	$ 3.31	1.53 %	56.13 %
		2017	19	$ 432	$ 2.98	$ 2.55	1.39 %	46.60 %
		2018	19	$ 441	$ 3.44	$ 2.71	1.33 %	55.91 %

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Table 9.10: Continued

	Year	Vessels	Cost Per Vessel, Median ($1,000)	Percent Of Total Expenses	Percent Of Gross Revenue	Cost Per Vessel-day ($1000)	Cost Per 1000 T ($)
All Annual Expenses	2008	22	$ 11,832	$ 100.00	$ 87.28	49.98 %	1,668.96 %
	2009	21	$ 10,242	$ 100.00	$ 82.96	41.30 %	1,396.41 %
	2010	20	$ 11,657	$ 100.00	$ 76.09	48.19 %	1,379.36 %
	2011	20	$ 15,780	$ 100.00	$ 70.98	61.23 %	1,581.96 %
	2012	20	$ 17,828	$ 100.00	$ 79.82	66.94 %	1,578.48 %
	2013	18	$ 13,359	$ 100.00	$ 76.92	52.38 %	1,339.98 %
	2014	18	$ 14,871	$ 100.00	$ 75.93	52.76 %	1,338.90 %
	2015	18	$ 14,684	$ 100.00	$ 86.87	51.77 %	1,362.72 %
	2016	19	$ 12,948	$ 100.00	$ 77.01	42.67 %	1,410.68 %
	2017	19	$ 15,461	$ 100.00	$ 79.18	57.55 %	1,586.52 %
	2018	19	$ 18,508	$ 100.00	$ 73.38	58.05 %	1,635.85 %

Notes: All dollar values are inflation-adjusted to 2018-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 11-year period in terms of a high-level income statement analysis, summarizing and synthesizing 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.[13] 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 $446 million during 2018, $199 million remained as estimated gross income after deducting aggregate operating costs, increasing only slightly from 2017 after quite volatile year-on-year variation in each of the previous 10 years. While 2018 saw the second highest gross revenue in the 11-year period, gross income reached it's highest value to-date in direct value and remained at near-peak residual percentage terms at 45% of gross revenue (compared to an average of 36.6% gross residual from 2008 to 2015). Despite substantially increased (labor and non-labor) operating costs reported for 2018 of $248 million, the decline in overhead expenses to $68 million (15% of gross revenue), aggregate fleet operating income in 2018 was the highest value to-date in both direct value at $130.5 million, and residual percentage terms at 29.2% of gross revenue. Cumulatively since 2008, these results represent a total $4.099 billion in gross revenue for the sector, returning 23% over the period for a total of $951 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 2017 to $24 million during 2018, the highest median gross revenue to-date. Median gross income has varied from $3 million to $10 million after deducting operating costs, with gross return rate varying from 24% in 2009 to 44% of gross revenue in 2016. With median labor costs (aggregated over labor categories) stable during 2018 at $7.6 million, while median non-labor operating costs in

[13] 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.

2018 increased to \$5.7 million, median gross income increased 14% from 2017 to \$9.95 million. After deducting overhead expenses, which declined slightly to \$4.05 million, median operating income for 2018 increased by 42% from 2017 to \$5.04 million, 26.6% of median gross revenue.

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.[14] 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, new construction, 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 non-routine expenditures, other than where necessary to avoid disclosure of confidential information. 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.[15]

Combined capital expenditures in total for the fleet have varied between \$9 million and \$20 million prior to 2017, but nearly tripled from \$13 million in 2016 to \$37 million in both 2017 and 2018, and nearly twice the highest previous value of \$19.7 million reported in 2012. Fleet aggregate capital expenditures on fishing equipment increased 28% during 2018, to \$4.3 million, and expenditures on vessel and equipment (exclusive of fishing and processing equipment) during 2018 reached \$13.5 million, both representing the highest level of investment reported to date for the respective category. Fleet aggregate values for other capital investment categories cannot be reported for 2018 due to confidentiality. On a median vessel basis, combined capital expenditures have varied between \$316 thousand and \$477 thousand prior to 2017, declined to \$271 thousand in 2017, and increased to \$645 thousand in 2018. Capital expenditures in vessel and other onboard equipment (including purchases and improvements in vessel capital exclusive of fishing and processing equipment) are the most

[14] 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.

[15] 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.

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 high values for median expenditures for those years. Seventeen vessels reported such investment in 2018, with a median of $205 thousand, declining slightly from 2017.

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 vessels at a given time, by labor category. Total fishing crew positions for the fleet in aggregate was 99 during 2018, and the total number of individuals participating as crew was 178, both declining to the lowest level reported over the 11-year period. Median crew positions per vessel has remained constant at 6, while the median number of distinct crew members declined to 8 in 2018. In contrast, processing employment in aggregate across the fleet increased in terms of number of processing positions, up from 504 in 2017 to 526, with the number of distinct persons employed increasing from 1,533 to 1,595. 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 2018, remained within the historic range of 23-25. Employment of other types of positions across the fleet, which include officers, engineers, and others involved in onboard management and record-keeping, increased to 165 during 2018, while the number of distinct persons employed in such positions declined, from 446 to 372.

Table 9.14 reports the spatial distribution of Amendment 80 crew employment and wages by community of crew residence for the years 2015 to 2018. The predominant location of residence for Amendment 80 vessel crew members (not including individuals employed solely in processing plants onboard the vessels) is the Seattle Metropolitan Statistical Area (MSA)[16]. During 2018, 373 of the total 538 crew members (69%) identified in EDR reporting were residents of the Seattle MSA, which is the highest proportion of annual crew employment associated with this location in the 4 years of data available, which has increased each year, from 52% in 2015 to 64% in 2017. The estimated income contribution to the Seattle MSA area from direct wages paid to vessel crew members during 2018 is $46 million, and $52 million to the state of Washington overall, which accounted for 419 (78%) of all crew members for the year. Alaska residents have accounted for between 3% and 8% of Amendment 80 crew employment over the 4-year period, declining to 16 of 538 (3%) total crew members in 2018, and accounting for an estimated $2 million in direct crew income paid to residents of Alaska for the year. The community of Unalaska/Dutch Harbor is the only Alaska locality that has accounted for at least 3% of total crew employment in any year for which data are available, with a maximum of 27 residents reported in 2015 representing 5% of the total 571 crew members identified that year, and accounting for $2.3 million in estimated wage income paid to residents of the community during 2015.

[16]The Seattle-Tacoma-Bellenue MSA is defined by Office of Management and Budget as the geographic area comprised of King, Pierce, and Snohomish counties of Washington state; https://www.whitehouse.gov/wp-content/uploads/2018/09/Bulletin-18-04.pdf

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	$ 422.39	100.00 %	$ 19,952	100.00 %
	2018	19	$ 436.81	100.00 %	$ 23,509	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	$ 97.72	30.38 %	$ 4,870	33.02 %
	2016	19	$ 98.78	28.65 %	$ 4,732	34.61 %
	2017	19	$ 134.85	31.93 %	$ 7,387	35.67 %
	2018	19	$ 136.34	31.21 %	$ 7,401	33.61 %
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	$ 97.69	23.13 %	$ 5,001	22.27 %
	2018	19	$ 105.89	24.24 %	$ 5,580	24.21 %
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	$ 115.69	35.97 %	$ 5,199	34.17 %
	2016	19	$ 152.15	44.13 %	$ 6,560	43.57 %
	2017	19	$ 189.85	44.95 %	$ 8,566	42.15 %
	2018	19	$ 194.59	44.55 %	$ 9,736	41.99 %

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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	17.50 %	$ 4,128	20.22 %
	2018	19	$ 66.92	15.32 %	$ 3,964	17.42 %
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	$ 53.03	16.49 %	$ 2,047	13.13 %
	2016	19	$ 83.07	24.09 %	$ 3,179	22.99 %
	2017	19	$ 115.95	27.45 %	$ 3,473	20.82 %
	2018	19	$ 127.67	29.23 %	$ 4,934	26.62 %

Notes: All dollar values are inflation-adjusted to 2018-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.

Table 9.12: Amendment 80 Fleet Capital Expenditures by Category and Year, Fleet Total and Median Vessel Values

	Year	Vessels	Expenditure Per Vessel, Median ($1,000)	Percent Of Vessel Total Capital Expenditures, Median	Total Fleet Expenditure ($million)	Percent Of Fleet Total Capital Expenditures
Fishing gear	2008	12	$ 106.83	40 %	$ 1.78	20 %
	2009	8	$ 58.31	37 %	$ 0.67	7 %
	2010	8	$ 41.51	36 %	$ *	* %
	2011	9	$ 110.38	13 %	$ 1.38	15 %
	2012	10	$ 292.93	41 %	$ 3.10	16 %
	2013	9	$ 79.54	18 %	$ 1.60	9 %
	2014	9	$ 73.25	32 %	$ 0.97	7 %
	2015	11	$ 221.31	24 %	$ 2.21	18 %
	2016	13	$ 151.86	35 %	$ 3.01	24 %
	2017	13	$ 68.50	38 %	$ 3.27	9 %
	2018	18	$ 152.40	21 %	$ 4.19	12 %
Processing plant and equipment	2008	11	$ 135.34	31 %	$ 2.02	22 %
	2009	9	$ 101.06	22 %	$ 1.09	12 %
	2010	13	$ 169.69	28 %	$ 3.21	28 %
	2011	10	$ 164.96	32 %	$ 2.62	28 %
	2012	14	$ 86.62	21 %	$ 3.27	17 %
	2013	9	$ 148.47	42 %	$ *	* %
	2014	8	$ 118.53	15 %	$ *	* %
	2015	10	$ 138.68	18 %	$ 1.78	14 %
	2016	8	$ 102.12	32 %	$ *	* %
	2017	11	$ 24.40	8 %	$ *	* %
	2018	15	$ 36.00	19 %	$ *	* %
Vessel and other onboard equipment	2008	11	$ 57.94	33 %	$ 2.03	22 %
	2009	13	$ 447.87	75 %	$ 7.02	74 %
	2010	15	$ 120.28	57 %	$ 5.91	52 %
	2011	11	$ 136.59	32 %	$ 3.30	36 %
	2012	18	$ 70.37	55 %	$ 11.96	62 %
	2013	11	$ 578.51	69 %	$ 11.04	59 %
	2014	13	$ 411.17	73 %	$ 6.94	47 %
	2015	12	$ 93.64	38 %	$ 4.14	33 %
	2016	10	$ 108.19	27 %	$ *	* %
	2017	11	$ 205.30	61 %	$ *	* %
	2018	17	$ 201.01	28 %	$ 13.19	37 %

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Table 9.12: Continued

	Year	Vessels	Expenditure Per Vessel, Median ($1,000)	Percent Of Vessel Total Capital Expenditures, Median	Total Fleet Expenditure ($million)	Percent Of Fleet Total Capital Expenditures
Other capital expenditures	2008	9	$ 97.21	17 %	$ *	* %
	2009	5	$ 46.93	7 %	$ *	* %
	2010	4	$ *	* %	$ *	* %
	2011	8	$ 151.83	63 %	$ 2.00	21 %
	2012	7	$ 104.69	5 %	$ 0.90	5 %
	2013	8	$ 117.30	44 %	$ 0.90	5 %
	2014	10	$ 178.47	47 %	$ 4.58	31 %
	2015	10	$ 155.37	51 %	$ *	* %
	2016	6	$ 209.51	81 %	$ *	* %
	2017	9	$ 299.23	91 %	$ *	* %
	2018	11	$ 148.40	27 %	$ *	* %
Total Annual Capital Expenditures	2008	17	$ 409.80	100 %	$ 9.08	100 %
	2009	16	$ 364.27	100 %	$ 9.45	100 %
	2010	18	$ 387.33	100 %	$ 11.38	100 %
	2011	15	$ 331.57	100 %	$ 9.30	100 %
	2012	19	$ 308.79	100 %	$ 19.23	100 %
	2013	16	$ 467.11	100 %	$ 18.79	100 %
	2014	18	$ 426.42	100 %	$ 14.76	100 %
	2015	16	$ 463.79	100 %	$ 12.51	100 %
	2016	18	$ 313.85	100 %	$ 12.63	100 %
	2017	19	$ 265.40	100 %	$ 35.92	100 %
	2018	19	$ 631.37	100 %	$ 36.05	100 %

Notes: All dollar values are inflation-adjusted to 2018-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.

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	20	10	242
		2013	18	8	214
		2014	18	11	239
		2015	18	11	231
		2016	19	13	262
		2017	19	11	202
		2018	19	8	178
	Positions on Board	2008	22	6	134
		2009	21	6	120
		2010	20	6	114
		2011	20	6	111
		2012	20	6	107
		2013	18	6	105
		2014	18	6	106
		2015	18	6	107
		2016	19	6	108
		2017	19	6	103
		2018	19	6	99
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	20	52	1,296
		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
		2018	19	74	1,595
	Positions on Board	2008	22	22	529
		2009	21	23	516
		2010	20	23	476
		2011	20	23	473
		2012	20	23	448
		2013	18	23	437
		2014	18	24	449
		2015	18	24	449
		2016	19	25	477
		2017	19	24	504
		2018	19	25	526

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	20	20	436
		2013	18	19	383
		2014	18	18	347
		2015	18	18	338
		2016	19	18	417
		2017	19	20	446
		2018	19	19	372
	Positions on Board	2008	22	7	156
		2009	21	6	136
		2010	20	7	145
		2011	20	7	150
		2012	20	7	170
		2013	18	7	160
		2014	18	7	140
		2015	18	7	141
		2016	19	7	157
		2017	19	7	160
		2018	19	7	165

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.

Table 9.14: Amendment 80 Catcher/Processor Fleet - Estimated Crew Employment and Income, by Community of Residence

		2015			2016			2017			2018		
	Community	Employ Count	Employ Share	Income $million	Employ Count	Employ Share	Income $million	Employ Count	Employ Share	Income $million	Employ Count	Employ Share	Income $million
Alaska	Unalaska/Dutch Harbor	27	5 %	$ 2.21	23	4 %	$ 1.74	11	2 %	$ 1.03	6	1 %	$ 0.71
	Other Alaska	14	2 %	$ 1.15	24	4 %	$ 1.82	26	4 %	$ 2.43	10	2 %	$ 1.19
	Alaska Total	41	7 %	$ 3.36	47	8 %	$ 3.55	37	6 %	$ 3.46	16	3 %	$ 1.90
Oregon	Oregon Total	21	4 %	$ 1.72	14	2 %	$ 1.06	11	2 %	$ 1.03	7	1 %	$ 0.83
Washington	Seattle MSA	299	52 %	$ 24.48	353	57 %	$ 26.70	427	64 %	$ 39.97	373	69 %	$ 44.24
	Other Wash.	80	14 %	$ 6.55	66	11 %	$ 4.99	60	9 %	$ 5.62	46	9 %	$ 5.46
	Wash. Total	380	67 %	$ 31.11	419	68 %	$ 31.69	488	73 %	$ 45.68	419	78 %	$ 49.70
Other	-	120	21 %	$ 9.82	120	19 %	$ 9.08	97	15 %	$ 9.08	83	15 %	$ 9.84
Unknown	-	9	2 %	$ 0.74	16	3 %	$ 1.21	31	5 %	$ 2.90	13	2 %	$ 1.54
All Locations		571	100 %	$ 46.74	616	100 %	$ 46.59	664	100 %	$ 62.16	538	100 %	$ 63.81

Notes: 'Employ count' reports the number of individual vessel crew members identified as resident of the listed community or location. 'Employ share' reports the proportion of the total vessel employment pool associated by residence with the listed community or location. Statistics are reported for individual communities or community groupings within states (incorporated cities, counties or boroughs, or metropolitan statistical areas (MSAs)) only for communities that represented 3% or greater of the total employment pool in at least one year of reporting; employment and income statistics for residence locations below that threshold are aggregated together as 'Other (state)'. Note that no Alaska city or borough other than Unalaska/Dutch Harbor (Aleutians West Census Area) represented at least 3% of total vessel employment in any year of reporting. 'Other' references residence locations other than the states of Alaska, Oregon and Washington, and 'Unknown' references crew identifier entries where a valid crew license permit number could not be identified from information reported in the EDR.
'Income' (reported in $million, inflation-adjusted to 2018-equivalent value) is the estimated amount of vessel labor income, by community/location of residence, that is distributed to vessel crew members in aggregate; the estimate is derived by multiplying aggregate direct labor payments to non-processing vessel crew (reported by year in Amendment 80 EDR data; includes Total fleet cost values reported for 'Labor Payment, Fishing Crew' and 'Labor Payment - Other Employees' in Table) by 'Employ share' percentage by community/location. This does not control for differentials in proportional residence associations among different crew labor types (i.e., deck crew, captain, fish master, etc.) and respective pay rates.

Source: Amendment 80 Economic Data Reports, ADF&G commercial crew license database, and CFEC gear operator permit database; source data and compilation are provided by the Alaska Fisheries Information Network (AKFIN)

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. GULF OF ALASKA GROUNDFISH TRAWL FISHERY - SOCIAL AND ECONOMIC INDICATORS FOR THE CATCHER VESSEL FLEET AND PROCESSING SECTOR

This section of the Groundfish Economic Status Report provides a brief summary of cost, employment, and earnings information associated with commercial fishing and processing industry operations in the groundfish trawl fisheries of the central and western Gulf of Alaska (GOA). Beginning in 2015, the GOA Groundfish Trawl Economic Data Report (EDR) data collection program has collected annual census data from trawl catcher vessels, catcher-processors, and share-based processors active in GOA groundfish fisheries. The EDR program was developed by the Council to collect baseline cost and employment data from vessels and processors in advance of FMP amendments intended to rationalize the GOA groundfish trawl fisheries and improve bycatch avoidance (79 FR 71313); although Council action on GOA rationalization was suspended in December 2016, the GOA Trawl EDR represents an effort to improve the quality of information describing baseline economic conditions that was not available in the implementation of earlier catch share programs.[1]

The GOA Trawl EDR is comprised of data collections targeting the three respective sectors of the fishery. The Annual Trawl Catcher Vessel EDR and Annual Shoreside Processor EDR were designed by the Council to collect selected data elements from the respective populations that would capture key operating cost and employment conditions that were expected to be particularly susceptible to institutional changes associated with rationalization. As such, the GOA Trawl EDR does not collect comprehensive financial and employment data sufficient to support monitoring and assessment of general economic conditions in the respective industry sectors. In particular, the scope of data captured in the EDR is as follows:

The Trawl CV EDR form is required for all trawl catcher vessels that harvested groundfish in the GOA during the previous year, and collects the following data elements:

- Estimated market value and replacement value of vessel;
- Fishing gear costs - total direct capitalized expenditures and fully expensed costs for purchase, lease, installation and repair of a) salmon and halibut excluder gear, and b) trawl gear (including excluder gear other than salmon and halibut);
- Annual total fuel and lubrication cost and gallons;
- Total labor payments to a) crew and b) captain (total of final settlement payments), and number of crew, for GOA groundfish only;
- ADF&G commercial crew license number or CFEC gear operator permit number, by individual crew member that worked on vessel during GOA groundfish trawl fishing.

[1] At its April, 2019 meeting, the North Pacific Fishery Management Council received a staff discussion paper reviewing the EDR Progam, and initiated an analysis of alternatives for amending regulatory requirements associated with the GOA Groundfish Trawl EDR, including potentially dicontinuiing the data collection. See Item D5 on the April, 2019 Council meeting agenda for more information. https://meetings.npfmc.org/Meeting/Details/583.

The Annual Shoreside Processor EDR form is required from all shore-based processors that receive and process groundfish from GOA trawl fisheries. The form collects the following data elements:

- Estimated market value; borough assessed value or replacement value;
- Municipal water utility consumption, gallons and cost, by month, for Kodiak plants only;
- Municipal electrical utility consumption, kilowatt-hours and cost, by month, for Kodiak plants only;
- Processing labor gross wages and hours, by month and housing-status (housed, non-housed), for groundfish processing only;
- Number of processing employees, by month, for groundfish only;
- Non-processing employment, number employed, total wages and salaries, annual total.

In addition, trawl CPs active in GOA groundfish fisheries are required to submit the Annual Trawl CP EDR, which collects more comprehensive financial and other data; with the exception of one CP that operates exclusively in the GOA, all other trawl CPs active in the GOA are part of the Amendment 80 CP fleet that also operate in the Bering Sea. Section 9 provides a more complete presentation of EDR data representing the trawl CP fleet, and this section of the Economic Status Report is limited to the GOA groundfish trawl catcher vessel and shore-based processing sectors. For the current edition, the analysis is limited to presentation of catcher vessel sector employment and wages, including regional and community-level detail, and annual vessel expenditures on fuel and trawl gear. In future editions, the authors intend to develop a more integrated analysis of economic and social indicators for all sectors of the fishery and affected communities.

10.1. Harvest Sector Employment

Trawl catcher vessel crew employment and revenue share earnings for 2015 to 2018 are shown in Table 10.1. The number of vessels operating in GOA groundfish fisheries over the period has ranged from 63 to 66, and in 2018 declined from 65 to 63 in 2017. Note that, for a given vessel, 'crew positions' is the typical number of crew members onboard the vessel at one time, i.e., the 'size' of the vessel's crew, whereas 'crew employed' is the (likely larger) number of distinct individuals employed by the vessel over the course of a year. Fleet aggregate crew positions declined from 279 in 2015 to 238 in 2018, while the number of crew employed in the fleet during each year has increased over the same period from 358 to 404, suggesting that crew turnover has increased concurrent with an overall decline in the aggregate size of the crew over all vessels.[2] Aggregate crew share payments for the fleet have varied between roughly $13 million to $14 million per year, and declined to $12.9

[2] For each vessel, the number of 'crew employed' is derived from the number of non-captain crew members receiving crew share payments, as reported in Trawl CV EDRs. Also for each vessel, the number of 'crew positions' is estimated as the average over all 'crew size' entries on the vessel's fish ticket records for the year, adjusted (less one) to exclude the captain position. At both the vessel and fleet level, 'crew employed' is likely to be larger that 'crew positions' due to employment turnover during the year. However, if crew turnover includes individual crew members rotating between vessels in the fleet, there will be some double-counting in fleet aggregate 'crew employed' values reported in Table 10.1. Also note that the aggregate crew employment counts reported in Table 10.2 are derived from counts of distinct crew members (uniquely identified by crew license number) and aren't subject to double-counting, but are inclusive of vessel captains and are thus greater than the counts shown in Table 10.1.

million for 2018, while share payments to vessel captains have generally declined over the period, from $9.3 million in 2015 to $8.3 million in 2018. On a median vessel basis, the number of crew positions has remained stable at 4, with the number of crew employed increasing to 6 per-vessel in 2018 from 5 during each of the previous years. Total non-captain share payment for the median vessel has declined over the period, from $206 thousand in 2015 to $165 thousand in 2018, and from $52 thousand to $42 thousand on a per-crew position basis. Median captain share payment has followed the same trend, declining from $141 thousand in 2015 to $120 thousand in 2018.

Table 10.1: Gulf of Alaska Catcher Vessel Fleet - Aggregate and Median Vessel Crew and Captain Employment and Share Earnings

	N	Fleet aggregate				Median vessel				
Year	Vessels	Crew Employed	Crew Positions	Crew Share ($million)	Captain Share ($million)	Crew Employed	Crew Positions	Crew Share ($1000)	Share Per Position ($1000)	Captain Share ($1000)
2015	63	358	279	$ 13.91	$ 9.30	5	4	$ 206.19	$ 51.55	$ 140.97
2016	66	385	252	$ 14.23	$ 9.44	5	4	$ 187.11	$ 46.78	$ 121.84
2017	64	388	250	$ 13.39	$ 8.26	5	4	$ 166.31	$ 41.58	$ 109.06
2018	63	404	238	$ 12.88	$ 8.27	6	4	$ 164.63	$ 41.16	$ 119.99

Notes: 'Fleet aggregate' statistics reported in the table represent the annual aggregate value of reported variables summed over all vessel-level observations in EDR data reported for trawl catcher vessels active in Gulf of Alaska groundfish fisheries for the year; 'Vessels' reports the number of vessel-level observations. 'Median vessel' statistics represent the average vessel-level value of reported variables; if preferred, arithmetic mean average values can be derived by dividing fleet aggregate values by the number of vessels. 'Crew employed' reports the number of individual vessel crew members receiving crew share payments; 'Crew positions' reports the average number of fishing crew members aboard the vessel (calculated from crew size data captured in eLandings records) and is smaller than the total number of crew employed due to turnover of crew members on a given vessel during the fishing year. 'Crew share' represents the aggregate share settlement payment to all non-Captain crew members of a given vessel, and 'Share per position' reports the average amount of share payment paid per crew position. Share payment values are inflation-adjusted using the GDP deflator to 2018-equivalent value, and reported in $million for fleet aggregate and $1000 at the median vessel level.

Source: GOA Trawl Economic Data Reports and eLandings; source data and compilation are provided by the Alaska Fisheries Information Network (AKFIN).

The spatial distribution of GOA trawl catcher vessel crew employment and wages is reported in Table 10.2, showing the estimated number of individual crew members (including captains) employed by location of residence (as identified from ADF&G commercial crew licenses and CFEC gear permit numbers reported in the CV EDR form), and the relative share of total crew employment and estimated share of total crew and captain share income accruing to residents at the community and regional level. Only four Alaska communities (Anchorage, King Cove, Kodiak, and Sand Point) have accounted for at least 3% of total crew employment in the trawl catcher vessel fleet in one or more year of 2015 to 2018 period. Kodiak represents the largest concentration of crew employment in the fleet, accounting over the period for between 25% and 32% of total employment, and between 101 and 153 individual crew members employed in the fleet. Estimated revenue share earnings paid to Kodiak-resident crew members in the fleet have ranged annually between $5.8 million and $7.4 million.[3] The state of Alaska as a whole averages approximately 50% of total crew employment in the GOA groundfish trawl catcher vessel fleet, with an average of 230 crew members per year and $11 million in crew wages. The state of Oregon averages approximately 19% of crew employments and Washington averages 17%.

[3]See the table notes for Table 10.2 for qualifications regarding the estimation of crew income by location.

Table 10.2: Gulf of Alaska Catcher Vessel Fleet - Estimated Vessel Crew Employment and Income, by Community of Residence

		2015			2016			2017			2018		
	Community	Employ Count	Employ Share	Income $million	Employ Count	Employ Share	Income $million	Employ Count	Employ Share	Income $million	Employ Count	Employ Share	Income $million
Alaska	Anchorage	13	3 %	$ 0.75	13	3 %	$ 0.66	16	3 %	$ 0.75	10	2 %	$ 0.44
	King Cove	9	2 %	$ 0.52	21	4 %	$ 1.06	23	5 %	$ 1.08	5	1 %	$ 0.22
	Kodiak	101	25 %	$ 5.80	147	31 %	$ 7.40	123	27 %	$ 5.79	153	32 %	$ 6.78
	Sand Point	51	13 %	$ 2.93	31	7 %	$ 1.56	29	6 %	$ 1.36	43	9 %	$ 1.90
	Other Alaska	23	6 %	$ 1.32	33	7 %	$ 1.66	44	10 %	$ 2.07	36	8 %	$ 1.59
	Alaska Total	197	49 %	$ 11.32	245	52 %	$ 12.34	235	51 %	$ 11.06	247	52 %	$ 10.95
Oregon	Lincoln County	55	14 %	$ 3.16	51	11 %	$ 2.57	47	10 %	$ 2.21	54	11 %	$ 2.39
	Other Oregon	32	8 %	$ 1.84	27	6 %	$ 1.36	27	6 %	$ 1.27	35	7 %	$ 1.55
	Oregon Total	87	22 %	$ 5.00	78	17 %	$ 3.93	74	16 %	$ 3.48	89	19 %	$ 3.95
Washington	Bellingham	11	3 %	$ 0.63	6	1 %	$ 0.30	5	1 %	$ 0.24	8	2 %	$ 0.36
	Seattle MSA	27	7 %	$ 1.55	44	9 %	$ 2.22	39	8 %	$ 1.84	34	7 %	$ 1.51
	Other Wash.	32	8 %	$ 1.84	30	6 %	$ 1.51	37	8 %	$ 1.74	31	6 %	$ 1.37
	Wash. Total	70	17 %	$ 4.02	80	17 %	$ 4.03	81	18 %	$ 3.81	73	15 %	$ 3.23
Other	-	35	9 %	$ 2.01	48	10 %	$ 2.42	50	11 %	$ 2.35	42	9 %	$ 1.86
Unknown	-	15	4 %	$ 0.86	19	4 %	$ 0.96	20	4 %	$ 0.94	26	5 %	$ 1.15
All Locations		404	100 %	$ 23.21	470	100 %	$ 23.67	460	100 %	$ 21.65	477	100 %	$ 21.14

Notes: 'Employ count' reports the number of individual vessel crew members identified as resident of the listed community or location. 'Employ share' reports the proportion of the total vessel employment pool associated by residence with the listed community or location. Statistics are reported for individual communities or community groupings within states (incorporated cities, counties or boroughs, or metropolitan statistical areas (MSAs)) only for communities that represented 3% or greater of the total employment pool in at least one year of reporting; employment and income statistics for residence locations below that threshold are aggregated together as 'Other (state)'. 'Other' references residence locations other than the states of Alaska, Oregon and Washington, and 'Unknown' references crew identifier entries where a valid crew license permit number could not be identified from information reported in the EDR.

'Income' (reported in $million, inflation-adjusted using the GDP deflator to 2018-equivalent value) is the estimated amount of vessel labor income, by community/location of residence, that is distributed to vessel crew members in aggregate; the estimate is derived by multiplying aggregate crew and captain labor payments (reported by year in GOA Trawl CV EDR data) by 'Employ share' percentage by community/location. This does not control for differentials in proportional residence associations among different crew labor types (i.e., deck crew, captain) and respective pay rates.

Source: GOA Trawl Economic Data Reports, ADF&G commercial crew license database, and CFEC gear operator permit database; source data and compilation are provided by the Alaska Fisheries Information Network (AKFIN).

10.2. Vessel fuel and trawl gear expenditures

Vessel fuel consumption and cost, and expenditures on trawl gear and salmon and halibut excluder gear are reported in Table 10.3. Aggregate fuel consumption in the fleet has varied between 4,300 and 4,900 gallons per year, with fuel costs ranging from $11.2 million to $14.2 million during the period. The majority of vessels have reported some expenditure on trawl gear each year, with fleet aggregate expenditure ranging from $4.1 million to $5.4 million. In each year of EDR reporting, fewer than half of the fleet has reported expenditures on salmon and halibut excluder gear, and 2018, only 14 of 63 vessels reported excluder costs; in aggregate over the fleet, expenditures have ranged annually from $135 thousand to $265 thousand. As noted above, gear expenditures as reported in the GOA Trawl CV EDR include the total over all direct capitalized expenditures during the year, as well as fully expensed costs for purchase, lease, installation and repair.

Table 10.3: Gulf of Alaska Catcher Vessel Fleet - Fuel and Gear Costs

	Vessels	Fuel gallons (1000)		Fuel cost ($1000)		Excluder gear ($1000)			Trawl gear ($1000)		
Year	N	Total	Median	Total	Median	Non-zero N	Total	Median	Non-zero N	Total	Median
2015	63	4,564	60.84	$ 13,307	$ 182.52	25	$ 208	$ 6.60	61	$ 5,393	$ 59.42
2016	66	4,809	60.03	$ 11,633	$ 173.83	27	$ 265	$ 7.13	63	$ 5,321	$ 44.35
2017	65	4,266	50.71	$ 11,219	$ 159.10	19	$ 192	$ 6.27	62	$ 4,093	$ 42.34
2018	63	4,920	84.03	$ 14,200	$ 248.36	14	$ 135	$ 8.47	60	$ 4,402	$ 47.13

Notes: 'Total' statistics reported in the table represent the annual aggregate value of reported variables summed over all vessel-level observations in EDR data reported for trawl catcher vessels active in Gulf of Alaska groundfish fisheries for the year; 'Vessels' reports the number of vessel-level observations. 'Median' statistics represent the average vessel-level value of reported variables; if preferred, arithmetic mean average values can be derived by dividing fleet aggregate values by the number of vessels or Non-zero observations for the variable. Fuel and gear cost values are inflation-adjusted us ing the GDP deflator to 2018-equivalent value, and reported in $1000 for both fleet aggregate total and vessel-median levels.

Source: GOA Trawl Economic Data Reports; source data and compilation are provided by the Alaska Fisheries Information Network (AKFIN).

11. APPENDIX: ECONOMIC AND SOCIAL SCIENCE RESEARCH PROGRAM PRODUCTS

11.1. Research and Data Collection Project Summaries and Updates 2019 Groundfish SAFE Report

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, 2018.* 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 in early 2020.

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 2019 the most recent available official prices were from 2017). To provide information on the current state of fisheries markets, nowcasting is used to estimate 2019 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 2019. Ex-vessel prices estimates are based on unadjusted prices on fish ticket through the month of Sept. 2019. First-wholesale price estimates are based on export prices through the month of Aug. 2019, estimated global catch, and exchanges rates for 2019. 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 2020 - 2021. Resampling methods are used to 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, 2018.* A technical report, Fissel (2015), details the basic methods used for creating the price projections.

References

Fissel, B. 2015. "Methods for the Alaska groundfish first-wholesale price projections: Section 6 of the Economic Status of the Groundfish Fisheries off Alaska." *NOAA Technical Memorandum* NMFS-AFSC-305, 39 p. U.S. Department of Commerce

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 *https://www.federalregister.gov/documents/2014/12/02/2014-28093/fisheries-of-the-exclusive-economic-zone-off-alaska-gulf-of-alaska-trawl-economic-data-report* 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.

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). Additionally, estimates of the economic contribution of the Alaska marine recreational charter fishing sector were developed (Lew and Seung 2019). In 2018, the survey was implemented to collect data for the 2017 fishing season. The data for this most recent survey were cleaned, validated, and analyzed during 2019. A draft NOAA Technical Memorandum was prepared and is currently under review.

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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 published in *Marine Resource Economics* (Lew 2019). Additional research is planned to integrate the economic model results with a population viability assessment model and to generate aggregate estimates of public benefits.

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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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The Non-Market Benefits of Early and Partial Gains in Managing Threatened Salmon

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Threatened species are increasingly dependent on conservation investments for persistence and recovery. Information that resource managers could use to evaluate investments – such as the public benefits arising from alternative conservation designs – is typically scarce because conservation benefits arise outside of conventional markets. Moreover, existing studies that measure the public benefits of conserving threatened species often do not measure the benefits from partial gains in species abundance that fall short of official recovery, or the benefits from achieving gains in species abundance that happen earlier in time. We report on a stated preference choice experiment designed to quantify the non-market benefits for conservation investments aimed at threatened Pacific Coho salmon (*Oncorhynchus kisutch*) along the Oregon Coast (OC). Our results show that a program aimed at increasing numbers of returning salmon can generate sizable benefits of up to $518 million/y for an extra 100,000 returning fish, even if the species is not officially declared recovered. Moreover, while conservation investment strategies expected to achieve relatively rapid results are likely to have higher up-front costs, our results show that the public attaches substantial additional value of up to $277 million/y for achieving conservation goals quickly. Our results and approach can be used to price natural capital investments that lead to gains in returning salmon, and as inputs to evaluations of the benefits and costs from alternative conservation strategies.

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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. Additional analyses conducted in 2019 were done to investigate methods for controlling for potential biases and to improve the model estimates. Another methodological paper investigated the potential for combining revealed preference and stated preference data from the angler surveys to improve the estimates of Alaska fishing demand (Whitehead and Lew, 2019).

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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 appears 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. Most recently, we have been investigating methods for minimizing some potential biases in the data to more accurately measure anglers' willingness to pay for Alaska marine recreational fishing trips.

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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 Economic 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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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.

Implications of halibut bycatch management in the North Pacific: A prospective model of fleet behavior in the groundfish trawl fisheries

By Matthew Reimer, Joshua K. Abbott, and Alan C. Haynie*

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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

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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

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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.

Using vessel monitoring data to evaluate fisheries management actions in the Gulf of Mexico

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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

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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Recreational Leasing of Alaska Commercial Halibut Quota: The Early Years of the GAF Program in Alaska

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The Pacific Halibut Catch Sharing Plan formalized the process for allocating halibut between the Alaska commercial and recreational charter sectors. It included a new program intended to allow for "flexibility" through inter-sectoral trading, permitting charter operators to lease commercial halibut pounds to relax client harvest restrictions. Here we evaluate the first two years of lease market activity and participation. Participation from some commercial quota holders in the lease market suggests that the program provided beneficial flexibility; in fact, the number of transfers to the charter sector was greater than transfers within the commercial sector for some quota types. We also identified a high proportion of self-leasers. However, transfers to the charter sector were on average smaller than within-sector commercial transfers, and total poundage leased by the charter sector was low compared to commercial transfers. Usage of leased quota by the recreational charter sector enables the harvest of larger fish or additional fish, and provides flexibility in catch composition on halibut closure days. Finally, the value-per-pound may be higher in the charter sector, as commercial-to-charter transfer prices approached the commercial ex-vessel price.

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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 examine 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).

This study was recently published in the journal Ocean and Coastal Management and reveals that community-level attributes are important predictors of QS selling decisions even when controlling for various individual and QS-level attributes (Szymkowiak et al. 2019). The most important characteristics are access to an airport with a long runway and the presence of a halibut buyer, both of which facilitate access to markets, and these attributes are different from the ones previously examined by researchers and the NPFMC. The presence of a fish buyer in the community has a consistent negative effect on the probability of selling, which may be related to not only the importance of having a relatively accessible buyer, but of broader fisheries diversification opportunities, and the less tangible effects of having a viable/functional fishing culture in the community. Thus the closure of a sole fish buyer in a community can have wideranging negative implications for not just fisheries participants but the community more broadly, especially in remote areas without alternative buyers or with few employment opportunities.

This research provides useful insights into the link between halibut QS transfer behavior, community characteristics, and market access; however, limited data prevented inclusion of potentially important individual drivers of QS buying and selling decisions, such as expectations about earnings, broader entry/exit and fisheries participation decisions, opportunity costs of time, and alternative investment opportunities. Research exploring the role these individual factors have on QS transfer decisions could provide additional insights, but would likely require more theoretically-driven structural frameworks than the one used here. Future extensions of this research could also examine the sensitivity of community-level drivers to time as the halibut market stabilized and regional differences in the importance of these drivers as the capacity to move fresh fish and the number of fish buyers are both much more constrained in the Bering Sea and Aleutian Islands than in the Gulf of Alaska.

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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 published in the ICES Journal of Marine Science (Zador et al. 2017).

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Zador, S., S. Gaichas, S. Kasperski, C.L. Ward, R.E. Blake, N.C. Ban, A. Himes-Cornell, and Z. Koehn. Linking ecosystem processes to communities of practice through commercially fished species in the Gulf of Alaska. *ICES Journal of Marine Science 74(7): 2024-2033.*

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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In FY18, we constructed 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 individual SAMs, we constructed a nine-region multiregional social accounting matrix

(9-MRSAM). We developed two different versions of the 9-MRSAM. The first version has

industry (vessel sectors) by commodity (species) format. In this version of the MRSAM, there are six fish harvesting sectors (industries) distinguished by the gear type used and eleven fish commodities (i.e., species caught). The second version of the MRSAM species the fish harvesting industries by the species caught. In this version, each fish harvesting industry represent the economic activity involving harvest of each of the eleven species. This version will be useful to estimate the economic impacts of a change in TAC of an individual species. In addition, because these two versions of MRSAM lack information about the activities of the at-sea sector (catcher processors and motherships), we assembled the data for the sector, and added the sector as a separate region in the MRSAMs, resulting in two different versions of a ten-region MRSAM (10-MRSAM). We also completed a tech memo describing the procedures to construct the MRSAMs. In FY20, we will start to develop regional economic models based on these MRSAMs.

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 published in a journal (Seung and Ianelli 2019).

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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 ($248 million in 2013 dollars) and lowest in the next year, 2012 (about $141 million in 2013 dollars). Subsequently, the total output increased in 2013 and then remained at a statistically similar level in 2015. This study has been published (Lew and Seung 2019).

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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 was published at Marine Fisheries Review (Anderson et al. 2018).

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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. 2018). 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, 2019).

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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11.2. AFSC Economic and Social Sciences Research Program Publications FY2018-2019

Full-Time Staff (names in bold)

FY2019

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