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, 2015

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 have begun an initiative to revise 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, and have developed an online survey to facilitate user feedback. The survey is available at:
`http://www.afsc.noaa.gov/REFM/Socioeconomics/Contact/SAFE_survey.php`

This report will be available at:
`http://www.afsc.noaa.gov/refm/docs/2016/economic.pdf`

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

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1. EXECUTIVE SUMMARY

The commercial groundfish fisheries off Alaska had a total catch of 2.2 million tons (t) in 2015 (including catch in federal and state waters) (Fig. 3.1 and Table 1). This amount was approximately equal to the catch in 2014. Groundfish accounted for 80% of Alaska's 2015 total catch, which was slightly less than typical because of high Pacific salmon catch (Table 1A). Notable increases in catch were observed in the Alaska pollock (particularly in the Gulf of Alaska) and Atka mackerel fisheries, while catch in the flatfish species complex saw a significant decrease in 2015.

The aggregate ex-vessel value of the FMP groundfish fisheries off Alaska was $895 million, which was 52% of the ex-vessel value of all commercial fisheries off Alaska in 2015 (Tables 17 and 19).[1] Nominal ex-vessel value of FMP groundfish decreased $39 million in 2015 (Table 19). After adjustment by the Personal Consumption Expenditure Index (PCE), real ex-vessel value decreased $44 million (Table 16). The ex-vessel market of the FMP groundfish fisheries off Alaska remained healthy in 2015 though aggregate economic metrics showed little change from 2014 levels.

Due to an aggregate ex-vessel price decrease of 4.9% to $0.191 per pound of retained catch, aggregate value decreased 4.2% (Tables 2, 6 and 19). Aggregate retained catch increased slightly (0.78%) to 2,126 thousand t, in part, because of decreased discards. The decrease in 2015 ex-vessel prices is related to the corresponding decrease in wholesale prices to which they are linked. Most species did not see dramatic price changes in 2015; the decrease in the aggregate ex-vessel price was the combined effect of marginal decreases in the prices for most of the individual species (complexes) (Table 18). Relatively small decreases in ex-vessel value were observed for nearly all species (complexes) except pollock, which saw a small increase. Because movements in price were generally small, changes in catch were more critical in determining the difference in the way ex-vessel value changed for individual fisheries across regions, sectors, and gear types. FMP groundfish made up a larger share of the ex-vessel value from the fisheries off Alaska than they did in 2014 largely because of the decrease in salmon revenues. Revenues from halibut and shellfish increased (Table 17).

The gross value of the 2015 groundfish catch after primary processing (first wholesale) was $2.26 billion (Table 31), a decrease of 3.6% from 2014. This change was the combined effect of a decrease in aggregate first-wholesale production, down 3.1% to 943.4 thousand t, and aggregate price decrease of 0.49% to $1.087 per pound in 2015 (Table 25 and 26). Similarly, small decreases in value were observed in the first-wholesale markets for most species (complexes) in 2015, with the exception of Atka mackerel where production rose substantially. Variation in production was the larger determinant of changes in value across species in 2015. In percentage terms the most significant increase in value was from Atka mackerel products, which grew 17.4% due to increased catch and production. The most significant decrease in value was in products from the flatfish complex, which fell 24.1%. This was again a result of decreased catch and production, particularly from yellowfin sole and arrowtooth flounder products. First-wholesale value from pollock and pacific cod products changed very little, decreasing only slightly. The strength of the U.S. dollar and strong global whitefish supplies were factors that hindered increases in first-wholesale prices of Alaska products.

[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.

The first-wholesale value of Alaska's FMP groundfish fisheries accounted for 53% of Alaska's total first-wholesale value from commercial fisheries (Table 30). First-wholesale value of Alaska's non-FMP groundfish fisheries totaled $2.01 billion, most of which ($1.5 billion) came from Pacific salmon. Pacific salmon value increased only 2.2% despite substantially increased catch levels in 2015 as prices were driven down in response to the supply and a strong U.S. dollar. Pacific halibut fisheries, which are concentrated in the Gulf of Alaska, saw a modest increase in total allowable catch and production in 2015 after steady declines over the last decade. First-wholesale value in the Pacific halibut fisheries increased $10 million to $132 million in 2015.

The groundfish fisheries off Alaska are an important segment of the U.S. fishing industry. In 2014, it accounted for 52% of the weight of total U.S. domestic landings and 16% of the ex-vessel value of total U.S. domestic landings (Fisheries of the United States, 2014).

A significant portion of the products produced from the commercial fisheries off Alaska are exported. Since 2006, exports of pollock originating from Washington and Alaska have risen from 280 thousand t to 374 thousand t in export volume and from $876 million to $1,029 million in value (Table E.2). Pollock fillet and surimi accounted for 72.3% of the export value. Germany, South Korea, and Japan were the primary export markets with a value of $220 million, $254 million and $265 million, respectively, while the export value of products going to China totaled $108 million in 2015 (Table E.2). Globally, pollock, Pacific cod, and sablefish from Alaska accounted for 11% of the World's 6.6 million t production of 'cod, hake, and haddock' species (as defined by the FAO) in 2014 (Tables 25 and E.1). Alaska's first-wholesale value from pollock, Pacific cod, and sablefish was $2 billion relative to the world's total 'cod, hake, and haddock' species product value of $9.4 billion. Between 2011 and 2014 Alaska's share of production in the global 'cod, hake, and haddock' market has increased from 10% to 11%, while value has gone from 23% to 21%.

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 of FMP groundfish. These data indicate that in 2015 crew weeks totaled 104,112 with the majority of them (100,096) occurring in the BSAI groundfish fishery (Table 50). In 2015 the maximum monthly employment peaked in March with 15,538 crew weeks. Relative to 2014, annual crew weeks decreased in 2015 by 0.33%, which comes after an increase of 4.8% in 2014 from 2013. Statewide average monthly employment in fish processing (of any species) was 10,200 employees in 2015, down slightly from the previous year (Table E.3). Statewide average monthly employment in groundfish harvesting between 2008 and 2012 (the most recent data currently available from the Alaska Department of Labor) was 1,552 employees and comprised 20% of the total fish harvesting employment in Alaska (Table E.4). The Alaska Department of Labor reports that groundfish harvesting employment grew 28.4% in 2014. Given the 2015 change in harvest volume, harvesting employment through 2015 likely remained steady.

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.

[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.

Catcher vessels accounted for a higher proportion of the ex-vessel value of groundfish landings than total catch (50% versus 47%) in 2015 becuase they take larger than average percentages of higher-priced species such as sablefish (Table 18). 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 2015.

Alaska pollock

Alaska pollock, the dominant species in terms of catch, accounted for 67% of FMP groundfish harvest with a catch of 1.5 million t in 2015 (Table 2). The ex-vessel value of the Alaska pollock fishery was $480 million (Table 19). While pollock prices fell slightly, increased catch (particularly in the GOA) had the net effect of a 1.2% increase in ex-vessel value (Table 19). Pollock first-wholesale value decreased 2.1% in 2015 to $1.38 billion, due to a 2.2% decrease in price (Tables 25 and 26). Ex-vessel and first-wholesale value in the pollock fishery remains above the 10 year average, though not at the peak in 2012 when ex-vessel prices were higher.

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 almost exclusively with trawl gear. Pollock catches increased throughout Alaska's regions and sectors but most prominently in the Gulf of Alaska where it increased by 16% to the highest level seen in recent history. Pollock is an abundant whitefish with extensive global markets and is harvested at or very near the TAC. Hence changes in pollock catch and 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. Because pollock is harvested at the TAC wholesale pollock prices 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, which made up a combined 81.7% of pollock total first-wholesale value. Value decreased for two of pollock's primary product forms: fillets and roe, while surimi value increased. Wholesale prices played a role in the changes in value. Fillet prices of fell 1.5% to $1.4 per pound as increases in Russian production put downward pressure on prices. Decreases in Japanese surimi production allowed for increases in both surimi production and prices, which rose 2.3% to $1.115 per pound.

Pacific cod

The fisheries for Pacific cod are the second largest by volume in Alaska with a total catch of 289 thousand t in 2015, a decrease of 3% from 2014. Decreases in both catch and ex-vessel price had the combined effect of a 8.7% decrease in ex-vessel value to $186 million. Similarly, Pacific cod aggregate first-wholesale value fell 0.8% with production, though the aggregate wholesale price was virtually unchanged over last year. The decreases in value in 2015 comes after a significant increase in 2014 and value in the Pacific cod fishery was roughly at, though just below, the 10 year average level of value.

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. 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, trawl, and pot gear. The change in value was the result of decreased catch across most of the different gear types, sectors, and regions, with the exception of the BSAI at-sea hook-and-line fishery which saw a small increase (4%) (Table 2). Like pollock, cod is harvested at or very near the TAC. Catch levels of Pacific cod remained strong in 2015 despite slight decreases, and are at or above their ten year average. Ex-vessel prices have been trending down since about 2007 which has been disruptive to ex-vessel revenues despite the strong catch levels. The declining ex-vessel prices are largely a reflection of a similar trend in first-wholesale prices. Pacific cod is processed in a number of different product form for wholesale markets, the two most important of which are fillets and head-and-gut (H&G). The at-sea sector produced mostly H&G products and the shoreside sector produces fillets, H&G, and other product forms. Whitefish products, such as those produced from cod, have come under increased global competion over the last decade which is reflected in the downward trend in wholesale prices. In 2015 the aggregate first-wholesale price was basically stagnant, increasing a mere 0.5%. This was the combined effect of the counteracting changes in the H&G and fillet prices. H&G prices increased 12.2% to $1.347 per pound while fillet prices fell 8.5% to $2.653 per pound. Correspondingly, production of fillets decreased while H&G production increased.

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 and catch. This trend continued through 2015 as catches decreased to 11.7 thousand t in 2015, down from 12.3 thousand t in 2014. At $94 million in 2015, ex-vessel value in the sablefish fishery decreased because of reduced catch levels, despite a $0.14 increase in ex-vessel price. Commensurate with this decrease in catch and corresponding production, first-wholesale value was down 8.1% to $91 in 2015 which was mitigated, in part, by a slight increase in the first wholesale price. Persistent declines in catch have been disruptive to revenues in the sablefish fishery. Strong prices have maintained value in the fishery as catches have declined; however, the peak price levels were seen in 2010.

Flatfish species complex

The flatfish complex is comprised of a number of different species. The species targeted vary substantially by region. In the BSAI the primary target species are yellowfin sole, rock sole, flathead sole, and arrowtooth flounder, which are mostly fished by catcher/processors in the Amendment 80 fleet.[3] 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. Aggregate flatfish catch decreased considerably in the both the BSAI and GOA. In the BSAI catch fell 21% to 218 thousand t. In the GOA, catch fell 44% to 24 thousand t. Decreases in catch were most prominent for arrowtooth flounder and yellowfin sole, though decreases occurred for many other flatfish species as well.

[3] Amendment 105 BSAI Flatfish Harvest Specification Flexibility went into effect in 2015 allowing cooperative and CDQ groups to exchange flatfish harvest quota between yellowfin sole, rock sole, and flathead sole under the Allowable Biological Catch (for details see `http://federalregister.gov/r/0648-BD23`).

Arrowtooth, the largest flatfish fishery in the GOA, can show considerable year over year catch variability, in part because of regulatory changes.[4] However, 2015 catches were at the lowest level seen since 2004 because of a closure in the non-rockfish, non-pollock fisheries from May 3rd to Aug 10th because they reached their Chinook salmon bycatch limit. In the BSAI the yellowfin sole fishery is the largest. The yellowfin TAC decreased to maintain the 2 million ton groundfish cap in the BSAI; however the TAC is not typically a binding constraint on the fishery, though industry may react to TAC changes. The decreased TAC in 2015 precluded harvests at 2014 levels, however, the fishery still only harvested 85% of the 2015 TAC and prices, while not high relative to recent history, were up from 2014. There were notable decreases in catch for the BSAI rock sole and arrowtooth fisheries as well. The decreased catch in BSAI flatfish fisheries were related to poor fishing conditions early in the year and voluntary efforts to reduce Pacific halibut PSC at the request of the NPFMC. Commensurate with the reduced catch was a decrease in aggregate flatfish ex-vessel value to $71 million in 2015. First-wholesale value decreased 24.1% to $162 million in 2015. The decrease in flatfish value can largely be attributed to the drop in production from reduced catch levels. Flatfish are mostly processed and sold in the head-and-gut product form. On the whole, first-wholesale flatfish prices were relatively stable, yellowfin sole price increased 4% and arrowtooth price decreased 5%.

Rockfish species complex

The rockfish fisheries target a diverse set of species which can vary by region and sector. By volume, the majority of rockfish (70%) is caught in the BSAI, which is largely attributable to the sizable BSAI fisheries for Pacific ocean perch (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. 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 catch in Alaska totaled 68 thousand t in 2015 with increases the Pacific ocean perch and northern rockfish fisheries (Table R1). Aggregate ex-vessel value increased 3.4% to $29 million in 2015 (Table 19) despite a decrease in aggregate prices (Table 18). Overall first-wholesale prices decreased 10%, the net effect of which was 5% decrease in first-wholesale value to $77.1 million.

Catches increased in 2015 for the GOA Pacific ocean perch and BSAI northern rockfish fisheries, but decreased for most other species. Diverted effort from the flatfish fisheries could, in part, account for the increases in Pacific ocean perch and northern rockfish catch. Though there is no directed fishery for northern rockfish, the marked increase in catch was also ostensibly associated with the increase in Atka mackerel catch. Pacific ocean perch and northern rockfish are the largest of the rockfish fisheries, accounting for 74% and 13% of the total rockfish revenues respectively. Ex-vessel prices in the GOA Pacific ocean perch fishery increased, resulting in a net increase in revenues for rockfish fisheries in this region. The increase in rockfish prices corresponded with a similar increase in the GOA shoreside wholesale price which rose 7%. Wholesale revenues in this sector rose 4% to $15.9 million. However, at-sea wholesale prices decreased in both the GOA and BSAI (down 5% and 10% respectively) which resulted in a net decrease in wholesale revenues ($17.9 and $42 million, respectively). These changes in aggregate price are largely a reflection of the change in wholesale prices for Pacific ocean perch and northern rockfish.

[4] 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`).

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 increase in catch of Atka mackerel to 54 thousand t brings catch back to roughly 2011 levels after significant reductions in the TAC in 2012 and 2013. The lower catch was due to area closures for Steller sea lions and survey-based changes in the spatial apportionment of TAC. Recent increases in TAC reflect the continued health of the stock and expanded fishing opportunities in the Aleutian Islands. 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. Commensurate with the increased production from catch, first-wholesale production increased 57%. The result was a 17.4% growth in first-wholesale revenue to $74 million, despite a 25.4% decrease in the wholesale price.

1.1. Report Card Metrics for the Alaska Commercial Groundfish Fisheries off Alaska 1993-2015

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 1993-2015 to help elucidate trends and provide historical context to the current state of 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 2015 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 2015 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.

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

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

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

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

6) Ratio of ex-vessel over first-wholesale revenues, which measures the value added from processing FMP groundfish.

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 productivity-related metric and 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 while real prices remain low (panels 1,2, and 3). High global pollock and cod production and exchange rates have put downward pressure on prices in recent years (panels 4 and 5). Globally, Alaska has a significant effective share of pollock and cod (approximately 40%). The effective real exchange rate index peaked in 2015, strength of the dollar has put downward pressure on prices. The ratio of ex-vessel to wholesale revenues is close to the long run average (panel 6), and revenue per-unit-effort has been fairly high (panel 7). Share of shoreside revenue to AK residents is higher relative to the mid-2000s (panel 8), due to Alaska resident's share of revenue in Pacific cod, which increased from 40% in 2003-2006 to 61% in 2015, sablefish, which increased from 44% in 2003 to 57% in 2015, and to a lesser extent pollock. Roughly 55% of the shoreside revenues are concentrated in a few key ports which in 2014 and 2015 were Akutan, Cordova, 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.

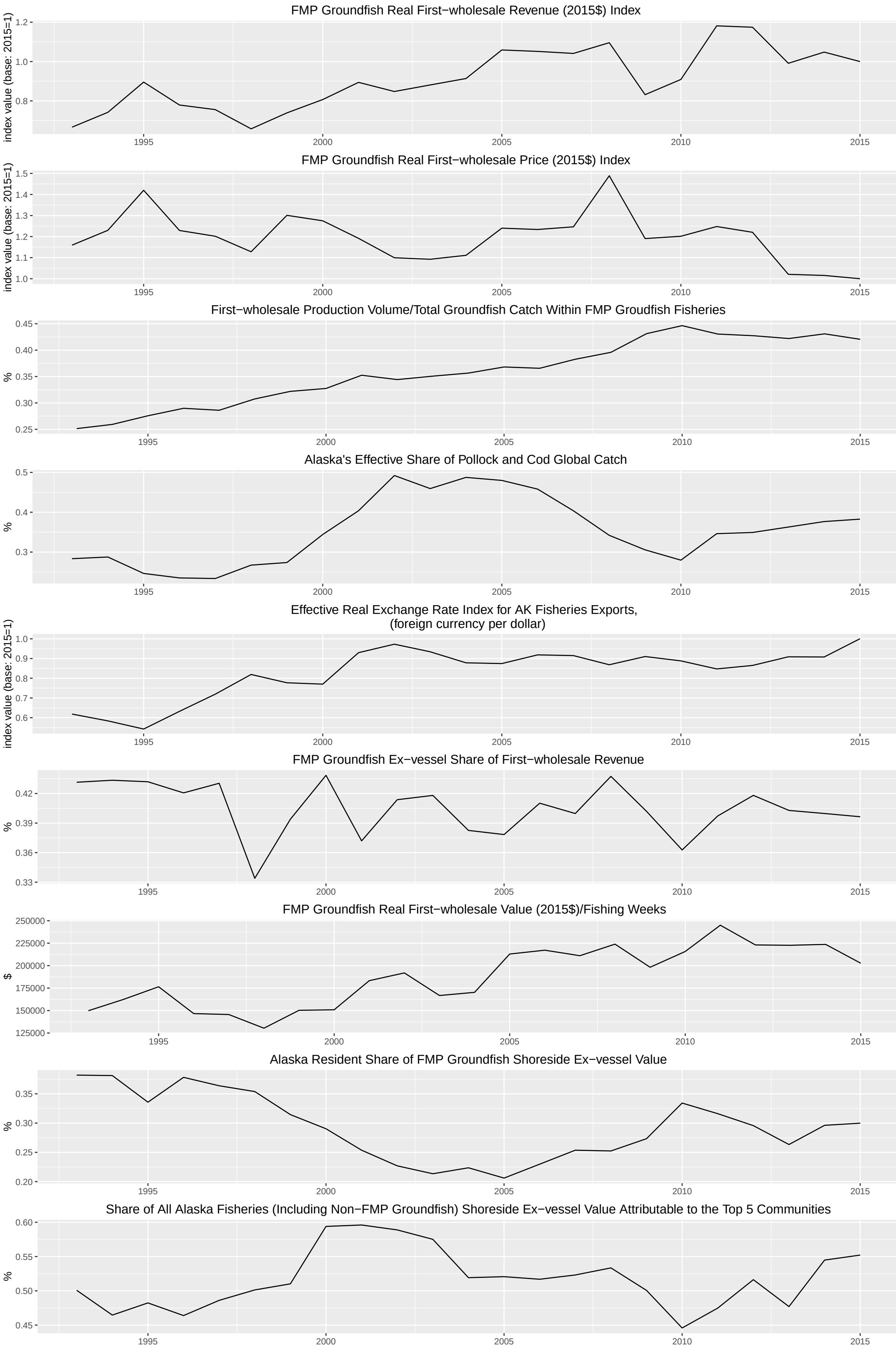


Figure 1.1: Economic Report Card Metrics.

1.2. The Groundfish Plan Team Economic Summary of the Alaska commercial groundfish fisheries in 2014-15

These following summaries were prepared for the Groundfish Plan Team Meeting (Nov. 2016). The information below are excerpts from the introductions in the BSAI and GOA Groundfish Plan Team reports. Some values may differ slightly from those found in the rest of the report.

The ex-vessel value of all Alaska domestic fish and shellfish catch, which includes the amount paid to harvesters for fish caught, and the estimated value of pre-processed fish species that are caught by catcher/processors, decreased from $1,853 million in 2014 to $1,720 million in 2015. The first-wholesale value of 2015 groundfish catch after primary processing was $2,262 million. The 2015 total groundfish catch decreased by 1%, and the total first-wholesale value decreased by 4%, relative to 2014.

The groundfish fisheries accounted for the largest share (52%) of the ex-vessel value of all commercial fisheries off Alaska, while the Pacific salmon (*Oncorhynchus spp.*) fishery was second with $413 million or 24% of the total Alaska ex-vessel value. The value of the shellfish fishery amounted to $293 million or 17% of the total for Alaska and exceeded the value of Pacific halibut (*Hippoglossus stenolepis*) with $111 million or 6% of the total for Alaska.

The Economic SAFE report (appendix bound separately) contains detailed information about economic aspects of the groundfish fisheries, including figures and tables, economic performance indices, catch share fishery indicators, product price forecasts, a summary of the Alaskan community participation in fisheries, an Amendment 80 fishery economic data report (EDR) summary, an Amendment 91 fishery economic data report (EDR) and vessel master survey summary, market profiles for the most commercially valuable species, a summary of the relevant research being undertaken by the Economic and Social Sciences Research Program (ESSRP) at the Alaska Fisheries Science Center (AFSC) and a list of recent publications by ESSRP analysts. 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. Appendices contain species specific ex-vessel and first-wholesale data for flatfish and rockfish, data on fishmeal, global whitefish production from the FAO, fisheries export data from the Census Bureau, employment data from the Alaska Dept. of Labor, and alternative ex-vessel pricing and value based on CFEC fish tickets. Generally, the data presented in this report cover 2011 - 2015, but limited catch and ex-vessel value data are reported for earlier years in order to illustrate the rapid development of the domestic groundfish fishery in the 1980s and to provide a more complete historical perspective on catch. The data behind the tables from this and past Economic SAFE reports are available online at http://www.afsc.noaa.gov/refm/Socioeconomics/SAFE/default.php

Decomposition of the change in first-wholesale revenues from 2014-15 in the BSAI

The following brief analysis summarizes the overall changes that occurred between 2014-15 in the quantity produced and revenue generated from BSAI groundfish. According to data reported in the 2016 Economic SAFE report, the ex-vessel value of BSAI groundfish decreased from $726 million in 2014 to $688 million in 2015 (Figure 1.2), and first-wholesale revenues from the processing and

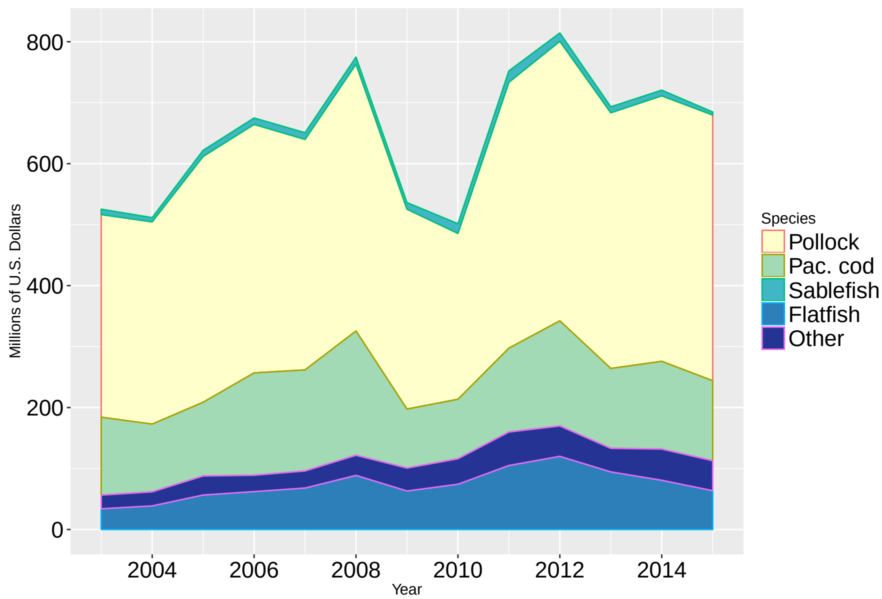


Figure 1.2: Real ex-vessel value of the groundfish catch in the domestic commercial fisheries in the BSAI area by species, 2003-2015 (base year = 2015).

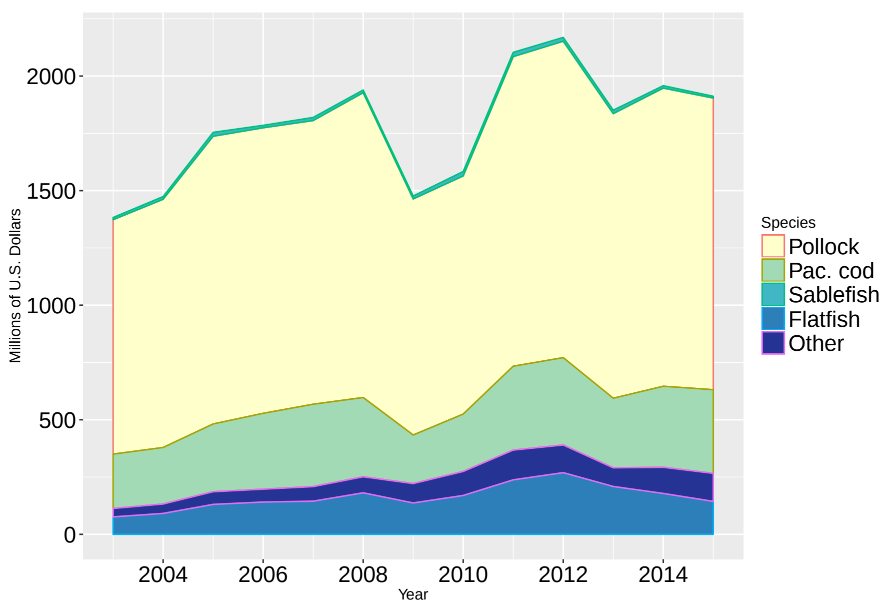


Figure 1.3: Real gross product value of the groundfish catch in the BSAI area by species, 2003-2015 (base year = 2015).

production of groundfish in the BSAI fell from $1,958 million in 2014 to $1,912 million in 2015, a decrease of 2% (Figure 1.3).

The total quantity of groundfish products from the BSAI decreased from 844 thousand metric tons in 2014 to 819 thousand metric tons in 2014, a difference of 25 thousand metric tons. These changes in the BSAI account for part of the change in first-wholesale revenues from Alaska groundfish fisheries overall which decreased by $83 million, a relative decrease of 4% in 2015 compared to 2014.

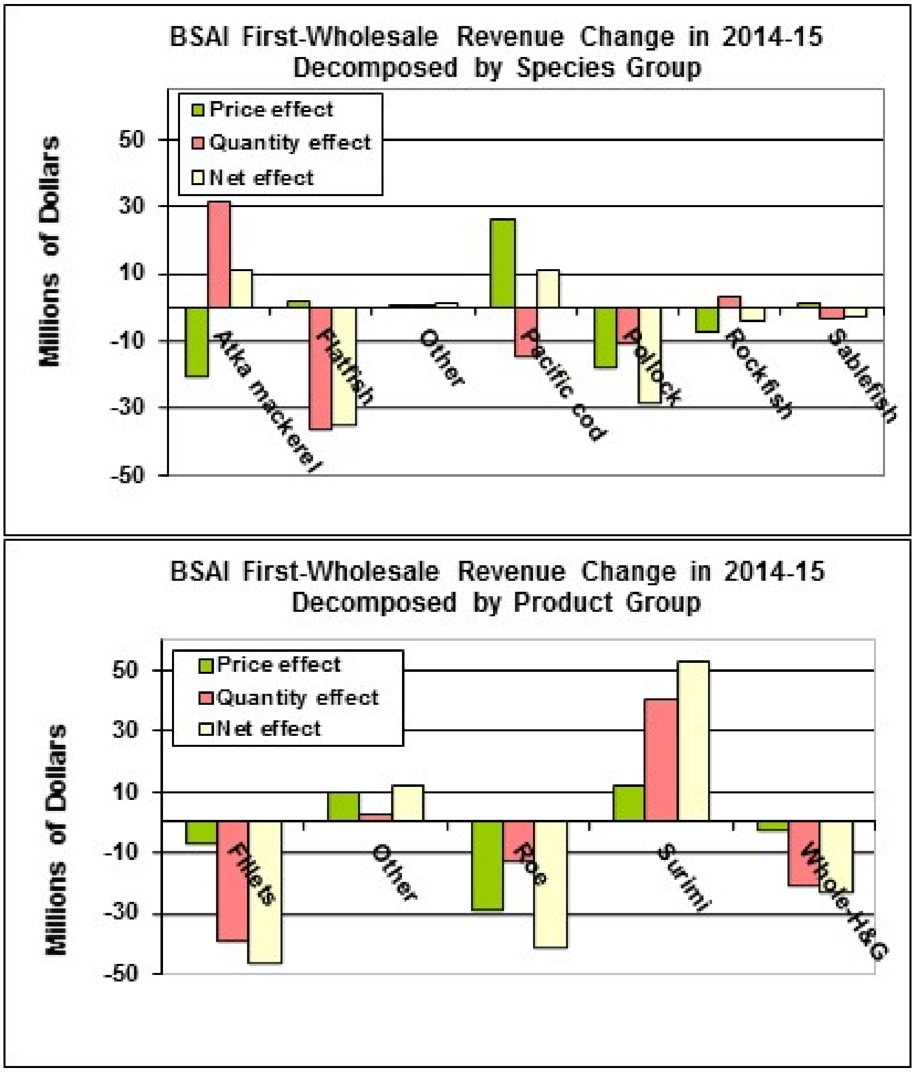


Figure 1.4: Decomposition of the change in first-wholesale revenues from 2014-15 in the BSAI area. **Notes:** The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due to the 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).

By species group, a negative quantity effect of $36 million for flatfish, and positive price effect of $26 million for cod, were the largest changes in first-wholesale revenues from the BSAI for 2014-15 (Figure 1.4). A positive quantity effect for Atka mackerel of $32 million largely offset the negative quantity effect for flatfish. Other notable changes in the BSAI were negative price and quantity effects for pollock that produced a negative net effect of $28 million. By product group, negative price and quantity effects were distributed among fillets, roe, and whole head & gut, for negative net effects of $46 million, $41 million, and $23 million, respectively. In contrast, surimi showed positive price and quantity effects for a positive net effect of $52 million in the BSAI first-wholesale revenue decomposition for 2014-15.

In summary, first-wholesale revenues from the BSAI groundfish fisheries decreased by $46 million from 2014-15. Major drivers were a negative quantity effect for flatfish, and negative price and quantity effects for pollock. In comparison, first-wholesale revenues decreased by $37 million from 2014-15 in the GOA, due primarily to a negative quantity effect for flatfish, and negative price and quantity effects for cod.

Decomposition of the change in first-wholesale revenues from 2014-15 in the GOA

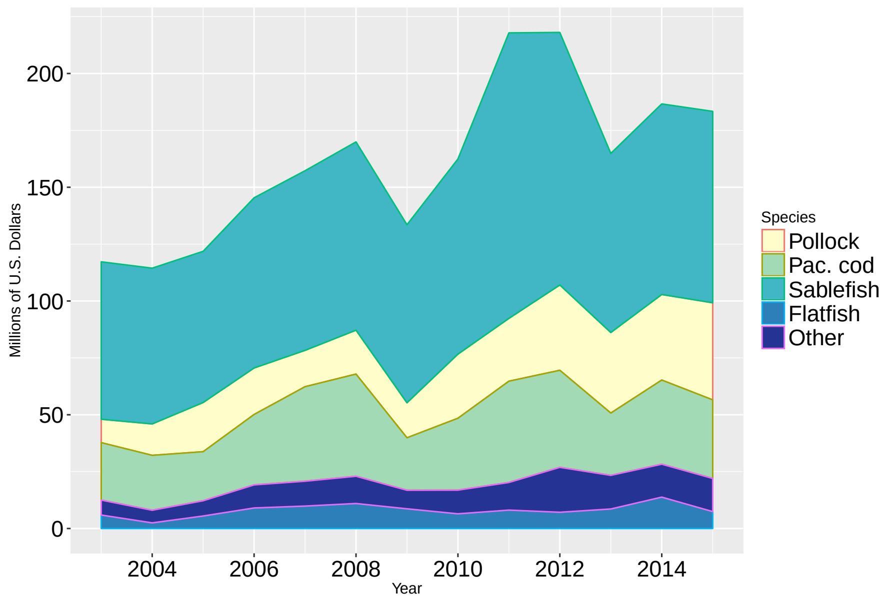


Figure 1.5: Real ex-vessel value of the groundfish catch in the domestic commercial fisheries in the GOA area by species, 2003-2015 (base year = 2015).

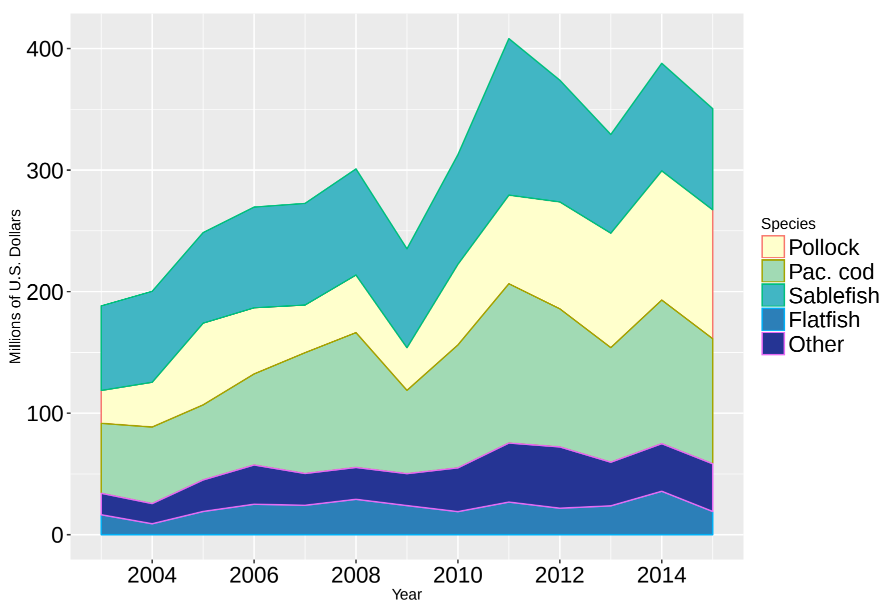
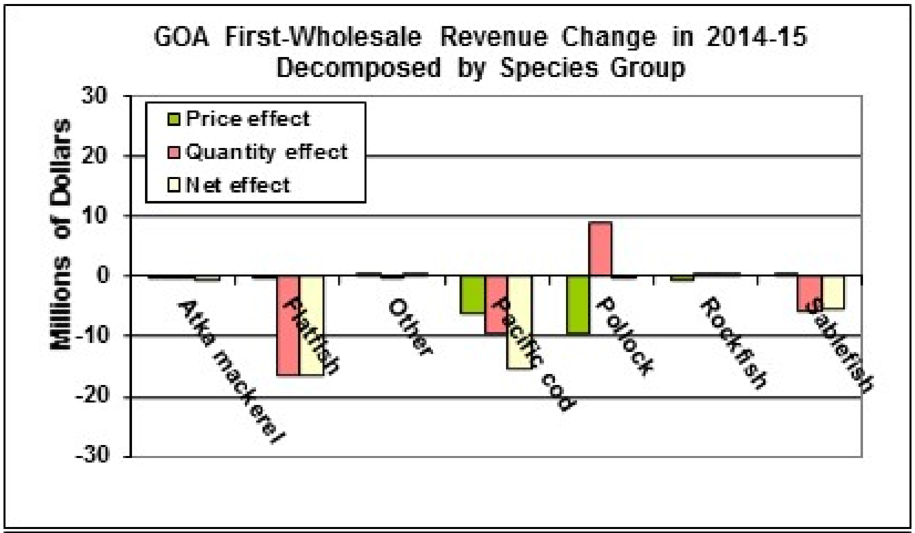


Figure 1.6: Real gross product value of the groundfish catch in the GOA area by species, 2003-2015 (base year = 2015).



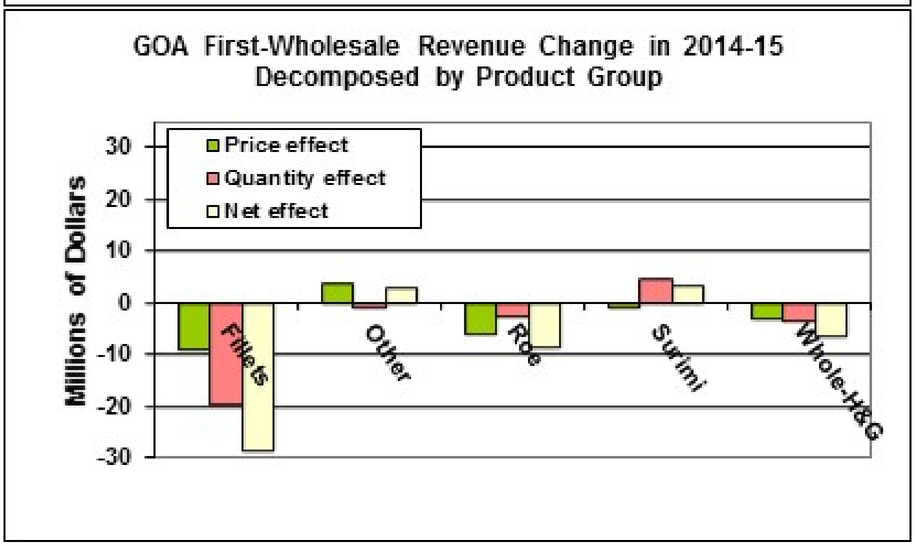


Figure 1.7: Decomposition of the change in first-wholesale revenues from 2014-15 in the GOA area. **Notes:** The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due to the 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).

The following brief analysis summarizes the overall changes that occurred between 2014-15 in the quantity produced and revenue generated from GOA groundfish. According to data reported in the 2016 Economic SAFE report, the ex-vessel value of GOA groundfish decreased from $208 million in 2014 to $206 million in 2015 (Figure 1.5), and first-wholesale revenues from the processing and production of groundfish in the Gulf of Alaska (GOA) fell from $388 million in 2014 to $350 million in 2015, a decrease of 10% (Figure 1.6). At the same time, the total quantity of groundfish products from the GOA decreased from 131 thousand metric tons to 126 thousand metric tons, a difference of 5 thousand metric tons. These changes in the GOA account for part of the change in first-wholesale revenues from Alaska groundfish fisheries overall which decreased by $83 million, a relative decrease of 4% in 2015 compared to 2014.

By species group, negative quantity effect for flatfish of $17 million was the largest change in first-wholesale revenues from the GOA for 2014-15, followed closely by negative price and quantity effects for cod that implied a negative net effect of $15 million (Figure 1.7). By product group, negative price and quantity effects were concentrated in the fillets category for a negative net effect of $28 million in the GOA first-wholesale revenue decomposition for 2014-15.

In summary, first-wholesale revenues from the GOA groundfish fisheries decreased by $37 million from 2014-15. The main drivers of this decrease were a negative quantity effect for flatfish, and negative price and quantity effects for cod. These negative effects were highest in the fillets product group. In comparison, first-wholesale revenues decreased by $46 million from 2014-15 in the BSAI due mainly to a negative quantity effect for flatfish, and negative price and quantity effects for pollock.

2. OVERVIEW OF ECONOMIC STATUS REPORT, 2015

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, 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.* 2015) 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 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 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 either 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; and 6) maintaining sustainable fisheries and fishing communities that allow for new entrants into the fisheries.

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. Section A contains additional economic data tables.

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 discard. The North Pacific Groundfish 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 1989. Observer data are collected by NMFS-certified 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).

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 both retained catch 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). 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.

In the CAS, at-sea sample 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 (post-stratification). 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, including levels of post-stratification, 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 generated every three years based on the estimated condition of halibut sampled by observers (Williams 2012). These rates are applied to the total estimated halibut discard (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 and catch for just FMP-managed groundfish are provided in Tables 2 through 5. Table 2 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. Tables 3 and 4 provide estimates of total catch by species, area, gear, and target species for the GOA and BSAI. 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 Tables 4, 8, 10, 13, and 15; and the other flatfish species category is not comparable in Tables 4, 8, and 26.

Catch data by the residency of primary vessel owners are summarized in Table 5. These data are sourced 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 domestic groundfish fishery as a whole, 83% of the 2015 catch volume was made by vessels with primary owners that were not Alaska residents, although catch in the GOA was more equally distributed between Alaska resident and non-resident vessel owners.

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 2011-2015. Tables 7-10 provide estimates of discarded catch and discard rates by species, area, gear, and target fishery.

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 2011-2015 are summarized by area and gear in Table 11. More detailed estimates of PSC and of PSC rates for 2014 and 2015 are in Tables 12-15. Details on PSC estimation can be found in Cahalan *et al.* (2014).

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. 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. Tables 16 through 24 summarize data on ex-vessel prices and value of Alaska groundfish fisheries, with Tables 19 through 22 including only groundfish catch counted against federal TACs. Tables 16, 17, 23 and 24 additionally including groundfish catch and/or pricing data from state-managed fisheries. In general, ex-vessel prices are derived from Commercial Operator Annual Report 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 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. Additional details on pricing methodology are available in metadata for these tables accessible at `http://www.afsc.noaa.gov/REFM/Socioeconomics/SAFE/CSV_groundfish/metadata/groundfish_exvessel_value_metadata.pdf`.

Table 18 contains estimated ex-vessel prices that are used with estimates of retained catch to calculate ex-vessel values (gross revenues). Prices in this table 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 Table 19.

Tables 20 and 21 summarize the ex-vessel value of catch delivered to shoreside processors by vessel-size class, gear, and area. Table 20 gives the total ex-vessel value in each category and Table 21 gives the ex-vessel value per vessel. Table 22 provides estimates of ex-vessel value by residency of primary vessel owners, area, and species. For the BSAI and GOA combined, 74% of the 2015 ex-vessel value was accounted for by vessels with primary owners who indicated that they were not residents of Alaska.

Table 23 presents estimates of ex-vessel value of catch delivered to shoreside processors, and Table 24 gives the ex-vessel value of groundfish as a percentage of the ex-vessel value of all species delivered to shoreside processors.[2] Data in both tables are summarized by processor groupings determined primarily by their geographical locations. Refer to the table footnotes for additional details on processor groupings.

An additional set of tables in the appendix, Tables 16.B-24.B, present ex-vessel prices and value utilizing prices derived from ADF&G fish tickets priced by the Alaska Commercial Fisheries Entry Commission (CFEC). This provides an alternative source of ex-vessel prices to the COAR purchasing data that has historically been used to assemble Tables 16-24. CFEC fish ticket prices reflect individual transactions reported on shoreside and mothership landing reports, adjusted by analysts with consideration to COAR buying data, and therefore may be subject to additional

[2] This including catch in non-Federal fisheries. See table notes for details.

scrutiny. Work is ongoing to analyze and characterize differences between the two pricing methods, and we are working with industry to get their perspective on which source may best reflect the pricing conditions faced by their companies. Until we have finalized this analysis we will retain the COAR pricing in the main body of the status report (Section 4: Tables 16-24) and include the CFEC pricing in the appendix. Note that Tables 16.B-24.B are valid only for the years after 2003.

2.2.3 First Wholesale Production, Prices and Value

The first wholesale market is the first sale onto the wholesale market of fisheries products after initial processing by a commercial processor with a Federal Processor Permit (FPP).[3] Groundfish first wholesale production data summarized in Tables 25 through 35 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 in Tables 25-35 are given as F.O.B. (Free On Board) Alaska, indicating that transportation costs are not included in values and prices.

Estimates of first wholesale weight and value (gross revenue) of the processed products sourced from catch of BSAI and GOA groundfish are presented by species, product form, area, and type of processor in Tables 25, 28, and 29. Product price-per-pound estimates are presented in Table 26, and estimates of total first wholesale product value per round metric ton of retained catch are reported in Table 27. For Table 27, we source the round weight of retained catch from CAS data rather than using product recovery rates to derive round weights from production data.

Table 30 reports estimates of the weight and first wholesale value of processed products from catch in the non-groundfish commercial fisheries of Alaska. As with the ex-vessel value estimates reported in Table 16, Tables 30 and 25 used together provide a means of comparing the value of groundfish and non-groundfish fisheries in Alaska.

Gross product value of Alaska groundfish is summarized by processing sector and area in Table 31. Table 32 and Table 33, respectively, summarize first wholesale value and value per vessel for the catcher/processor sector, stratified by vessel category, length, and area. Vessel categories are assigned by vessel rather than by trip; categorization methods are described in metadata for these tables available at `http://www.afsc.noaa.gov/REFM/Socioeconomics/SAFE/CSV_groundfish/metadata/groundfish_first_wholesale_value_metadata.pdf`.

Tables 34 and 35 present the gross product value of groundfish processed by shoreside processors and the groundfish gross product value as a percentage of all-species gross product value, with both tables reported by the same processor groupings used in Tables 23 and 24. 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.

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

2.2.4 Counts and Average Revenue of Vessels That Meet a Revenue Threshold

For the purposes of Regulatory Flexibility Act analyses, a business involved in fish harvesting is defined by the National Marine Fisheries Service (NMFS) as a small business if it is independently owned and operated and is not dominant in its field of operation (including its affiliated operations worldwide). As of December 29, 2015, the NMFS size standards for finfish fishing (NAICS code 114111) and shellfish fishing (NAICS code 114112) vessels defined a small entity vessel as that which has combined annual receipts across all revenue sources no greater than $11 million.[4] Prior to December 29, 2015 Regulatory Flexibility Act analyses used the Small Business Administration (SBA) size standards which defined a small entity size for finfish fishing and shellfish fishing industries as those that have combined annual receipts across all revenue sources no greater than $20.5 million and $5 million, respectively.

Tables 36 - 39b present estimated counts and average revenues of entities with catch in federally-managed Alaska groundfish fisheries, reported by NMFS entity size standard. Entities are classified as large or small for a given year using their average annual gross revenues over the three most recent years. Beginning with the reporting of 2013 data, which draws on more complete accounting of groundfish bycatch in directed halibut fisheries, we include vessels with indirect catch of groundfish while targeting halibut among the entities reported in these tables.

Estimates of gross revenue include revenue streams from ex-vessel landings (for catcher vessels) and first wholesale production (for catcher/processors) of groundfish and other species. Available sources of data on Alaska fisheries revenue include the CFEC gross earnings file, COAR product reports, and federal groundfish production data priced via AKFIN's product price index. Data on ex-vessel revenue from federal West Coast fisheries, including the imputed ex-vessel value of the at-sea whiting fishery, have also been incorporated into revenue estimates for the relevant entities to maintain consistency with the size standard requirement that all revenue sources be used. It should be noted that current methods for calculating gross revenue are likely to overestimate the number of small entities and underestimate the number of large entities, as vessels may have additional revenue streams (e.g., tendering activity) not represented in these data sets. We also lack information necessary to determine if a vessel is independently owned and operated, although we attempt in some tables to report counts and average revenues accounting for known affiliations among vessels, as described further below.

Estimates of fishing vessels that are clearly large entities and those that are potentially small entities are presented in Tables 36 and 37a, respectively. Estimates of the average annual revenue per vessel are presented in Table 38 for large entity vessels and in Table 39a for the small entity vessels. These tables treat vessels as proxies for entities, in that revenue and entity size are determined for each vessel individually without regard to affiliated vessels.

An alternative set of tables, Tables 37b and 39b, show, respectively, small entity counts and average annual revenues per entity taking into account known affiliations among vessels. These tables utilize information on cooperative affiliations in the AFA pollock, Amendment 80 non-pollock trawl, Central Gulf of Alaska rockfish, Bering Sea & Aleutians Islands crab, and freezer longliner BSAI Pacific cod fisheries, in addition to known corporate affiliations among vessels. Group revenue for these affiliations is calculated as the total revenue across all member vessels; group revenue is used to determine small or large entity status for affiliations. Entity size for all affiliations is determined

[4] `https://federalregister.gov/a/2015-32564`.

with respect to the finfish small entity standard, with the exception of crab cooperatives, which are subject to the shellfish standard.

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

Tables 40 through 50 present data on selected 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. Data for these tables are sourced from catch accounting data, ADF&G groundfish fish tickets, North Pacific groundfish observer data, and at-sea groundfish production reports. Note that these tables are not directly useable or comparable with Tables 36-39b in that they do not count vessels and trips for fishing activity where halibut is identified as the target species.

Vessel counts and registered net tonnage of vessels in the groundfish fisheries are presented by area and gear in Table 40, and the numbers of vessels that landed groundfish are depicted in Fig. 3.6 by gear type. More detailed measures of vessel participation stratified by target, vessel type, length class, catch volume, residency of vessel owners, and month are shown in Tables 41-47, with Tables 42 and 44 additionally reporting mean length and net tonnage for vessels in these strata. In particular, Table 43 gives the numbers of smaller (i.e., less than 60 feet in length) hook-and-line catcher vessels.

Tables 48 and 49 provide estimates of vessel weeks for catcher vessels and catcher/processors, respectively, stratified by length class, area, gear, and target fishery. 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.

At-sea groundfish production reports, which include data on the number of licensed crew working aboard motherships and catcher/processors, provide the source for reporting of "crew weeks" by month and area in Table 50. 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.

2.2.6 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.[5] Under the 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.[6] Since 1995 the commercial halibut fisheries off Alaska have been managed as a catch share fishery through

[5] www.iphc.int/home.html.
[6] http://www.adfg.alaska.gov/index.cfm?adfg=halibut.management.

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 H1A-H13 are only for the commercial fishing sector. Tables H1A-H2 display Pacific halibut commercial landings (net weight retained catch). Table H3 displays prohibited species catch (of non-halibut species) on commercial trips where was the halibut target species. Ex-vessel value and price are displayed by various management areas, vessel length and ports in Tables H4A-H6. First-wholesale production, value and prices by product type is displayed in Table H7 and value by region in Table H8. Fishing effort as measured by: vessel counts are displayed in Tables H9-H11; days fishing are displayed in Table H12; crew weeks are displayed in Table H13.

2.2.7 Description of the Category "Other" in Data Tables

- TABLE 1A: "Other shellfish" comprises shellfish other than crab, including abalone, mussel, clam, oyster, scallop, sea cucumber, sea urchin, shrimp, and snails. Note that octopus and squid are reported as groundfish as they are managed under the BSAI and GOA groundfish FMPs.
- TABLE 4, 8: "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 11, 12: "Other salmon" are non-Chinook salmon species (sockeye, coho, pink, chum). "Other King crab" are blue, golden (brown), and scarlet king crab species. "Other Tanner crab" are snow, grooved, and triangle Tanner crab species.
- TABLE 12, 14: "Other groundfish" are octopus, sculpin, shark, skates, and squid.
- TABLE 13, 15: "Other flatfish" in the BSAI include Alaska Plaice and species within the BSAI other flatfish management complex (starry flounder and dover, rex, butter, english, petrale, and sand sole)
- TABLE 25, 26, 28, 29: "Other fillets" for pollock include fillets with skin and ribs; fillets with skin, no ribs; fillets with ribs, no skin; and skinless/boneless fillets
- TABLE 26: "Flat Other" includes BSAI Alaska Plaice and species within the BSAI other flatfish management complex (starry flounder and dover, rex, butter, english, petrale, and sand sole)
- TABLE 27: "Other" species are primarily skate, squid, octopus, shark, and sculpin.

- TABLE 30: "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).

2.2.8 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 19, 20, 25, and 26. 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 and first wholesale value estimates reported in Tables 16. 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 ex-vessel and first wholesale value estimates reported in Tables 30. 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 Table 54-56 of this report, are available in Fisheries of the United States (FUS), published annually by the NMFS Office of Science & Technology. The 2015 FUS is available at: `http://www.st.nmfs.noaa.gov/Assets/commercial/fus/fus12/index.html`.

- 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`.

- The information provided by the FMA division of the AFSC has had a key role in the monitoring of total allowable catches (TACs), catch of prohibited species. In recent years, observer data for individual vessel accounting has been important in the management of the CDQ program, AFA pollock, BSAI crab, Amendment 80 fisheries, as well as others. In addition, much of the information that is used to assess the status of groundfish stocks, to monitor the interactions between the groundfish fishery and marine mammals and sea birds, and to analyze fishery management actions is provided by the FMA.

- 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. An online survey to facilitate user feedback is available at: `http://www.afsc.noaa.gov/REFM/Socioeconomics/SAFE/SAFE_survey.php`.

2.4. Citations

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2.5. Acknowledgements

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

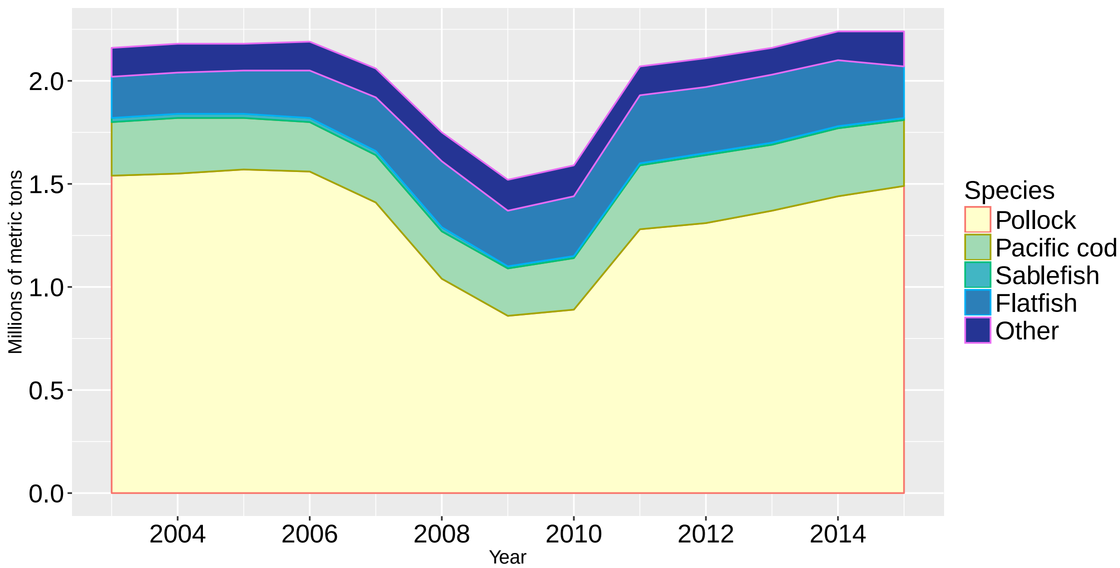

Figure 3.1: Groundfish catch in the commercial fisheries off Alaska by species, 2003-2015.

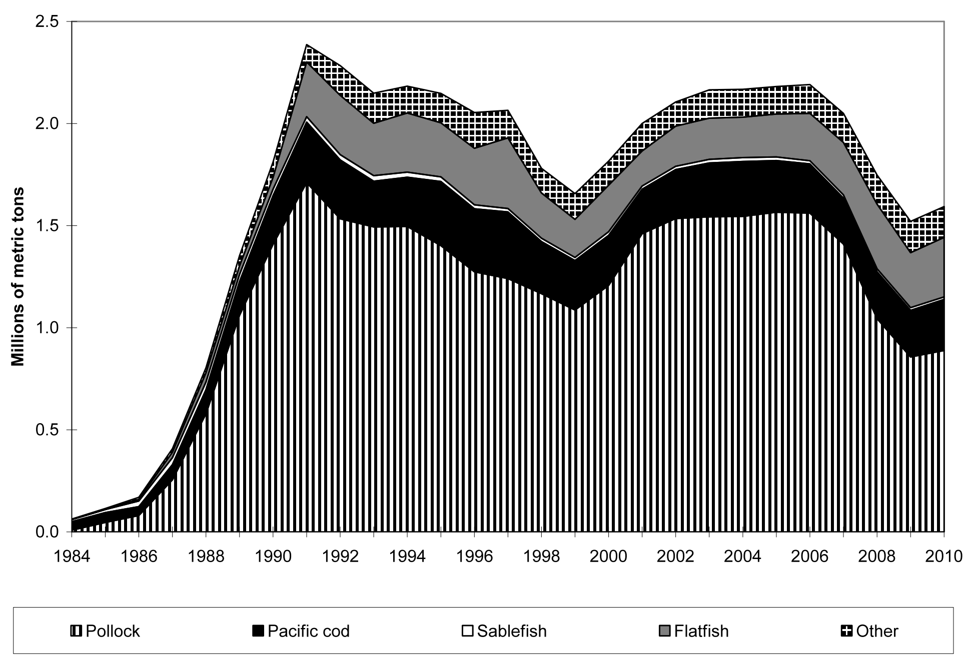

Figure 3.2: Groundfish catch in the domestic commercial fisheries off Alaska by species, (1984-2010).
Notes: Catch for 2011 and onward are displayed in Figure 3.1.

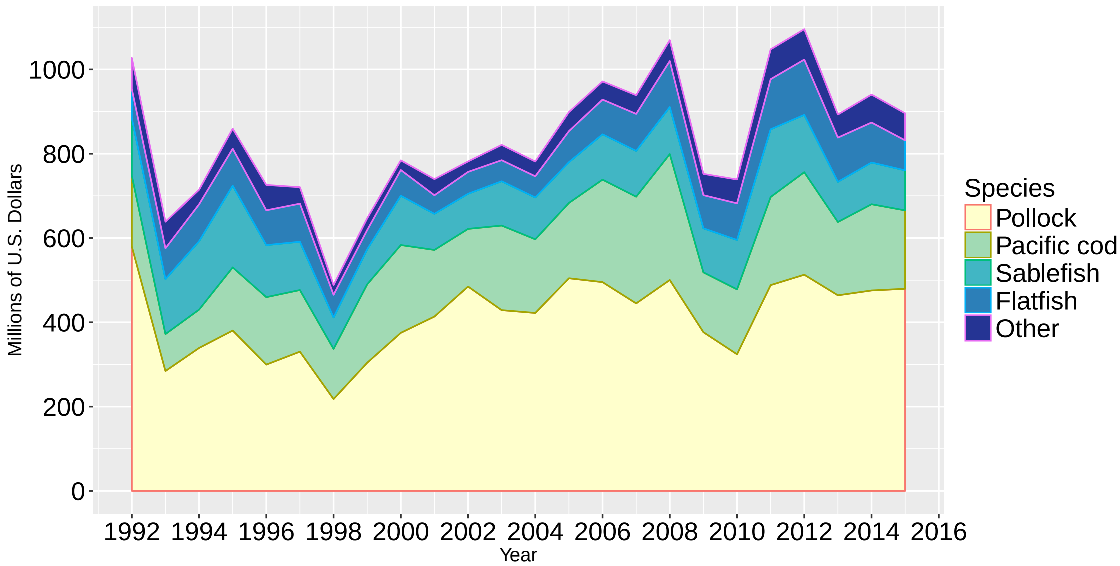

Figure 3.3: Real ex-vessel value of the groundfish catch in the domestic commercial fisheries off Alaska by species, 1992-2015 (base year = 2015).

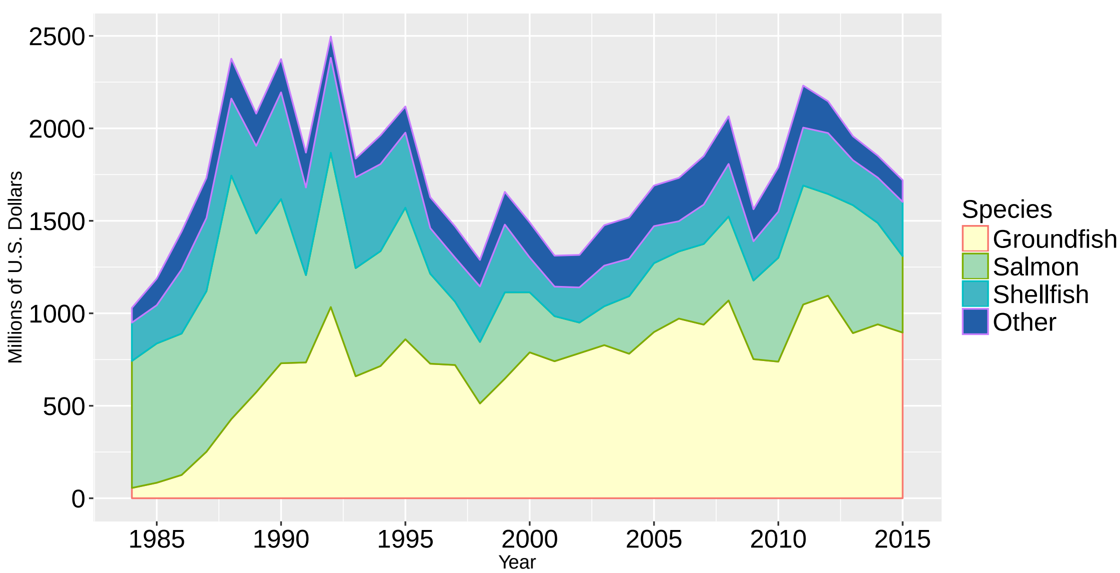

Figure 3.4: Real ex-vessel value of the domestic fish and shellfish catch off Alaska by species group, 1984-2015 (base year = 2015).

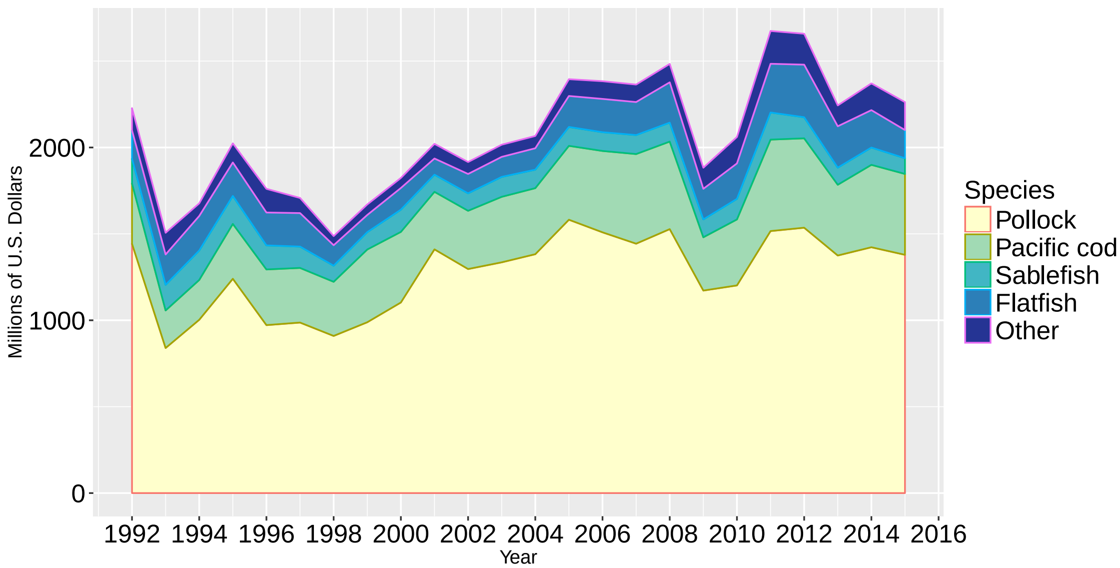

Figure 3.5: Real gross product value of the groundfish catch off Alaska by species, 1992-2015 (base year = 2015).

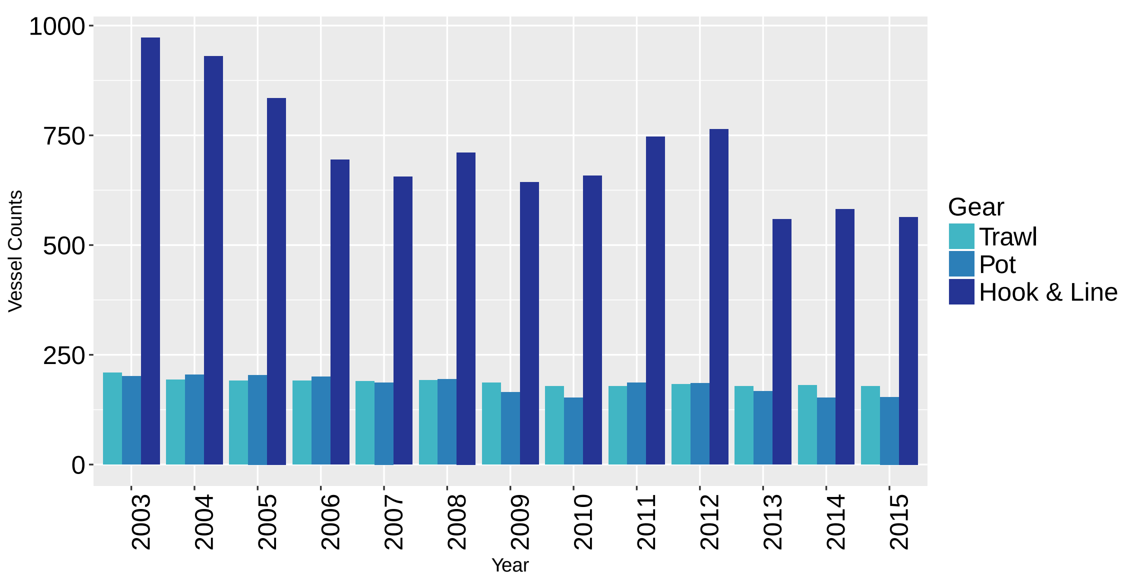

Figure 3.6: Number of vessels in the domestic fishery off Alaska by gear type, 2003-2015.

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

Table 1: Groundfish catch in the commercial fisheries of Alaska by area and species, 2006-2015 (1,000 metric tons, round weight).

	Year	Pollock	Sablefish	Pacific Cod	Flatfish	Rockfish	Atka Mackerel	Total
Gulf of Alaska	2006	72.0	14.6	47.9	42.3	24.5	0.9	210.3
	2007	52.7	14.7	52.3	40.5	23.6	1.5	192.4
	2008	52.6	13.6	59.0	45.7	23.1	2.1	202.6
	2009	44.2	12.0	53.2	42.3	22.8	2.2	185.6
	2010	76.7	10.9	78.3	37.7	25.5	2.4	238.7
	2011	81.5	12.0	85.2	41.1	23.1	1.6	251.8
	2012	104.0	12.7	77.9	29.5	27.4	1.2	258.7
	2013	96.4	12.8	68.6	33.9	24.9	1.3	250.2
	2014	142.6	11.1	84.8	47.6	28.8	1.0	326.2
	2015	167.6	11.1	79.0	26.7	29.0	1.2	324.1
Bering Sea & Aleutian Islands	2006	1,489.8	2.2	193.0	189.5	17.7	61.9	1,982.6
	2007	1,357.0	2.4	174.5	216.2	23.6	58.7	1,860.4
	2008	991.9	2.0	171.0	270.0	21.7	58.1	1,545.7
	2009	812.5	2.0	175.8	226.3	19.5	72.8	1,337.1
	2010	811.6	1.8	171.9	253.3	23.5	68.6	1,354.5
	2011	1,200.4	1.7	220.1	285.8	28.2	51.8	1,817.6
	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	1,914.5
	2014	1,300.2	1.1	249.4	276.0	36.0	31.0	1,928.2
	2015	1,323.2	0.6	242.1	219.2	39.6	53.3	1,914.1
All Alaska	2006	1,561.8	16.9	240.9	231.8	42.2	62.8	2,192.9
	2007	1,409.7	17.0	226.7	256.7	47.2	60.2	2,052.8
	2008	1,044.4	15.7	230.0	315.7	44.8	60.2	1,748.3
	2009	856.8	14.0	229.0	268.6	42.3	75.0	1,522.7
	2010	888.4	12.7	250.2	291.0	49.0	71.1	1,593.2
	2011	1,281.9	13.7	305.3	326.9	51.3	53.4	2,069.4
	2012	1,310.2	14.6	328.9	320.7	55.5	49.0	2,116.6
	2013	1,370.1	14.5	318.9	331.1	59.8	24.5	2,164.7
	2014	1,442.9	12.3	334.2	323.6	64.9	32.0	2,254.5
	2015	1,490.8	11.7	321.1	245.9	68.7	54.5	2,238.2

Notes: These estimates include catch from both federal and state of Alaska fisheries.

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

Table 1A: Catch of species other than groundfish in the domestic commercial fisheries, 2001-2015 (1,000 metric tons).

Year	Crab	Other Shellfish	Salmon	Halibut	Herring	Total
2001	21.4	2.8	311.3	33.7	38.4	407.8
2002	26.3	3.8	237.3	35.4	31.7	334.3
2003	25.8	2.5	286.0	34.8	31.3	380.4
2004	23.9	3.6	316.6	34.7	32.2	410.9
2005	25.9	2.9	395.7	33.5	38.9	496.9
2006	31.4	2.5	287.8	31.4	36.2	389.2
2007	32.1	2.1	390.7	30.5	30.5	485.8
2008	45.1	2.3	290.4	29.3	38.2	405.4
2009	40.6	2.2	304.6	26.2	39.4	413.0
2010	36.1	2.1	343.3	24.9	49.2	455.6
2011	36.5	1.7	334.8	18.7	44.7	436.5
2012	50.8	1.9	277.6	14.7	34.0	379.0
2013	39.5	1.8	459.3	13.0	38.6	552.3
2014	38.6	1.8	309.9	9.8	43.9	404.1
2015	55.0	2.2	472.1	10.4	31.1	570.7

Notes: These estimates include catch from both federal and state of Alaska fisheries

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

Table 2: Groundfish catch off Alaska by area, vessel type, gear and species, 2011-2015 (1,000 metric tons, round weight).

			Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Year	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total
Hook & Line	Sablefish	2011	9	1	10	1	0	1	10	1	11
		2012	10	1	11	1	0	1	11	1	12
		2013	10	1	11	1	0	1	11	1	12
		2014	9	1	9	1	0	1	9	1	10
		2015	9	0	9	0	0	0	9	1	10
	Pacific Cod	2011	9	8	17	1	117	119	10	126	136
		2012	11	5	15	1	131	132	11	136	147
		2013	10	3	13	1	125	127	12	128	140
		2014	10	6	16	2	125	128	12	131	144
		2015	8	5	13	1	130	131	9	136	144
	Flatfish	2011	0	0	0	0	4	4	0	4	5
		2012	0	0	0	0	5	5	0	5	5
		2013	0	0	1	0	3	3	1	3	4
		2014	0	0	0	0	4	4	0	4	4
		2015	0	0	0	0	4	4	0	4	5
	Rockfish	2011	1	0	1	0	0	0	1	0	1
		2012	1	0	1	0	0	0	1	0	2
		2013	2	0	2	0	0	0	2	0	3
		2014	1	0	2	0	0	0	2	0	2
		2015	1	0	2	0	0	0	1	0	2
	All Groundfish	2011	22	10	32	2	146	148	24	156	180
		2012	24	6	31	2	162	164	26	168	194
		2013	30	5	34	3	156	158	32	160	193
		2014	25	8	33	4	159	163	29	166	196
		2015	22	8	29	2	168	170	24	176	200

Continued on next page.

Table 2: Continued

		Year	Gulf of Alaska Catcher Vessels	Gulf of Alaska Catcher Processors	Gulf of Alaska Total	Bering Sea & Aleutian Islands Catcher Vessels	Bering Sea & Aleutian Islands Catcher Processors	Bering Sea & Aleutian Islands Total	All Alaska Catcher Vessels	All Alaska Catcher Processors	All Alaska Total
Pot	Pacific Cod	2011	29	*	29	25	3	28	54	3	57
		2012	21	*	21	23	5	29	45	5	50
		2013	17	-	17	23	7	30	40	7	47
		2014	20	-	20	24	8	31	44	8	51
		2015	21	-	21	22	8	30	43	8	51
Trawl	Pollock	2011	78	2	80	632	562	1,195	710	564	1,274
		2012	99	1	101	634	567	1,201	733	568	1,302
		2013	91	2	93	662	605	1,267	753	607	1,360
		2014	138	2	140	670	623	1,293	808	624	1,433
		2015	161	1	163	688	629	1,316	849	630	1,479
	Sablefish	2011	1	1	1	0	0	0	1	1	1
		2012	0	0	1	*	0	0	0	1	1
		2013	0	0	1	0	0	0	0	1	1
		2014	0	0	1	*	0	0	0	0	1
		2015	1	0	1	0	0	0	1	0	1
	Pacific Cod	2011	15	1	16	39	33	72	54	34	89
		2012	19	1	20	46	37	84	65	39	103
		2013	20	1	21	42	45	87	62	46	108
		2014	24	2	26	41	36	77	65	38	103
		2015	20	1	22	38	35	73	58	36	94
	Flatfish	2011	23	16	39	7	272	278	30	288	318
		2012	16	11	27	6	272	277	22	282	304
		2013	20	12	31	4	275	279	24	287	311
		2014	20	24	44	4	260	264	25	284	308
		2015	13	11	24	13	202	214	26	213	238

Continued on next page.

Table 2: Continued

		Year	Gulf of Alaska: Catcher Vessels	Gulf of Alaska: Catcher Processors	Gulf of Alaska: Total	Bering Sea & Aleutian Islands: Catcher Vessels	Bering Sea & Aleutian Islands: Catcher Processors	Bering Sea & Aleutian Islands: Total	All Alaska: Catcher Vessels	All Alaska: Catcher Processors	All Alaska: Total
Trawl	Rockfish	2011	9	13	22	1	26	27	10	39	49
		2012	11	15	26	0	25	26	12	40	52
		2013	10	13	23	0	32	32	10	45	55
		2014	12	15	27	0	33	33	12	48	60
		2015	11	15	27	4	36	39	15	51	66
	Atka Mackerel	2011	0	1	1	5	46	52	5	48	53
		2012	0	1	1	1	43	44	1	44	45
		2013	0	1	1	0	21	21	0	23	23
		2014	0	1	1	0	28	28	0	29	29
		2015	0	1	1	3	50	53	4	51	54
	All Groundfish	2011	128	35	162	686	949	1,634	813	983	1,797
		2012	148	30	178	689	953	1,642	837	984	1,821
		2013	144	30	173	710	989	1,698	854	1,018	1,872
		2014	196	44	241	718	987	1,706	915	1,032	1,946
		2015	209	31	240	748	956	1,704	957	987	1,944
All Gear	All Groundfish	2011	180	45	224	714	1,098	1,812	894	1,143	2,036
		2012	195	36	231	714	1,121	1,835	909	1,157	2,065
		2013	191	34	225	736	1,151	1,888	927	1,186	2,113
		2014	243	52	295	747	1,154	1,901	989	1,206	2,196
		2015	252	38	291	773	1,133	1,906	1,025	1,171	2,196

Notes: The estimates are of total catch (i.e., retained and discarded catch). All groundfish include additional species categories. These estimates include only catch counted against federal TACs. Includes FMP groundfish catch on halibut targets. Beginning in 2013, CAS includes estimates of groundfish discards in halibut fishery "*" 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: Gulf of Alaska groundfish catch by species, gear, and target fishery, 2014-2015 (1,000 metric tons, round weight).

		Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	All Species
2014	Hook & Line	Pollock, Bottom	*	-	-	-	-	-	-	-	*	-	*
		Sablefish	0	8.8	0.1	0.2	0	-	0	0	1.1	-	10.7
		Pacific Cod	0.2	0	14.6	0	0	-	0	0	0.1	0	17.6
		Rockfish	0	*	0	-	-	-	-	-	0.1	-	0.1
		All Targets	0.2	9.5	15.8	0.3	0	-	0	0	1.5	0	32.7
	Pot	Sablefish	-	-	*	-	-	-	-	-	-	-	*
		Pacific Cod	0	0	20.0	0	0	*	-	0	0	0	21.4
		All Targets	0	0	20.0	0	0	*	-	0	0	0	21.4
	Trawl	Pollock, Bottom	18.7	0	2.8	2.2	0.3	0.3	0	0.2	0.2	*	25.4
		Pollock, Pelagic	116.5	0	0.5	0.2	0.1	0	0	0	0.4	*	117.8
		Sablefish	0	0.1	0	0	0	0	0	0	0	-	0.2
		Pacific Cod	1.3	0	17.2	1.3	0.3	0.1	0	0.9	0.1	0	21.5
		Arrowtooth	1.5	0.2	3.0	29.4	1.3	1.8	0.1	0.7	2.6	0.5	42.2
		Flathead Sole	*	*	*	*	*	*	*	*	*	-	*
		Rex Sole	0	0	0.1	0.2	0	0.4	0	0	0.1	*	0.8
		Flatfish, Shallow	0.3	0	1.8	0.4	0.2	0	0	1.9	0	*	4.8
		Rockfish	1.3	0.5	0.6	1.4	0	0.1	0.1	0	23.2	0.4	27.9
		All Targets	139.7	0.9	26.0	35.1	2.2	2.7	0.3	3.8	26.7	1.0	240.7
	All Gear	All Targets	139.9	10.4	61.8	35.4	2.2	2.7	0.3	3.8	28.3	1.0	294.8

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Table 3: Continued

		Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	All Species
2015	Hook & Line	Pollock, Bottom	*	-	-	-	-	-	-	-	*	-	*
		Sablefish	0	8.5	0.1	0.1	0	-	0	0	1.1	0	10.4
		Pacific Cod	0.2	0	12.6	0	0	0	0	0	0.1	*	15.4
		Rockfish	0	-	0	-	-	-	-	-	0.1	*	0.1
		All Targets	0.2	9.3	13.1	0.2	0	0	0	0	1.6	0	29.3
	Pot	Pacific Cod	0.1	0	20.7	0	0	0	0	0	0	0	21.9
		All Targets	0.1	0	20.7	0	0	0	0	0	0	0	21.9
	Trawl	Pollock, Bottom	12.2	0.1	1.1	1.3	0.3	0.1	0	0.3	0.1	0	15.9
		Pollock, Pelagic	147.1	0	0.6	0.4	0.2	0	0	0	0.1	0	149.1
		Sablefish	*	0.2	*	0	-	0	0	0	0.1	-	0.3
		Pacific Cod	0.8	0	17.5	1.1	0.3	0.1	0	1.0	0.2	0.1	21.8
		Arrowtooth	0.9	0.2	1.4	13.9	0.8	0.9	0.1	0.2	1.2	0	20.3
		Flathead Sole	*	*	*	*	*	*	*	*	*	-	*
		Rex Sole	*	*	*	*	*	*	*	*	*	*	*
		Flatfish, Shallow	0.2	0	0.4	0.1	0	0	*	0.9	0	*	1.7
		Rockfish	1.3	0.4	0.8	1.4	0	0.1	0	0	25.2	1.0	30.5
		All Targets	162.5	1.0	21.7	18.1	1.7	1.3	0.2	2.5	26.9	1.2	239.5
	All Gear	All Targets	162.8	10.2	55.5	18.3	1.7	1.3	0.2	2.5	28.5	1.2	290.7

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. Includes FMP groundfish catch on halibut targets. Beginning in 2013, CAS includes estimates of groundfish discards in halibut fishery "*" 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 4: Bering Sea and Aleutian Islands groundfish catch by species, gear, and target fishery, 2014-2015, (1,000 metric tons, round weight).

		Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Yellowfin	Flat Other	Rockfish	Atka Mackerel	All Species
2014	Hook & Line	Sablefish	*	0.6	*	0	0	*	-	-	0	0.1	0	1.0
		Pacific Cod	6.0	0	127.5	0.5	0	0.6	0.1	1.9	0	0.1	0	159.8
		Turbot	0	0	*	0	0	0	-	-	*	0	-	0.8
		Rockfish	-	*	*	*	*	-	-	-	-	*	-	*
		All Targets	6.0	0.7	127.7	0.6	0.1	0.6	0.1	1.9	0.1	0.4	0	162.9
	Pot	Sablefish	-	*	-	*	*	-	-	-	-	*	-	*
		Pacific Cod	0	-	31.2	0	*	0	0	0.4	0	0	0	32.2
		All Targets	0	*	31.2	0	*	0	0	0.4	0	0	0	32.2
	Trawl	Pollock, Bottom	47.7	0	1.1	0.3	0.1	0.6	1.9	1.2	0.3	0.2	0.1	54.2
		Pollock, Pelagic	1,196.1	*	4.1	0.5	0.1	2.0	2.5	0.7	0.2	1.2	0	1,209.2
		Sablefish	*	*	-	*	-	*	*	-	*	*	-	*
		Pacific Cod	5.5	*	42.6	0.2	0	0.2	1.5	1.5	0.7	0	0	52.8
		Arrowtooth	2.7	0	0.4	10.1	2.1	0.9	0	0	0.6	0.8	0.5	19.0
		Kamchatka Flounder	0.4	0	0	1.0	2.0	*	*	*	0	0.1	0	3.8
		Flathead Sole	4.1	-	2.3	1.7	0.2	6.9	1.7	2.9	1.0	0.1	*	21.3
		Rock Sole	11.2	*	10.9	0.7	0.1	1.3	36.9	8.7	3.6	0	*	74.9
		Turbot	*	*	*	*	*	*	*	*	*	*	-	*
		Yellowfin	23.8	*	14.3	2.1	0.5	3.9	6.8	133.9	16.4	0	*	204.7
		Other Flatfish	0	-	0	0	0	*	*	*	0	0	*	0.1
		Rockfish	0.9	0	0.3	0.7	0.6	0	0	0	0.1	25.3	1.8	30.1
		Atka Mackerel	0.6	0	0.9	1.0	0.6	*	0	-	0	5.7	25.8	35.4
		All Targets	1,293.1	0.1	76.9	18.3	6.3	15.8	51.3	148.8	22.9	33.4	28.2	1,705.6
	All Gear	All Targets	1,299.1	0.8	235.8	19.0	6.4	16.4	51.4	151.1	22.9	33.8	28.2	1,900.7

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Table 4: Continued

Year	Gear	Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Yellowfin	Flat Other	Rockfish	Atka Mackerel	All Species
2015	Hook & Line	Pollock, Bottom	*	-	-	*	*	*	-	-	-	*	-	*
		Sablefish	*	0.4	*	*	*	*	-	-	*	0.1	*	0.5
		Pacific Cod	7.0	0	131.1	0.7	0.1	0.5	0.1	1.8	0.1	0.2	0	167.6
		Turbot	0	0	*	0	0.1	0	-	*	*	0	*	1.4
		Rockfish	-	*	*	*	-	-	-	-	-	*	*	*
		All Targets	7.0	0.5	131.3	0.7	0.1	0.5	0.1	1.8	0.1	0.3	0	170.3
	Pot	Sablefish	-	0.1	-	0	0	-	-	-	-	0	-	0.1
		Pacific Cod	0	-	29.9	0	*	0	0	0.3	0	0	0	30.9
		All Targets	0	0.1	29.9	0	0	0	0	0.3	0	0	0	31.0
	Trawl	Pollock, Bottom	36.6	*	0.9	0.1	0	0.3	0.6	0.4	0.1	0.6	0	40.4
		Pollock, Pelagic	1,240.6	0	7.4	0.3	0	1.9	1.1	0.5	0.1	2.1	0.2	1,256.8
		Pacific Cod	2.1	0	35.9	0.2	0	0.1	1.7	0.6	0.3	0	0	41.4
		Arrowtooth	1.4	0	0.3	5.1	0.7	0.6	0	0	0.4	0.3	*	9.7
		Kamchatka Flounder	0.9	0	0.1	1.0	2.6	*	*	-	0	0.1	0	4.9
		Flathead Sole	2.6	*	1.7	1.0	0.2	3.6	0.7	2.0	0.5	0	*	12.5
		Rock Sole	9.4	0	11.0	0.3	0	0.8	31.3	12.9	1.9	0	0	68.3
		Turbot	*	*	*	*	*	*	-	-	-	*	-	*
		Yellowfin	21.3	0	12.2	1.7	0.4	3.3	9.8	108.0	12.7	0	0	171.6
		Other Flatfish	0.3	*	0.3	0.1	0	0	0.1	0.6	0.9	*	-	2.3
		Rockfish	0.9	0	0.7	0.6	0.6	0.1	0	0	0	26.6	5.5	35.5
		Atka Mackerel	0.2	0	2.3	0.1	0.3	0	0.1	*	0	9.5	47.5	60.9
		All Targets	1,316.2	0	72.6	10.6	4.9	10.8	45.4	124.8	16.9	39.2	53.2	1,704.3
	All Gear	All Targets	1,323.2	0.6	233.8	11.3	5.0	11.3	45.5	126.9	17.0	39.6	53.3	1,905.7

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 5: Groundfish catch off Alaska by area, residency, and species, 2011-2015, (1,000 metric tons, round weight).

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Year	Alaska	Other	Alaska	Other	Alaska	Other
Pollock	2011	30	50	229	972	259	1,021
	2012	39	62	212	994	252	1,056
	2013	32	61	231	1,043	263	1,104
	2014	59	81	227	1,073	286	1,155
	2015	66	97	238	1,085	304	1,182
Sablefish	2011	6	5	1	1	7	6
	2012	6	6	1	1	7	7
	2013	6	6	1	1	7	7
	2014	6	5	0	1	6	6
	2015	5	5	0	0	6	5
Pacific Cod	2011	41	22	53	167	94	189
	2012	38	19	58	188	95	207
	2013	31	21	59	187	90	208
	2014	40	23	54	183	94	206
	2015	41	15	54	180	95	195
Flatfish	2011	15	26	24	262	39	288
	2012	9	20	5	286	15	306
	2013	13	21	17	280	30	301
	2014	12	35	17	259	29	295
	2015	9	18	15	204	24	222
Rockfish	2011	4	19	1	27	5	46
	2012	6	21	0	28	6	49
	2013	6	19	0	34	7	53
	2014	7	22	0	36	7	58
	2015	6	22	1	38	8	61
Atka Mackerel	2011	0	2	0	52	0	53
	2012	0	1	0	48	0	49
	2013	0	1	0	23	0	24
	2014	0	1	0	31	0	32
	2015	0	1	0	53	0	54
All Groundfish	2011	101	126	312	1,505	413	1,631
	2012	102	132	282	1,571	384	1,703
	2013	96	133	314	1,595	410	1,728
	2014	129	170	306	1,610	435	1,780
	2015	134	161	317	1,589	451	1,750

Notes: These estimates include only catch counted against federal TACs. Catch delivered to motherships is classified by the residence 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. Other includes catch by vessels for which residency information was unavailable. Includes FMP groundfish catch on halibut targets. Beginning in 2013, CAS includes estimates of groundfish discards in halibut fishery.

Source: NMFS Alaska Region Blend and Catch-accounting System estimates; CFEC gross earnings (fish tickets) file; and 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 6: Discards and discard rates for groundfish catch off Alaska by area, gear, and species, 2011-2015, (1,000 metric tons, round weight).

			Fixed		Trawl		All Gear	
		Year	Total Discards	Discard Rate	Total Discards	Discard Rate	Total Discards	Discard Rate
Gulf of Alaska	Pollock	2011	0	20 %	2.1	3 %	2.1	3 %
		2012	0	21 %	1.9	2 %	2.0	2 %
		2013	0.1	32 %	2.4	2 %	2.4	3 %
		2014	0.1	31 %	1.4	1 %	1.5	1 %
		2015	0.1	31 %	1.2	1 %	1.3	1 %
	Sablefish	2011	0.4	4 %	0.2	16 %	0.6	5 %
		2012	0.3	2 %	0.1	8 %	0.3	3 %
		2013	0.7	6 %	0	6 %	0.8	6 %
		2014	0.5	5 %	0.1	8 %	0.6	5 %
		2015	0.7	7 %	0.2	17 %	0.9	8 %
	Pacific Cod	2011	1.4	1 %	0.7	4 %	2.1	1 %
		2012	0.3	0 %	0.7	3 %	1.0	1 %
		2013	2.3	5 %	2.3	11 %	4.6	7 %
		2014	1.7	3 %	3.5	13 %	5.2	6 %
		2015	0.9	2 %	0.8	4 %	1.7	2 %
	Flatfish	2011	0.3	91 %	7.6	19 %	7.9	19 %
		2012	0.3	90 %	5.6	19 %	5.9	20 %
		2013	0.5	97 %	5.8	17 %	6.3	19 %
		2014	0.3	96 %	3.9	8 %	4.2	9 %
		2015	0.3	93 %	2.4	9 %	2.7	10 %
	Rockfish	2011	0.3	28 %	1.6	7 %	1.9	8 %
		2012	0.5	33 %	1.6	6 %	2.0	8 %
		2013	1.1	48 %	1.8	8 %	2.9	12 %
		2014	0.7	40 %	2.3	8 %	2.9	10 %
		2015	0.7	38 %	1.6	6 %	2.2	8 %
	Atka Mackerel	2011	0	99 %	0.5	35 %	0.5	35 %
		2012	0	86 %	0.5	42 %	0.5	42 %
		2013	0	99 %	0.4	36 %	0.4	36 %
		2014	0	97 %	0.1	7 %	0.1	7 %
		2015	0	100 %	0.3	26 %	0.3	27 %
	All Groundfish	2011	5.3	4 %	13.7	8 %	19.0	7 %
		2012	3.2	4 %	11.5	6 %	14.7	6 %
		2013	12.5	14 %	14.3	8 %	26.8	10 %
		2014	9.7	10 %	12.8	5 %	22.6	7 %
		2015	8.2	9 %	8.3	3 %	16.5	5 %

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Table 6: Continued

		Year	Fixed Total Discards	Fixed Discard Rate	Trawl Total Discards	Trawl Discard Rate	All Gear Total Discards	All Gear Discard Rate
Bering Sea & Aleutian Islands	Pollock	2011	0.8	15 %	4.0	0 %	4.9	0 %
		2012	0.5	10 %	5.0	0 %	5.5	0 %
		2013	0.6	12 %	4.9	0 %	5.5	0 %
		2014	0.6	10 %	13.9	1 %	14.5	1 %
		2015	0.7	9 %	9.0	1 %	9.6	1 %
	Sablefish	2011	0	1 %	0	4 %	0	1 %
		2012	0	1 %	0	1 %	0	1 %
		2013	0	2 %	0	1 %	0	2 %
		2014	0	4 %	0	2 %	0	4 %
		2015	0	2 %	0	16 %	0	3 %
	Pacific Cod	2011	1.9	1 %	0.5	1 %	2.5	1 %
		2012	1.9	1 %	0.9	1 %	2.8	1 %
		2013	3.6	2 %	1.5	2 %	5.2	2 %
		2014	3.3	2 %	0.6	1 %	3.9	2 %
		2015	2.7	2 %	0.4	1 %	3.1	1 %
	Flatfish	2011	2.1	47 %	22.3	8 %	24.4	9 %
		2012	2.6	49 %	18.8	7 %	21.4	7 %
		2013	2.9	79 %	22.5	8 %	25.4	9 %
		2014	3.5	81 %	14.7	5 %	18.2	7 %
		2015	3.5	75 %	7.9	4 %	11.4	5 %
	Rockfish	2011	0.1	39 %	1.0	4 %	1.1	4 %
		2012	0.1	27 %	1.4	5 %	1.5	5 %
		2013	0.3	61 %	0.9	3 %	1.1	3 %
		2014	0.2	63 %	1.2	3 %	1.4	4 %
		2015	0.2	64 %	1.8	5 %	2.1	5 %
	Atka Mackerel	2011	0	81 %	1.7	3 %	1.8	3 %
		2012	0	54 %	1.3	3 %	1.3	3 %
		2013	0	92 %	0.7	3 %	0.7	3 %
		2014	0	95 %	0.4	1 %	0.4	1 %
		2015	0	100 %	0.8	1 %	0.8	1 %
	All Groundfish	2011	20.5	12 %	37.6	2 %	58.0	3 %
		2012	20.4	10 %	35.7	2 %	56.2	3 %
		2013	24.1	12 %	39.0	2 %	63.1	3 %
		2014	25.9	12 %	37.9	2 %	63.8	3 %
		2015	27.9	13 %	25.8	2 %	53.7	3 %

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Table 6: Continued

		Year	Fixed Total Discards	Fixed Discard Rate	Trawl Total Discards	Trawl Discard Rate	All Gear Total Discards	All Gear Discard Rate
All Alaska	Pollock	2011	0.9	16 %	6.1	0 %	7.0	1 %
		2012	0.5	11 %	6.9	1 %	7.4	1 %
		2013	0.7	13 %	7.3	1 %	7.9	1 %
		2014	0.7	11 %	15.3	1 %	16.0	1 %
		2015	0.8	10 %	10.1	1 %	10.9	1 %
	Sablefish	2011	0.5	3 %	0.2	15 %	0.6	4 %
		2012	0.3	2 %	0.1	6 %	0.3	3 %
		2013	0.8	6 %	0	5 %	0.8	6 %
		2014	0.5	5 %	0.1	8 %	0.6	5 %
		2015	0.7	7 %	0.2	17 %	0.9	7 %
	Pacific Cod	2011	3.3	1 %	1.2	1 %	4.5	1 %
		2012	2.2	1 %	1.6	1 %	3.7	1 %
		2013	5.9	3 %	3.8	3 %	9.8	3 %
		2014	5.0	2 %	4.2	4 %	9.2	3 %
		2015	3.6	2 %	1.2	1 %	4.9	2 %
	Flatfish	2011	2.4	49 %	29.9	9 %	32.3	10 %
		2012	2.9	51 %	24.5	8 %	27.3	9 %
		2013	3.4	82 %	28.3	9 %	31.8	10 %
		2014	3.8	82 %	18.6	6 %	22.4	7 %
		2015	3.8	76 %	10.3	4 %	14.1	6 %
	Rockfish	2011	0.4	31 %	2.6	5 %	3.1	6 %
		2012	0.5	32 %	3.0	6 %	3.5	6 %
		2013	1.4	50 %	2.6	5 %	4.0	7 %
		2014	0.9	44 %	3.5	6 %	4.4	7 %
		2015	0.9	42 %	3.4	5 %	4.3	6 %
	Atka Mackerel	2011	0	84 %	2.2	4 %	2.3	4 %
		2012	0	63 %	1.8	4 %	1.8	4 %
		2013	0	93 %	1.1	5 %	1.1	5 %
		2014	0	96 %	0.4	1 %	0.5	1 %
		2015	0	100 %	1.1	2 %	1.1	2 %
	All Groundfish	2011	25.8	9 %	51.2	3 %	77.0	4 %
		2012	23.6	9 %	47.3	3 %	70.9	3 %
		2013	36.6	13 %	53.3	3 %	89.9	4 %
		2014	35.6	12 %	50.7	3 %	86.3	4 %
		2015	36.0	12 %	34.1	2 %	70.1	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: Gulf of Alaska groundfish discards by species, gear, and target fishery, 2014-2015, (metric tons, round weight).

		Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Flat Shallow	Atka Mackerel	All Species
2014	Hook & Line	Sablefish	1	367	69	163	0	2	-	1,710
		Pacific Cod	57	7	335	43	18	18	2	2,945
		Rockfish	0	0	0	-	-	-	-	0
		All Targets	76	510	1,431	262	19	22	3	8,594
	Pot	Sablefish	-	*	*	-	-	-	-	*
		Pacific Cod	8	2	267	1	0	2	5	1,155
		All Targets	8	2	267	1	0	2	5	1,155
	Trawl	Pollock, Bottom	25	0	6	921	4	0	*	1,336
		Pollock, Pelagic	529	0	1	8	2	0	*	857
		Sablefish	1	0	0	31	0	1	-	59
		Pacific Cod	26	3	57	779	101	303	0	1,503
		Arrowtooth	394	44	1,561	840	23	32	7	4,604
		Flathead Sole	0	*	0	24	0	0	-	27
		Rex Sole	1	0	34	275	1	1	*	721
		Flatfish, Shallow	243	10	1,797	164	4	66	14	2,612
		Rockfish	167	19	81	180	4	4	47	1,082
		All Targets	1,384	76	3,537	3,224	139	409	68	12,801
	All Gear	All Targets	1,468	588	5,235	3,487	158	433	76	22,550

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Table 7: Continued

Year	Gear	Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Flat Shallow	Atka Mackerel	All Species
2015	Hook & Line	Sablefish	3	455	88	131	0	2	0	1,681
		Pacific Cod	68	37	235	47	16	13	2	2,475
		Rockfish	0	-	0	-	-	-	*	0
		All Targets	75	672	681	221	16	20	2	7,076
	Pot	Sablefish	-	*	-	-	-	-	-	*
		Pacific Cod	22	2	247	1	0	3	7	1,079
		All Targets	22	2	247	1	0	3	7	1,079
	Trawl	Pollock, Bottom	66	62	7	489	12	28	20	850
		Pollock, Pelagic	562	4	4	9	1	0	0	1,036
		Sablefish	*	0	*	44	-	0	-	103
		Pacific Cod	43	4	191	407	82	282	138	1,666
		Arrowtooth	141	75	261	442	20	16	11	1,964
		Flathead Sole	*	*	*	*	*	*	-	*
		Rex Sole	19	1	16	100	8	1	*	388
		Flatfish, Shallow	43	14	184	106	1	31	7	625
		Rockfish	296	23	149	137	2	6	140	1,669
		All Targets	1,171	182	812	1,733	125	365	316	8,301
	All Gear	All Targets	1,267	856	1,741	1,955	141	388	325	16,456

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. 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. "*" 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: Bering Sea and Aleutian Islands groundfish discards by species, gear, and target fishery, 2014-2015, (metric tons, round weight).

Year	Gear	Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Turbot	Yellowfin	Flat Other	Rockfish	Atka Mackerel	All Species
2014	Hook & Line	Sablefish	*	9	0	11	15	*	-	34	-	11	67	0	221
		Pacific Cod	616	1	2,898	468	40	543	52	5	1,812	38	84	4	23,145
		Turbot	1	0	*	17	38	7	-	16	-	*	2	-	126
		Rockfish	-	*	*	*	*	-	-	*	-	-	1	-	1
		All Targets	617	29	3,140	509	104	550	52	58	1,813	57	230	4	24,733
	Pot	Sablefish	-	*	-	*	*	-	-	*	-	-	*	-	*
		Pacific Cod	11	-	156	1	*	0	2	*	351	0	4	7	1,122
		All Targets	11	*	156	1	*	0	2	*	351	0	4	7	1,122
	Trawl	Pollock, Bottom	252	0	2	26	6	5	9	4	31	56	90	1	676
		Pollock, Pelagic	456	*	5	115	19	469	804	3	295	24	639	5	4,092
		Sablefish	*	*	-	*	-	*	*	-	-	*	*	-	*
		Pacific Cod	2,527	*	214	189	18	111	465	2	81	144	19	2	4,268
		Arrowtooth	455	0	1	153	47	15	2	127	0	13	74	0	1,187
		Kamchatka Flounder	54	0	0	3	6	*	*	2	*	1	0	0	167
		Flathead Sole	910	-	18	219	41	79	19	13	78	109	0	*	1,866
		Rock Sole	2,523	*	196	316	50	14	379	3	123	1,390	1	*	6,278
		Turbot	*	*	*	*	*	*	*	*	*	*	*	-	*
		Yellowfin	6,549	*	157	640	153	133	182	35	1,834	5,353	1	*	17,467
		Other Flatfish	0	-	0	0	0	*	*	*	*	0	2	*	4
		Rockfish	93	1	28	116	59	7	7	1	0	10	237	254	1,055
		Atka Mackerel	95	0	8	28	23	*	11	0	-	1	142	113	868
		All Targets	13,915	1	629	1,807	423	834	1,877	190	2,442	7,101	1,206	376	37,928
	All Gear	All Targets	14,544	30	3,925	2,317	527	1,384	1,932	248	4,606	7,158	1,441	386	63,783

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Table 8: Continued

		Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Turbot	Yellowfin	Flat Other	Rockfish	Atka Mackerel	All Species
2015	Hook & Line	Sablefish	*	5	*	2	4	*	-	10	-	*	23	*	63
		Pacific Cod	622	3	2,415	580	44	480	51	14	1,803	59	152	13	25,742
		Turbot	10	1	*	6	69	8	-	10	*	*	3	*	317
		Rockfish	-	*	*	*	-	-	-	*	-	-	*	*	*
		All Targets	632	13	2,600	604	121	489	51	53	1,803	62	220	13	26,890
	Pot	Sablefish	-	0	-	4	0	-	-	*	-	-	0	-	5
		Pacific Cod	25	-	104	1	0	0	1	*	315	0	5	8	976
		All Targets	25	0	104	5	0	0	1	*	315	0	5	8	981
	Trawl	Pollock, Bottom	347	*	3	19	2	2	2	0	5	25	31	0	668
		Pollock, Pelagic	387	0	3	64	12	483	300	5	97	13	987	105	3,768
		Pacific Cod	474	0	141	142	6	98	338	0	16	112	17	4	1,800
		Arrowtooth	391	0	3	164	22	7	0	24	0	11	95	*	899
		Kamchatka Flounder	138	0	0	1	3	*	*	0	-	1	8	0	294
		Flathead Sole	789	*	21	167	33	62	10	13	34	41	13	*	1,433
		Rock Sole	1,741	4	62	155	15	21	274	0	207	650	0	0	3,756
		Turbot	*	*	*	*	*	*	-	*	-	-	*	-	*
		Yellowfin	4,573	0	172	446	107	55	135	20	1,386	1,939	0	0	10,582
		Other Flatfish	41	*	2	2	2	0	1	*	5	26	*	-	113
		Rockfish	89	0	6	49	38	13	15	1	0	7	203	106	809
		Atka Mackerel	8	0	20	11	9	0	10	0	*	1	475	555	1,685
		All Targets	8,979	5	431	1,220	249	741	1,086	64	1,751	2,825	1,830	772	25,808
	All Gear	All Targets	9,636	18	3,135	1,829	370	1,230	1,137	117	3,869	2,887	2,054	792	53,679

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. 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. "*" 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 9: Gulf of Alaska groundfish discard rates by species, gear, and target fishery, 2014-2015 (percent).

		Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	All Species
	Hook & Line	Sablefish	99	4	60	98	100	-	100	100	39	-	13
		Pacific Cod	27	25	2	84	100	-	96	100	55	100	14
		Rockfish	0	0	0	-	-	-	-	-	0	-	0
		All Targets	33	5	7	96	100	-	100	100	40	100	16
	Pot	Sablefish	-	*	*	-	-	-	-	-	-	-	*
		Pacific Cod	19	100	1	51	24	*	-	100	100	95	3
2014		All Targets	19	100	1	51	24	*	-	100	100	95	3
	Trawl	Pollock, Bottom	0	0	0	41	1	0	0	0	63	*	5
		Pollock, Pelagic	0	0	0	4	3	5	0	0	76	*	1
		Sablefish	100	0	21	100	99	97	81	75	19	-	26
		Pacific Cod	2	13	0	61	36	14	6	34	0	93	7
		Arrowtooth	26	22	52	3	2	1	29	4	39	1	11
		Flathead Sole	0	*	0	30	0	0	6	0	0	-	5
		Rex Sole	1	0	12	40	1	0	31	4	76	*	25
		Flatfish, Shallow	47	41	79	25	1	1	6	2	4	27	38
		Rockfish	12	4	13	13	13	5	76	14	2	11	4
		All Targets	1	8	13	9	5	1	38	9	8	7	5
	All Gear	All Targets	1	5	6	10	6	1	41	9	10	7	7

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Table 9: Continued

Year	Gear	Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Flathead Sole	Rex Sole	Flat Deep	Flat Shallow	Rockfish	Atka Mackerel	All Species
2015	Hook & Line	Sablefish	95	5	70	88	100	-	100	100	40	100	14
		Pacific Cod	29	77	1	93	100	100	100	100	24	100	13
		Rockfish	0	-	0	-	-	-	-	-	0	*	0
		All Targets	31	7	4	91	100	100	100	99	37	100	14
	Pot	Sablefish	-	*	-	-	-	-	-	-	-	-	*
		Pacific Cod	31	100	1	93	71	52	100	89	99	100	3
		All Targets	31	100	1	93	71	52	100	89	99	100	3
	Trawl	Pollock, Bottom	1	56	1	38	4	5	34	9	35	82	5
		Pollock, Pelagic	0	20	1	2	0	0	0	0	11	0	1
		Sablefish	*	0	*	98	-	74	81	100	36	-	28
		Pacific Cod	5	12	1	38	25	6	63	28	49	93	8
		Arrowtooth	16	39	19	3	2	1	49	10	34	50	10
		Flathead Sole	*	*	*	*	*	*	*	*	*	-	*
		Rex Sole	51	7	10	26	18	0	85	22	69	*	23
		Flatfish, Shallow	17	47	26	33	0	2	*	2	51	22	17
		Rockfish	22	5	19	10	3	8	65	23	3	14	5
		All Targets	1	17	4	9	7	2	60	11	6	26	3
	All Gear	All Targets	1	8	2	10	7	2	64	12	8	27	5

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. 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. "*" indicates a confidential value; "-" indicates no applicable data or value.

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

Table 10: Bering Sea and Aleutian Islands groundfish discard rates by species, gear, and target fishery, 2014-2015 (percent).

		Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Turbot	Yellowfin	Flat Other	Rockfish	Atka Mackerel	All Species
2014	Hook & Line	Sablefish	*	1	1	91	79	*	-	76	-	100	48	100	21
		Pacific Cod	10	20	2	86	84	97	100	31	97	99	79	99	14
		Turbot	74	2	*	38	100	100	-	3	-	*	7	-	16
		Rockfish	-	*	*	*	*	-	-	*	-	-	19	-	19
		All Targets	10	4	2	83	90	97	100	8	97	99	63	99	15
	Pot	Sablefish	-	*	-	*	*	-	-	*	-	-	*	-	*
		Pacific Cod	70	-	0	100	*	67	100	*	100	100	99	94	3
		All Targets	70	*	0	100	*	67	100	*	100	100	99	94	3
	Trawl	Pollock, Bottom	1	0	0	9	5	1	0	14	3	16	37	1	1
		Pollock, Pelagic	0	*	0	24	36	24	33	19	39	13	54	27	0
		Sablefish	*	*	-	*	-	*	*	-	-	*	*	-	*
		Pacific Cod	46	*	0	84	60	50	32	68	5	21	94	99	8
		Arrowtooth	17	2	0	2	2	2	9	20	26	2	9	0	6
		Kamchatka Flounder	13	0	1	0	0	*	*	2	*	16	0	0	4
		Flathead Sole	22	-	1	13	25	1	1	72	3	11	0	*	9
		Rock Sole	22	*	2	46	53	1	1	63	1	38	100	*	8
		Turbot	*	*	*	*	*	*	*	*	*	*	*	-	*
		Yellowfin	27	*	1	29	31	3	3	61	1	31	82	*	8
		Other Flatfish	0	-	0	0	0	*	*	*	*	2	41	*	5
		Rockfish	8	3	8	17	9	18	31	2	11	14	1	12	3
		Atka Mackerel	15	5	1	3	4	*	33	1	-	42	2	0	2
		All Targets	1	2	1	10	7	5	4	20	2	30	3	1	2
	All Gear	All Targets	1	4	2	12	8	8	4	15	3	30	4	1	3

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Table 10: Continued

		Target	Pollock	Sablefish	Pacific Cod	Arrowtooth	Kamchatka Flounder	Flathead Sole	Rock Sole	Turbot	Yellowfin	Flat Other	Rockfish	Atka Mackerel	All Species
2015	Hook & Line	Sablefish	*	1	*	100	100	*	-	92	-	*	31	*	11
		Pacific Cod	9	75	2	87	86	99	100	59	99	78	81	100	15
		Turbot	53	9	*	65	93	100	-	1	*	*	10	*	22
		Rockfish	-	*	*	*	-	-	-	*	-	-	*	*	*
		All Targets	9	3	2	87	90	99	100	5	99	78	64	100	16
	Pot	Sablefish	-	0	-	100	100	-	-	*	-	-	87	-	4
		Pacific Cod	78	-	0	99	100	61	91	*	100	100	100	99	3
		All Targets	78	0	0	100	100	61	91	*	100	100	99	99	3
	Trawl	Pollock, Bottom	1	*	0	26	18	1	0	5	1	24	6	1	2
		Pollock, Pelagic	0	15	0	20	27	25	27	14	20	11	46	61	0
		Pacific Cod	23	100	0	63	58	80	20	43	3	39	41	24	4
		Arrowtooth	29	4	1	3	3	1	2	3	12	3	36	*	9
		Kamchatka Flounder	16	0	0	0	0	*	*	0	-	5	6	7	6
		Flathead Sole	30	*	1	17	18	2	1	21	2	9	54	*	11
		Rock Sole	19	93	1	46	40	3	1	48	2	34	100	22	5
		Turbot	*	*	*	*	*	*	-	*	-	-	*	-	*
		Yellowfin	21	66	1	26	25	2	1	48	1	15	19	50	6
		Other Flatfish	15	*	1	3	4	1	1	*	1	3	*	-	5
		Rockfish	9	1	1	8	7	25	39	2	25	17	1	2	2
		Atka Mackerel	5	8	1	10	3	6	19	1	*	5	5	1	3
		All Targets	1	16	1	12	5	7	2	6	1	17	5	1	2
	All Gear	All Targets	1	3	1	16	7	11	3	5	3	17	5	1	3

Notes: Totals may include additional categories. The target is derived from an algorithm used to determine preponderance of catch, accounting for processor, trip, processing mode, NMFS area, and gear. These estimates include only catch counted against federal TACs. 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. "*" 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: Prohibited species catch by species, area and gear, 2011-2015, (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)
Gulf of Alaska	Hook & Line	2011	-	-	-	-	-	0	6	-
		2012	-	-	-	-	-	0	3	0
		2013	-	-	-	-	0	0	1	-
		2014	-	-	-	-	-	0	0	0
		2015	-	-	-	-	0	0	0	-
	Pot	2011	45	-	-	-	-	-	21	-
		2012	42	-	-	-	-	-	167	-
		2013	15	-	-	-	-	-	568	-
		2014	11	-	-	-	-	-	133	-
		2015	22	-	-	-	-	-	128	-
	Trawl	2011	1,870	11	20	3	-	0	103	-
		2012	1,704	1	20	1	-	0	83	-
		2013	1,228	11	23	5	-	0	243	-
		2014	1,392	6	16	2	-	*	64	-
		2015	1,410	80	19	1	-	*	73	-
	All Gear	2011	1,915	11	20	3	-	0	130	-
		2012	1,746	1	20	1	-	0	254	0
		2013	1,243	11	23	5	0	0	813	-
		2014	1,403	6	16	2	-	0	198	0
		2015	1,433	80	19	1	0	0	201	-
Bering Sea & Aleutian Islands	Hook & Line	2011	552	0	0	-	3	2	14	38
		2012	613	0	0	-	4	2	16	30
		2013	521	0	*	-	6	1	17	18
		2014	442	-	0	-	8	1	20	20
		2015	316	0	0	0	4	1	23	16
	Pot	2011	7	-	-	-	19	197	298	145
		2012	6	-	-	-	8	*	104	16
		2013	4	-	-	-	101	0	230	14
		2014	4	-	-	-	137	*	572	83
		2015	3	-	-	-	171	2	610	121
	Trawl	2011	2,609	396	26	194	46	53	905	766
		2012	3,117	2,376	13	24	34	26	432	626
		2013	3,078	988	15	127	31	31	714	691
		2014	3,029	186	18	224	32	23	624	484
		2015	2,229	1,531	25	243	20	13	424	492
	All Gear	2011	3,168	396	26	194	68	252	1,217	949
		2012	3,736	2,376	13	24	45	27	552	672
		2013	3,603	988	15	127	138	32	961	724
		2014	3,474	186	18	224	177	24	1,216	587
		2015	2,548	1,531	25	243	194	16	1,056	629

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Table 11: Continued

		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)
All Alaska	All Gear	2011	5,083	407	46	197	68	252	1,347	949
		2012	5,482	2,377	33	25	45	28	805	672
		2013	4,846	999	37	132	138	32	1,773	724
		2014	4,877	192	34	226	177	24	1,413	587
		2015	3,980	1,610	44	245	194	16	1,257	629

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. 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 12: Prohibited species catch in the Gulf of Alaska by species, gear, and groundfish target fishery, 2014-2015, (metric tons (t) or number in 1,000s).

		Target	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)
2014	Hook & Line	Sablefish	-	-	-	-	-	0	0	-
		Pacific Cod	-	-	-	-	-	-	0.2	0
		All Targets	-	-	-	-	-	0	0.2	0
	Pot	Pacific Cod	10.6	-	-	-	-	-	133.2	-
	Trawl	Pollock, Bottom	82.5	-	3.8	0.1	-	-	2.1	-
		Pollock, Pelagic	-	4.6	7.1	1.3	-	-	-	-
		Sablefish	1.1	-	-	-	-	*	-	-
		Pacific Cod	215.5	-	0.3	-	-	-	12.1	-
		Arrowtooth	790.6	0.1	1.0	0.2	-	-	39.2	-
		Flathead Sole	2.3	-	1.2	-	-	-	-	-
		Rex Sole	55.3	-	0.4	0.1	-	-	0.2	-
		Flatfish, Deep	-	-	-	-	-	*	-	-
		Flatfish, Shallow	163.6	0.8	0.7	*	-	-	10.5	-
		Rockfish	81.5	*	1.2	0.6	-	*	0.2	-
		All Targets	1,392.5	5.5	15.7	2.3	-	*	64.3	-
	All Gear	All Targets	1,403.1	5.5	15.7	2.3	-	0	197.8	0

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Table 12: Continued

		Target	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)
2015	Hook & Line	Sablefish	-	-	-	-	0	0	0.2	-
		Pacific Cod	-	-	-	-	0	0	0.2	-
		All Targets	-	-	-	-	0	0	0.3	-
	Pot	Pacific Cod	22.2	-	-	-	-	-	127.7	-
	Trawl	Pollock, Bottom	94.3	1.9	1.5	0	-	-	2.3	-
		Pollock, Pelagic	7.8	76.3	12.1	0.9	-	-	-	-
		Sablefish	2.1	-	-	-	-	-	*	-
		Pacific Cod	484.0	*	1.2	*	-	-	1.2	-
		Arrowtooth	581.5	0.1	2.1	0.1	-	*	6.7	-
		Flathead Sole	*	-	-	-	-	-	*	-
		Rex Sole	29.5	-	0.1	0	-	-	0.1	-
		Flatfish, Shallow	107.6	1.4	-	-	-	-	62.3	-
		Rockfish	103.7	*	1.9	0.3	-	*	*	-
		All Targets	1,410.3	79.7	18.9	1.3	-	*	72.6	-
	All Gear	All Targets	1,432.5	79.7	18.9	1.3	0	0	200.6	-

Notes: These estimates include only catches counted against federal TACs. 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. The estimates of halibut PSC mortality are based on the International Pacific Halibut Commission 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 PSC numbers unavailable. Therefore, estimates of halibut PSC 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. 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 13: Prohibited species catch in the Bering Sea and Aleutian Islands by species, gear, and groundfish target fishery, 2014-2015, (metric tons (t) or number in 1,000s)..

		Target	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)
2014	Hook & Line	Sablefish	-	-	-	-	0	0.5	-	-
		Pacific Cod	440.3	-	0	-	7.5	0.7	19.8	19.7
		Turbot	1.3	-	-	-	-	*	*	*
		Rockfish	*	-	-	-	-	-	-	-
		Other Ground-fish	*	-	-	-	-	-	-	*
		All Targets	441.6	-	0	-	7.6	1.2	19.8	19.7
	Pot	Sablefish	*	-	-	-	-	*	-	*
		Pacific Cod	3.2	-	-	-	136.8	-	571.7	83.3
		All Targets	3.6	-	-	-	136.8	*	571.7	83.3
	Trawl	Pollock, Bottom	80.6	8.2	0.7	1.8	0.4	*	11.6	16.1
		Pollock, Pelagic	119.1	151.3	14.4	218.1	*	-	0.9	3.3
		Sablefish	*	-	-	-	-	-	-	-
		Pacific Cod	331.5	1.1	1.3	*	0.6	*	21.7	12.5
		Arrowtooth	191.0	0.3	-	*	-	5.0	5.5	6.5
		Kamchatka Flounder	14.4	*	-	-	-	8.3	-	*
		Flathead Sole	119.6	*	-	0.7	*	-	85.3	100.5
		Rock Sole	677.2	0.7	0.9	0.5	24.4	0.2	108.6	11.9
		Turbot	-	-	-	-	-	*	-	-
		Yellowfin	1,342.0	24.7	0.3	1.7	6.3	0.3	390.5	333.6
		Other Flatfish	*	*	-	-	-	-	-	-
		Rockfish	69.5	-	0.3	0.3	*	7.2	*	-
		Atka Mackerel	83.7	-	0.3	0.5	0.8	2.3	-	-
		All Targets	3,028.5	186.2	18.2	223.5	32.4	23.2	624.1	484.5
	All Gear	All Targets	3,473.7	186.2	18.2	223.5	176.8	24.4	1,215.6	587.5

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Table 13: Continued

		Target	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)
2015	Hook & Line	Pollock, Bottom	*	-	-	-	-	-	-	-
		Sablefish	-	-	0	-	0.2	0.2	-	-
		Pacific Cod	312.5	0	0	0.1	4.0	0.8	22.5	16.3
		Turbot	3.1	-	*	0	-	*	-	*
		Other Ground-fish	*	-	-	-	*	-	-	-
		All Targets	315.6	0	0.1	0.1	4.2	1.0	22.5	16.3
	Pot	Sablefish	0.1	-	-	-	-	*	-	0
		Pacific Cod	3.4	-	-	-	170.6	2.0	610.3	120.8
		All Targets	3.4	-	-	-	170.6	2.0	610.3	120.8
	Trawl	Pollock, Bottom	26.5	101.3	0.7	1.6	-	-	7.7	5.4
		Pollock, Pelagic	103.7	1,387.5	17.6	236.3	-	-	1.2	2.9
		Pacific Cod	287.6	3.1	1.4	0.3	0.3	-	13.4	5.8
		Arrowtooth	65.0	*	0.2	0.5	-	4.2	14.2	4.1
		Kamchatka Flounder	44.0	-	-	*	-	3.1	-	-
		Flathead Sole	46.8	0.5	*	0.6	*	*	54.2	21.1
		Rock Sole	506.9	6.8	3.1	0.9	10.0	*	50.7	8.8
		Yellowfin	756.0	30.7	1.1	1.1	9.3	0.5	269.9	422.4
		Other Flatfish	1.9	0.6	-	-	*	*	12.1	21.1
		Rockfish	60.8	-	0.8	0.3	*	5.1	*	-
		Atka Mackerel	97.5	-	*	1.7	*	0.5	0.3	*
		EFP	232.0	-	-	-	-	-	-	-
		All Targets	2,228.7	1,530.6	25.0	243.2	19.7	13.4	423.7	491.7
	All Gear	All Targets	2,547.7	1,530.6	25.0	243.3	194.4	16.4	1,056.5	628.7

Notes: These estimates include only catches counted against federal TACs. Totals may include additional categories. The target EFP accounts for halibut mortality taken by Amendment 80 vessels under the Exempted Fishing Permit (EFP) No.2015-02. The target is derived from an algorithm used to determine preponderance of catch, accounting for processor, trip, processing mode, NMFS area and gear. The estimates of halibut PSC mortality are based on the International Pacific Halibut Commission 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 PSC numbers unavailable. This is particularly a problem in the Bering Sea and Aleutian Islands sablefish hook-and-line fishery. Therefore, estimates of halibut PSC mortality are not included in this table for that fishery. 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 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 14: Prohibited species catch rates in the Gulf of Alaska by species, gear, and groundfish target fishery, 2014-2015, (metric tons PSC per metric ton target catch or numbers of PSC per metric ton target catch).

		Target	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)
2014	Hook & Line	Sablefish	-	-	-	-	-	0.004	0.001	-
		Pacific Cod	-	-	-	-	-	-	0.014	0
		All Targets	-	-	-	-	-	0.001	0.009	0
	Pot	Pacific Cod	0	-	-	-	-	-	6.230	-
	Trawl	Pollock, Bottom	0.003	-	0.149	0.005	-	-	0.081	-
		Pollock, Pelagic	-	0	0.060	0.011	-	-	-	-
		Sablefish	0.005	-	-	-	-	*	-	-
		Pacific Cod	0.010	-	0.013	-	-	-	0.565	-
		Arrowtooth	0.019	0	0.025	0.005	-	-	0.930	-
		Flathead Sole	0.004	-	1.946	-	-	-	-	-
		Rex Sole	0.019	-	0.131	0.040	-	-	0.079	-
		Flatfish, Deep	-	-	-	-	-	*	-	-
		Flatfish, Shallow	0.024	0	0.102	*	-	-	1.521	-
		Rockfish	0.003	*	0.045	0.020	-	*	0.006	-
		All Targets	0.006	0	0.064	0.009	-	*	0.262	-
	All Gear	All Targets	0.005	0	0.053	0.008	-	0	0.670	0

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Table 14: Continued

		Target	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)
2015	Hook & Line	Sablefish	-	-	-	-	0.001	0.004	0.016	-
		Pacific Cod	-	-	-	-	0.001	0	0.011	-
		All Targets	-	-	-	-	0.001	0.002	0.013	-
	Pot	Pacific Cod	0.001	-	-	-	-	-	5.832	-
	Trawl	Pollock, Bottom	0.006	0	0.093	0.003	-	-	0.146	-
		Pollock, Pelagic	0	0.001	0.081	0.006	-	-	-	-
		Sablefish	0.006	-	-	-	-	-	*	-
		Pacific Cod	0.022	*	0.054	*	-	-	0.056	-
		Arrowtooth	0.029	0	0.105	0.004	-	*	0.330	-
		Flathead Sole	*	-	-	-	-	-	*	-
		Rex Sole	0.018	-	0.080	0	-	-	0.049	-
		Flatfish, Shallow	0.030	0	-	-	-	-	17.118	-
		Rockfish	0.003	*	0.062	0.011	-	*	*	-
		All Targets	0.006	0	0.078	0.005	-	*	0.298	-
	All Gear	All Targets	0.005	0	0.065	0.005	0	0	0.688	-

Notes: These estimates include only catches counted against federal TACs. 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. The estimates of halibut PSC mortality are based on the International Pacific Halibut Commission 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 PSC numbers unavailable. Therefore, estimates of halibut PSC 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. 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 15: Prohibited species catch rates in the Bering Sea and Aleutian Islands by species, gear, and groundfish target fishery, 2014-2015, (metric tons PSC per metric ton target catch or numbers of PSC per metric ton target catch).

Year	Gear	Target	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)
2014	Hook & Line	Sablefish	-	-	-	-	0.046	0.480	-	-
		Pacific Cod	0.003	-	0	-	0.047	0.004	0.124	0.123
		Turbot	0.002	-	-	-	-	*	*	*
		Rockfish	*	-	-	-	-	-	-	-
		Other Ground-fish	*	-	-	-	-	-	-	*
		All Targets	0.003	-	0	-	0.047	0.007	0.123	0.122
	Pot	Sablefish	*	-	-	-	-	*	-	*
		Pacific Cod	0	-	-	-	4.244	-	17.737	2.585
		All Targets	0	-	-	-	4.200	*	17.555	2.558
	Trawl	Pollock, Bottom	0.001	0	0.013	0.032	0.007	*	0.215	0.297
		Pollock, Pelagic	0	0	0.012	0.180	*	-	0.001	0.003
		Sablefish	*	-	-	-	-	-	-	-
		Pacific Cod	0.006	0	0.025	*	0.011	*	0.410	0.237
		Arrowtooth	0.010	0	-	*	-	0.261	0.288	0.340
		Kamchatka Flounder	0.004	*	-	-	-	2.168	-	*
		Flathead Sole	0.006	*	-	0.031	*	-	3.996	4.708
		Rock Sole	0.009	0	0.012	0.006	0.325	0.002	1.444	0.158
		Turbot	-	-	-	-	-	*	-	-
		Yellowfin	0.006	0	0.001	0.008	0.029	0.002	1.827	1.561
		Other Flatfish	*	*	-	-	-	-	-	-
		Rockfish	0.002	-	0.008	0.010	*	0.218	*	-
		Atka Mackerel	0.002	-	0.008	0.014	0.021	0.060	-	-
		All Targets	0.002	0	0.011	0.130	0.019	0.014	0.363	0.282
	All Gear	All Targets	0.002	0	0.010	0.117	0.092	0.013	0.635	0.307

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Table 15: Continued

		Target	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)
2015	Hook & Line	Pollock, Bottom	*	-	-	-	-	-	-	-
		Sablefish	-	-	0.018	-	0.417	0.358	-	-
		Pacific Cod	0.002	0	0	0.001	0.024	0.005	0.134	0.097
		Turbot	0.002	-	*	0.024	-	*	-	*
		Other Ground-fish	*	-	-	-	*	-	-	-
		All Targets	0.002	0	0	0.001	0.025	0.006	0.133	0.096
	Pot	Sablefish	0.001	-	-	-	-	*	-	0.204
		Pacific Cod	0	-	-	-	5.525	0.065	19.770	3.912
		All Targets	0	-	-	-	5.503	0.065	19.689	3.897
	Trawl	Pollock, Bottom	0.001	0.003	0.018	0.039	-	-	0.190	0.134
		Pollock, Pelagic	0	0.001	0.014	0.188	-	-	0.001	0.002
		Pacific Cod	0.007	0	0.034	0.008	0.008	-	0.323	0.139
		Arrowtooth	0.007	*	0.019	0.054	-	0.433	1.466	0.420
		Kamchatka Flounder	0.009	-	-	*	-	0.617	-	-
		Flathead Sole	0.004	0	*	0.045	*	*	4.324	1.684
		Rock Sole	0.007	0	0.046	0.013	0.147	*	0.742	0.129
		Yellowfin	0.004	0	0.007	0.006	0.054	0.003	1.573	2.462
		Other Flatfish	0.001	0	-	-	*	*	5.103	8.894
		Rockfish	0.002	-	0.022	0.008	*	0.144	*	-
		Atka Mackerel	0.002	-	*	0.028	*	0.009	0.004	*
		All Targets	0.001	0.001	0.015	0.143	0.012	0.008	0.249	0.288
	All Gear	All Targets	0.001	0.001	0.013	0.128	0.102	0.009	0.555	0.330

Notes: These estimates include only catches counted against federal TACs. 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. The estimates of halibut PSC mortality are based on the International Pacific Halibut Commission 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 PSC numbers unavailable. This is particularly a problem in the Bering Sea and Aleutian Islands sablefish hook-and-line fishery. Therefore, estimates of halibut PSC mortality are not included in this table for that fishery. 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 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 16: Real ex-vessel value of the catch in the domestic commercial fisheries off Alaska by species group, 2006-2015; calculations based on COAR ($ millions, base year = 2015).

Year	Shellfish	Salmon	Herring	Halibut	Groundfish	Total
2006	163.3	363.0	11.4	223.0	972.0	1,732.7
2007	212.6	436.1	17.4	245.2	939.3	1,850.6
2008	284.2	454.0	28.1	229.3	1,070.2	2,065.9
2009	211.7	425.1	26.2	147.4	752.6	1,563.0
2010	248.8	561.8	23.8	216.0	739.3	1,789.7
2011	313.1	643.4	11.4	215.8	1,048.3	2,232.0
2012	329.2	549.8	22.4	149.5	1,096.2	2,147.1
2013	242.7	691.9	16.6	113.5	893.4	1,958.1
2014	245.1	548.1	11.5	107.1	940.8	1,852.6
2015	293.1	413.2	7.0	110.7	896.3	1,720.3

Notes: These estimates include the value of catch from both federal and state of Alaska fisheries. The data have been adjusted to 2015 dollars by applying the Personal Consumption Expenditure Index at (https://research.stlouisfed.org/fred2/series/PCEPI).

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 17: Percentage distribution of ex-vessel value of the catch in the domestic commercial fisheries off Alaska by species group, 2006-2015; calculations based on COAR.

Year	Shellfish	Salmon	Herring	Halibut	Groundfish
2006	9.4 %	20.9 %	0.7 %	12.9 %	56.1 %
2007	11.5 %	23.6 %	0.9 %	13.3 %	50.8 %
2008	13.8 %	22.0 %	1.4 %	11.1 %	51.8 %
2009	13.5 %	27.2 %	1.7 %	9.4 %	48.1 %
2010	13.9 %	31.4 %	1.3 %	12.1 %	41.3 %
2011	14.0 %	28.8 %	0.5 %	9.7 %	47.0 %
2012	15.3 %	25.6 %	1.0 %	7.0 %	51.1 %
2013	12.4 %	35.3 %	0.8 %	5.8 %	45.6 %
2014	13.2 %	29.6 %	0.6 %	5.8 %	50.8 %
2015	17.0 %	24.0 %	0.4 %	6.4 %	52.1 %

Notes: These estimates report the distribution of the value of catch from both federal and state of Alaska fisheries.

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 18: Ex-vessel prices in the groundfish fisheries off Alaska by area, gear, and species, 2011-2015; calculations based on COAR ($/lb, round weight).

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska
	Year	Fixed	Trawl	Fixed	Trawl	All Gear
Pollock	2011	0.128	0.161	0.178	0.165	0.165
	2012	0.144	0.171	0.108	0.173	0.173
	2013	0.156	0.176	0.092	0.150	0.152
	2014	0.115	0.123	0.097	0.154	0.151
	2015	0.088	0.120	0.170	0.150	0.147
Sablefish	2011	5.463	3.986	5.105	1.790	5.290
	2012	4.421	3.231	3.522	1.014	4.192
	2013	3.215	2.434	2.838	1.173	3.100
	2014	3.919	2.972	4.001	1.317	3.841
	2015	4.101	3.008	3.720	1.277	3.985
Pacific Cod	2011	0.339	0.309	0.306	0.249	0.300
	2012	0.361	0.326	0.327	0.313	0.329
	2013	0.273	0.244	0.252	0.240	0.251
	2014	0.307	0.271	0.289	0.262	0.284
	2015	0.306	0.260	0.269	0.234	0.267
Flatfish	2011	0.512	0.110	0.174	0.182	0.174
	2012	0.223	0.137	0.017	0.204	0.197
	2013	0.019	0.141	0.015	0.158	0.156
	2014	0.241	0.145	0.131	0.142	0.142
	2015	0.336	0.141	0.003	0.140	0.139
Rockfish	2011	0.668	0.157	0.742	0.348	0.276
	2012	0.848	0.266	0.687	0.289	0.292
	2013	0.826	0.207	0.975	0.211	0.225
	2014	0.775	0.185	0.630	0.238	0.226
	2015	0.706	0.187	0.833	0.198	0.203
Atka Mackerel	2011	0.016	0.365	0.124	0.268	0.270
	2012	0.131	0.388	0.180	0.293	0.294
	2013	*	0.367	0.017	0.327	0.328
	2014	*	0.377	0.341	0.353	0.353
	2015	*	0.302	0.279	0.257	0.257

Notes: 1) Prices are for catch from both federal and state of Alaska fisheries.
2) The unfrozen landings price is calculated as landed value divided by estimated or actual round weight.
3) 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.
4) 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.
5) The "All Alaska/All gear" column is the average weighted by retianed catch.
Values 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 19: Ex-vessel value of the groundfish catch off Alaska by area ,vessel category, gear, and species, 2011-2015; calculations based on COAR ($ millions).

			Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Year	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors
Hook & Line	Sablefish	2011	116.4	9.1	125.5	7.4	4.7	12.1	123.8	13.7	137.6
		2012	105.2	6.8	112.0	5.5	3.7	9.2	110.7	10.5	121.2
		2013	74.5	4.7	79.2	3.6	2.9	6.5	78.1	7.6	85.7
		2014	78.4	4.8	83.2	4.5	1.7	6.3	83.0	6.5	89.5
		2015	78.9	5.1	84.0	2.9	1.0	3.9	81.8	6.1	87.9
	Pacific Cod	2011	10.1	6.1	16.2	0.7	78.0	78.7	10.8	84.1	94.9
		2012	12.6	3.7	16.3	0.6	93.1	93.7	13.2	96.8	110.0
		2013	6.3	1.9	8.1	0.6	67.7	68.2	6.8	69.5	76.4
		2014	8.3	4.0	12.3	1.4	78.0	79.4	9.7	82.0	91.7
		2015	7.0	3.6	10.6	0.5	75.8	76.3	7.4	79.4	86.9
	Flatfish	2011	0	0	0	*	0.9	0.9	0	0.9	0.9
		2012	0	0	0	*	0.1	0.1	0	0.1	0.1
		2013	0	*	0	*	0	0	0	0	0
		2014	0	*	0	*	0.2	0.2	0	0.2	0.2
		2015	0	0	0	*	0	0	0	0	0
	Rockfish	2011	1.2	0.1	1.4	0.1	0.2	0.3	1.3	0.4	1.7
		2012	1.9	0.2	2.1	0.1	0.3	0.4	2.0	0.5	2.5
		2013	2.0	0.1	2.2	0.1	0.3	0.3	2.1	0.4	2.5
		2014	1.6	0.1	1.8	0.1	0.1	0.2	1.7	0.3	1.9
		2015	1.6	0.1	1.7	0.1	0.2	0.2	1.6	0.3	1.9
	All Species	2011	128.4	15.7	144.0	8.2	89.7	98.0	136.6	105.4	242.0
		2012	120.6	10.9	131.4	6.2	100.4	106.7	126.8	111.3	238.1
		2013	83.5	6.8	90.2	4.2	78.1	82.4	87.7	84.9	172.6
		2014	89.0	9.0	98.0	6.0	89.5	95.4	95.0	98.5	193.5
		2015	88.1	9.0	97.1	3.4	81.6	85.0	91.5	90.6	182.2

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Table 19: Continued

			Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Year	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors
Pot	Pacific Cod	2011	34.1	*	34.1	16.8	2.2	19.0	50.8	2.2	53.1
		2012	29.5	*	29.5	18.7	3.9	22.6	48.2	3.9	52.0
		2013	18.7	-	18.7	15.0	*	15.0	33.7	*	33.7
		2014	25.8	-	25.8	22.2	4.9	27.0	48.0	4.9	52.9
		2015	27.1	-	27.1	17.7	4.7	22.4	44.8	4.7	49.5
Trawl	Pollock	2011	27.7	0.4	28.1	229.7	204.6	434.3	257.5	205.0	462.4
		2012	38.0	0.4	38.4	241.3	216.1	457.4	279.3	216.5	495.9
		2013	35.9	0.4	36.4	218.7	199.8	418.5	254.6	200.3	454.8
		2014	37.7	0.5	38.2	226.5	207.8	434.3	264.3	208.2	472.5
		2015	43.5	0.3	43.8	227.3	206.0	433.3	270.8	206.3	477.1
	Sablefish	2011	4.6	3.5	8.1	0	0.3	0.3	4.6	3.8	8.4
		2012	2.9	2.7	5.7	*	0.5	0.5	2.9	3.3	6.2
		2013	2.2	2.1	4.3	*	0.5	0.5	2.2	2.6	4.8
		2014	3.0	2.8	5.8	*	0.2	0.2	3.0	3.0	6.0
		2015	2.8	3.0	5.8	0	0.1	0.1	2.8	3.0	5.9
	Pacific Cod	2011	9.9	0.8	10.7	16.9	23.0	40.0	26.8	23.9	50.7
		2012	13.0	0.9	13.9	29.0	30.8	59.8	42.0	31.7	73.7
		2013	9.8	0.6	10.4	21.5	25.1	46.6	31.3	25.7	57.0
		2014	13.2	0.7	13.9	21.4	24.0	45.4	34.5	24.7	59.2
		2015	11.6	0.7	12.3	16.3	21.0	37.3	27.9	21.7	49.6
	Flatfish	2011	5.0	3.1	8.1	1.6	102.4	104.0	6.6	105.5	112.1
		2012	4.2	2.9	7.1	1.7	118.2	119.9	5.9	121.1	127.0
		2013	5.5	3.1	8.6	0.6	93.8	94.5	6.1	97.0	103.1
		2014	5.8	8.0	13.8	0.7	79.8	80.5	6.5	87.8	94.3
		2015	3.5	3.9	7.4	0.3	63.3	63.7	3.8	67.3	71.1

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Table 19: Continued

		Year	Gulf of Alaska Catcher Vessel	Gulf of Alaska Catcher Processor	Gulf of Alaska All Sectors	Bering Sea & Aleutian Islands Catcher Vessel	Bering Sea & Aleutian Islands Catcher Processor	Bering Sea & Aleutian Islands All Sectors	All Alaska Catcher Vessel	All Alaska Catcher Processor	All Alaska All Sectors
Trawl	Rockfish	2011	3.0	4.0	7.0	0.1	20.5	20.6	3.1	24.5	27.6
		2012	6.3	7.9	14.2	0.2	16.6	16.8	6.5	24.6	31.0
		2013	4.4	5.2	9.5	0.1	15.5	15.6	4.5	20.7	25.1
		2014	4.4	5.7	10.2	0.2	17.9	18.1	4.7	23.6	28.2
		2015	4.6	5.9	10.6	0.3	16.0	16.3	5.0	22.0	26.9
	Atka Mackerel	2011	0	0.8	0.8	0.6	29.0	29.5	0.6	29.8	30.4
		2012	0	0.6	0.6	0.1	29.8	30.0	0.2	30.4	30.6
		2013	0	0.7	0.7	0	16.1	16.2	0	16.8	16.9
		2014	0	0.8	0.8	0.1	23.7	23.8	0.1	24.5	24.6
		2015	0	0.6	0.6	0	29.7	29.7	0.1	30.2	30.3
	All Species	2011	51.8	12.9	64.8	249.0	380.2	629.2	300.8	393.1	693.9
		2012	65.9	15.8	81.8	272.4	412.4	684.9	338.4	428.2	766.6
		2013	59.5	12.1	71.6	240.9	351.1	592.0	300.4	363.2	663.6
		2014	64.9	18.7	83.6	249.2	353.8	603.0	314.1	372.5	686.6
		2015	67.0	14.5	81.5	244.6	336.4	581.1	311.6	350.9	662.6
All Gear	Pollock	2011	27.8	0.4	28.1	229.7	206.4	436.1	257.5	206.8	464.3
		2012	38.0	0.4	38.5	241.3	217.2	458.5	279.4	217.6	497.0
		2013	36.0	0.5	36.4	218.7	200.7	419.4	254.6	201.2	455.8
		2014	37.8	0.5	38.2	226.5	208.9	435.4	264.3	209.4	473.7
		2015	43.5	0.3	43.8	227.3	208.4	435.7	270.9	208.7	479.6
	Sablefish	2011	121.5	12.5	134.1	13.3	5.0	18.3	134.9	17.5	152.4
		2012	108.1	9.5	117.7	5.5	4.2	9.7	113.7	13.7	127.4
		2013	76.9	6.8	83.8	3.6	3.4	7.0	80.5	10.2	90.7
		2014	81.4	7.6	89.1	4.5	1.9	6.4	85.9	9.6	95.5
		2015	81.7	8.0	89.8	2.9	1.1	4.0	84.7	9.1	93.7

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Table 19: Continued

		Year	Gulf of Alaska Catcher Vessel	Gulf of Alaska Catcher Processor	Gulf of Alaska All Sectors	Bering Sea & Aleutian Islands Catcher Vessel	Bering Sea & Aleutian Islands Catcher Processor	Bering Sea & Aleutian Islands All Sectors	All Alaska Catcher Vessel	All Alaska Catcher Processor	All Alaska All Sectors
All Gear	Pacific Cod	2011	54.1	7.0	61.0	34.4	103.3	137.7	88.5	110.2	198.7
		2012	55.1	4.6	59.6	48.3	127.8	176.1	103.4	132.3	235.7
		2013	34.8	2.5	37.2	37.0	92.8	129.8	71.8	95.3	167.1
		2014	47.3	4.7	52.0	45.0	106.8	151.8	92.3	111.5	203.8
		2015	45.7	4.3	50.0	34.5	101.5	136.0	80.1	105.9	186.0
	Flatfish	2011	5.0	3.1	8.1	1.6	103.4	105.0	6.6	106.5	113.1
		2012	4.2	2.9	7.1	1.7	118.3	120.0	5.9	121.2	127.1
		2013	5.5	3.1	8.6	0.6	93.9	94.5	6.1	97.0	103.1
		2014	5.8	8.0	13.8	0.7	80.0	80.7	6.5	88.0	94.5
		2015	3.5	3.9	7.4	0.3	63.3	63.7	3.8	67.3	71.1
	Rockfish	2011	4.2	4.2	8.4	0.2	20.7	20.9	4.4	24.8	29.3
		2012	8.1	8.2	16.3	0.3	16.9	17.2	8.4	25.0	33.5
		2013	6.4	5.3	11.7	0.2	15.8	16.0	6.6	21.1	27.7
		2014	6.0	5.9	11.9	0.3	18.0	18.3	6.3	23.8	30.2
		2015	6.2	6.1	12.3	0.4	16.2	16.6	6.6	22.3	28.9
	Atka Mackerel	2011	0	0.8	0.8	0.6	29.0	29.5	0.6	29.8	30.4
		2012	0	0.6	0.6	0.1	29.8	30.0	0.2	30.4	30.6
		2013	0	0.7	0.7	0	16.1	16.2	0	16.8	16.9
		2014	0	0.8	0.8	0.1	23.7	23.8	0.1	24.5	24.6
		2015	0	0.6	0.6	0	29.7	29.7	0.1	30.2	30.3
	All Species	2011	215.1	28.6	243.7	280.0	472.1	752.1	495.1	500.7	995.8
		2012	216.3	26.7	243.0	297.4	516.7	814.1	513.7	543.4	1,057.1
		2013	162.1	18.9	181.0	260.2	429.2	689.4	422.3	448.1	870.3
		2014	180.2	27.8	208.0	277.5	448.1	725.6	457.7	475.9	933.6
		2015	182.5	23.5	206.1	265.8	422.7	688.5	448.3	446.3	894.6

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 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 20: Ex-vessel value of Alaska groundfish delivered to shoreside processors by area, gear and catcher-vessel length, 2006-2015; calculations based on COAR ($ millions).

		Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
	Year	<60	60-125	>=125	<60	60-125	>=125	<60	60-125	>=125
Fixed	2006	65.6	32.8	0.2	6.4	14.2	3.8	72.0	47.0	4.1
	2007	75.0	33.5	0	5.5	16.0	2.5	80.5	49.4	2.5
	2008	86.0	35.4	0.3	9.1	16.7	3.6	95.1	52.1	3.9
	2009	68.5	26.8	*	5.1	7.3	1.6	73.6	34.1	1.6
	2010	80.1	31.2	*	7.7	11.6	3.2	87.8	42.8	3.2
	2011	117.5	45.8	*	11.9	15.2	3.9	129.4	60.9	3.9
	2012	108.9	41.8	*	14.4	10.8	3.6	123.4	52.6	3.6
	2013	75.8	26.8	*	11.0	7.8	3.2	86.8	34.6	3.2
	2014	85.7	29.9	-	19.4	8.9	2.8	105.1	38.8	2.8
	2015	85.4	30.4	-	14.0	7.5	0.6	99.4	37.9	0.6
Trawl	2006	7.7	33.4	-	*	94.0	112.1	7.7	127.4	112.1
	2007	8.7	34.2	-	*	92.7	100.1	8.7	126.9	100.1
	2008	10.8	38.2	*	*	106.9	119.2	10.8	145.1	119.2
	2009	6.5	27.1	-	*	72.4	84.2	6.5	99.5	84.2
	2010	10.3	39.0	-	*	60.8	69.3	10.3	99.8	69.3
	2011	8.2	43.6	-	*	100.4	107.8	8.2	144.1	107.8
	2012	15.4	50.5	-	*	111.2	119.7	15.4	161.8	119.7
	2013	8.9	50.6	-	*	95.2	108.4	8.9	145.9	108.4
	2014	12.8	52.1	-	*	98.8	112.0	12.8	150.9	112.0
	2015	14.6	52.4	-	-	94.0	112.3	14.6	146.4	112.3
All Gear	2006	73.2	66.2	0.2	6.4	108.3	116.0	79.6	174.5	116.2
	2007	83.7	67.7	0	5.5	108.7	102.6	89.2	176.3	102.6
	2008	96.8	73.6	0.3	9.1	123.7	122.8	105.9	197.3	123.1
	2009	75.0	53.9	*	5.1	79.7	85.8	80.1	133.6	85.8
	2010	90.4	70.2	*	7.7	72.4	72.6	98.1	142.6	72.6
	2011	125.7	89.4	*	11.9	115.6	111.7	137.6	205.0	111.7
	2012	124.3	92.4	*	14.4	122.0	123.4	138.8	214.4	123.4
	2013	84.6	77.5	*	11.0	103.0	111.6	95.7	180.5	111.6
	2014	98.5	82.0	-	19.4	107.7	114.8	117.9	189.7	114.8
	2015	100.0	82.8	-	14.0	101.5	112.9	114.1	184.3	112.9

Notes: These estimates include only catch counted against federal TACs. Values 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 21: Ex-vessel value per catcher vessel for Alaska groundfish delivered to shoreside processors by area, gear and catcher-vessel length, 2006-2015; calculations based on COAR ($ thousands).

		Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
	Year	<60	60-125	>=125	<60	60-125	>=125	<60	60-125	>=125
Fixed	2006	65	263	57	98	226	321	70	316	340
	2007	72	301	9	76	275	209	76	351	211
	2008	79	337	74	117	275	359	86	395	353
	2009	67	276	*	74	155	200	71	286	178
	2010	77	328	*	113	242	358	83	372	323
	2011	106	498	*	165	271	490	116	521	436
	2012	98	510	*	225	234	404	110	496	363
	2013	82	362	*	140	165	354	91	353	354
	2014	91	427	-	381	212	312	110	417	312
	2015	90	447	-	223	196	104	103	436	104
Trawl	2006	295	682	-	*	1,306	4,313	295	1,341	4,313
	2007	324	744	-	*	1,288	3,848	324	1,426	3,848
	2008	384	867	*	*	1,528	4,256	384	1,630	4,256
	2009	231	616	-	*	1,081	3,119	231	1,171	3,119
	2010	412	908	-	*	980	2,568	396	1,248	2,568
	2011	340	970	-	*	1,477	3,993	340	1,757	3,993
	2012	642	1,099	-	*	1,711	4,276	642	1,973	4,276
	2013	341	1,151	-	*	1,465	4,016	341	1,779	4,016
	2014	474	1,212	-	*	1,620	4,148	474	1,863	4,148
	2015	563	1,218	-	-	1,492	4,159	563	1,807	4,159
All Gear	2006	72	406	57	94	808	3,053	77	752	3,059
	2007	80	445	9	70	842	2,699	83	787	2,700
	2008	88	511	59	110	951	3,231	95	917	3,155
	2009	73	396	*	67	705	2,452	77	675	2,384
	2010	87	528	*	107	658	2,016	92	750	1,961
	2011	113	672	*	163	932	3,192	122	1,051	3,104
	2012	112	739	*	209	1,099	3,334	123	1,159	3,246
	2013	91	674	*	136	920	3,101	99	1,020	3,101
	2014	104	745	-	366	1,046	3,189	122	1,109	3,189
	2015	105	767	-	223	1,005	3,422	117	1,117	3,422

Notes: These estimates include only catch counted against federal TACs. Values 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 22: Ex-vessel value of the groundfish catch off Alaska by area, residency, and species, 2011-2015; calculations based on COAR ($ millions).

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Year	Alaska	Other	Alaska	Other	Alaska	Other
Pollock	2011	10.8	17.3	83.3	352.8	94.2	370.1
	2012	15.1	23.4	80.6	377.8	95.7	401.2
	2013	12.5	23.9	76.2	343.2	88.6	367.2
	2014	16.1	22.2	76.3	359.1	92.4	381.3
	2015	17.8	26.1	78.8	357.0	96.5	383.0
Sablefish	2011	74.1	60.0	7.8	10.5	81.9	70.5
	2012	63.9	54.2	2.8	7.0	66.7	61.2
	2013	46.2	37.5	4.4	5.3	50.6	42.9
	2014	50.1	39.2	2.2	4.3	52.3	43.5
	2015	50.7	39.3	1.4	2.5	52.2	41.9
Pacific Cod	2011	44.2	16.8	35.0	102.7	79.2	119.5
	2012	44.2	15.5	42.7	133.4	86.9	148.9
	2013	25.3	11.9	31.1	98.7	56.4	110.6
	2014	37.6	14.4	38.7	113.0	76.3	127.5
	2015	40.4	9.6	34.4	101.6	74.8	111.2
Flatfish	2011	2.5	5.6	8.3	96.6	10.8	102.2
	2012	2.0	5.2	1.7	118.3	3.6	123.5
	2013	2.9	5.7	5.0	89.5	7.9	95.2
	2014	3.3	10.5	4.5	76.2	7.7	86.8
	2015	2.4	5.1	4.0	59.6	6.4	64.7
Rockfish	2011	2.0	6.3	0.6	20.4	2.6	26.7
	2012	4.1	12.2	0.1	17.1	4.2	29.3
	2013	3.5	8.2	0.3	15.7	3.8	23.9
	2014	3.2	8.7	0.1	18.1	3.4	26.8
	2015	3.2	9.1	0.5	16.1	3.7	25.1
Atka Mackerel	2011	0	0.8	0	29.5	0	30.4
	2012	0	0.6	0	30.0	0	30.6
	2013	0	0.7	0	16.2	0	16.9
	2014	0	0.8	0	23.8	0	24.5
	2015	0	0.6	0	29.7	0	30.3
All Groundfish	2011	135.5	108.2	136.2	615.9	271.7	724.1
	2012	130.9	112.5	128.8	685.3	259.7	797.8
	2013	91.6	89.5	118.8	573.3	210.4	662.9
	2014	111.8	96.5	124.1	601.5	235.9	697.9
	2015	116.1	90.3	119.7	568.8	235.8	659.1

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 residence 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 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 23: Ex-vessel value of groundfish delivered to shoreside processors by processor group, 2011-2015; calculations based on COAR ($ millions).

Region	2011	2012	2013	2014	2015
Bering Sea Pollock	254.4	270.3	231.3	257.0	242.8
AK Peninsula/Aleutians	12.0	19.7	15.0	14.2	11.5
Kodiak	77.4	87.6	68.3	76.1	77.6
South Central	44.8	37.0	26.4	29.4	29.9
Southeastern	44.8	43.3	28.4	31.3	33.1
All Regions	433.5	457.8	369.2	408.0	395.0

Notes: Refer to the notes for Table 24.

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 24: Ex-vessel value of groundfish as a percentage of the ex-vessel value of all species delivered to shoreside processors by processor group, 2011-2015; calculations based on COAR (percent).

Region	2011	2012	2013	2014	2015
Bering Sea Pollock	58.7	64.4	62.9	67.4	63.9
AK Peninsula/Aleutians	4.6	7.0	5.4	4.6	4.5
Kodiak	41.9	47.9	40.5	50.8	49.6
South Central	17.7	15.6	9.7	14.1	14.3
Southeastern	13.9	15.7	8.8	12.2	15.1
All Regions	29.8	32.8	26.3	31.2	32.4

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 in Table 34. The data are for catch from both federal and state of Alaska fisheries. The processor groups are defined as follows: "Bering Sea Pollock" are the AFA inshore pollock processors including the two AFA floating processors. "AK Peninsula/Aleutian" are other processors on the Alaska Peninsula or in the Aleutian Islands. "Kodiak" are processors on Kodiak Island. "South Central" are processors west of Yakutat and on the Kenai Peninsula. "Southeastern" are processors located from Yakutat south. Values 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 25: Production and gross value of groundfish products in the fisheries off Alaska by species, 2011-2015, (1,000 metric tons product weight and million dollars).

		2011		2012		2013		2014		2015	
	Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Pollock	Whole Fish	2.01	$ 3.2	2.19	$ 2.2	2.48	$ 2.8	1.67	$ 1.5	4.10	$ 4.1
	Head And Gut	59.60	$ 109.1	48.15	$ 71.2	62.26	$ 100.0	67.22	$ 94.0	55.72	$ 76.4
	Roe	19.29	$ 152.9	18.16	$ 169.2	16.12	$ 115.6	24.12	$ 148.2	21.87	$ 103.6
	Deep-Skin Fillets	46.19	$ 171.0	55.49	$ 206.5	51.59	$ 184.5	43.69	$ 153.6	43.77	$ 150.2
	Other Fillets	120.72	$ 399.1	96.96	$ 314.0	125.07	$ 379.5	140.27	$ 403.2	132.34	$ 374.8
	Surimi	148.07	$ 418.0	167.04	$ 523.6	170.26	$ 377.5	183.66	$ 441.4	202.38	$ 497.6
	Minced Fish	30.99	$ 50.8	31.59	$ 54.3	30.94	$ 46.0	26.25	$ 34.4	25.19	$ 37.1
	Fishmeal	52.92	$ 82.5	52.52	$ 78.8	53.87	$ 92.9	56.85	$ 96.1	61.03	$ 101.5
	Other Products	33.97	$ 37.3	38.79	$ 48.6	33.81	$ 36.2	36.46	$ 34.7	34.31	$ 32.8
	All Products	513.75	$ 1,424.0	510.89	$ 1,468.4	546.41	$ 1,335.1	580.20	$ 1,407.0	580.71	$ 1,377.9
Sablefish	Head And Gut	6.86	$ 138.3	7.52	$ 113.4	7.35	$ 93.6	6.29	$ 96.1	5.81	$ 89.0
	Other Products	0.81	$ 9.1	0.63	$ 3.4	0.49	$ 2.6	0.41	$ 2.9	0.25	$ 2.0
	All Products	7.67	$ 147.4	8.16	$ 116.8	7.84	$ 96.2	6.70	$ 99.0	6.06	$ 91.0

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Table 25: Continued

		2011		2012		2013		2014		2015	
	Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Pacific Cod	Whole Fish	2.47	$ 3.7	3.27	$ 4.8	3.64	$ 3.9	1.43	$ 2.5	1.20	$ 1.4
	Head And Gut	106.07	$ 348.6	119.61	$ 354.1	104.39	$ 240.9	114.51	$ 317.3	119.88	$ 355.9
	Salted/Split	*	$ *	*	$ *	*	$ *	-	$ -	-	$ -
	Roe	3.17	$ 4.9	3.86	$ 7.1	4.38	$ 9.1	5.25	$ 11.7	3.71	$ 6.3
	Fillets	15.79	$ 106.2	15.84	$ 103.1	18.50	$ 122.2	18.27	$ 117.2	12.67	$ 74.1
	Other Products	15.06	$ 33.3	14.17	$ 25.3	14.59	$ 21.9	15.13	$ 23.3	15.00	$ 30.1
	All Products	142.56	$ 496.7	156.75	$ 494.4	145.50	$ 397.9	154.58	$ 471.9	152.46	$ 467.9
Flatfish	Whole Fish	21.54	$ 30.2	26.03	$ 39.1	15.71	$ 41.3	27.07	$ 33.0	12.57	$ 14.9
	Head And Gut	142.08	$ 222.5	142.22	$ 241.6	151.20	$ 182.7	146.10	$ 175.1	118.71	$ 141.5
	Kirimi	*	$ *	*	$ *	*	$ *	0.13	$ 0.4	0.66	$ 1.5
	Fillets	0.19	$ 0.8	0.19	$ 0.9	0.22	$ 0.8	0.16	$ 0.6	0.05	$ 0.2
	Fishmeal	0	$ 0	0	$ 0	0.01	$ 0.0	0.01	$ 0.0	0.01	$ 0.0
	Other Products	3.47	$ 8.1	3.12	$ 6.4	2.02	$ 5.9	1.59	$ 3.7	1.24	$ 3.3
	All Products	167.27	$ 261.7	171.57	$ 288.0	169.16	$ 230.7	175.06	$ 212.7	133.23	$ 161.5
Rockfish	Whole Fish	3.61	$ 8.5	3.24	$ 7.0	3.79	$ 7.5	4.28	$ 7.9	4.32	$ 8.1
	Head And Gut	22.32	$ 84.0	22.66	$ 72.6	24.98	$ 58.0	27.57	$ 71.5	29.16	$ 67.0
	Other Products	0.43	$ 2.4	0.69	$ 5.2	0.40	$ 2.4	0.44	$ 1.8	0.50	$ 2.0
	All Products	26.35	$ 94.9	26.59	$ 84.7	29.17	$ 67.8	32.28	$ 81.2	33.99	$ 77.1
Atka Mackerel	Whole Fish	5.33	$ 5.3	5.63	$ 7.9	2.91	$ 5.3	3.25	$ 4.7	3.31	$ 3.9
	Head And Gut	27.41	$ 69.6	24.51	$ 67.0	11.67	$ 34.1	17.63	$ 58.6	29.56	$ 70.4
	Other Products	0	$ 0	0.03	$ 0.0	0	$ 0	0	$ 0	0.01	$ 0.0
	All Products	32.74	$ 74.9	30.17	$ 74.8	14.57	$ 39.4	20.88	$ 63.3	32.87	$ 74.3
All Species	Total	893.19	$ 2,507.6	907.81	$ 2,538.7	916.02	$ 2,177.1	973.63	$ 2,343.7	943.43	$ 2,259.9

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 26: Price per pound of groundfish products in the fisheries off Alaska by species and processing mode, 2011-2015, (dollars).

		2011		2012		2013		2014		2015	
	Product	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside
Pollock	Whole Fish	$ 0.66	$ 0.73	$ 0.53	$ 0.45	$ 0.40	$ 0.52	$ 0.47	$ 0.39	$ 0.45	$ 0.45
	Head And Gut	$ 0.92	$ 0.65	$ 0.73	$ 0.60	$ 0.71	$ 0.76	$ 0.64	$ 0.62	$ 0.64	$ 0.61
	Roe	$ 3.94	$ 3.07	$ 5.03	$ 3.38	$ 3.73	$ 2.74	$ 3.31	$ 2.29	$ 2.64	$ 1.55
	Deep-Skin Fillets	$ 1.75	$ 1.52	$ 1.70	$ 1.67	$ 1.71	$ 1.41	$ 1.63	$ 1.50	$ 1.58	$ 1.47
	Other Fillets	$ 1.46	$ 1.53	$ 1.42	$ 1.52	$ 1.29	$ 1.46	$ 1.31	$ 1.30	$ 1.39	$ 1.20
	Surimi	$ 1.41	$ 1.16	$ 1.61	$ 1.26	$ 1.08	$ 0.94	$ 1.19	$ 1.00	$ 1.26	$ 0.99
	Minced Fish	$ 0.76	$ 0.70	$ 0.79	$ 0.74	$ 0.68	$ 0.65	$ 0.60	$ 0.59	$ 0.67	$ 0.66
	Fishmeal	$ 0.79	$ 0.65	$ 0.86	$ 0.56	$ 0.88	$ 0.72	$ 0.96	$ 0.63	$ 0.92	$ 0.63
	Other Products	$ 0.60	$ 0.44	$ 0.67	$ 0.53	$ 0.59	$ 0.43	$ 0.46	$ 0.41	$ 0.52	$ 0.38
	All Products	$ 1.36	$ 1.15	$ 1.44	$ 1.17	$ 1.17	$ 1.05	$ 1.19	$ 1.01	$ 1.22	$ 0.94
Pacific Cod	Whole Fish	$ 0.49	$ 0.73	$ 0.57	$ 0.73	$ 0.50	$ 0.46	$ 0.36	$ 0.86	$ 0.34	$ 0.56
	Head And Gut	$ 1.56	$ 1.31	$ 1.41	$ 1.18	$ 1.10	$ 0.82	$ 1.32	$ 1.07	$ 1.43	$ 1.13
	Salted/Split	$ -	$ *	$ -	$ *	$ -	$ *	$ -	$ -	$ -	$ -
	Roe	$ 0.76	$ 0.70	$ 0.81	$ 0.84	$ 0.77	$ 0.95	$ 0.89	$ 1.03	$ 0.59	$ 0.81
	Fillets	$ 2.43	$ 3.08	$ 1.51	$ 2.98	$ 1.07	$ 3.03	$ 0.94	$ 2.93	$ 1.18	$ 2.68
	Other Products	$ 1.26	$ 0.89	$ 0.91	$ 0.78	$ 0.53	$ 0.75	$ 0.74	$ 0.69	$ 0.95	$ 0.89
	All Products	$ 1.53	$ 1.65	$ 1.37	$ 1.51	$ 1.06	$ 1.55	$ 1.30	$ 1.50	$ 1.39	$ 1.39
Sablefish	Head And Gut	$ 7.83	$ 9.38	$ 5.31	$ 7.09	$ 5.19	$ 5.87	$ 6.19	$ 7.04	$ 5.86	$ 7.08
	Other Products	$ 1.20	$ 6.06	$ 1.29	$ 2.58	$ 0.82	$ 3.22	$ 0.83	$ 3.87	$ 1.14	$ 4.62
	All Products	$ 6.94	$ 9.04	$ 5.03	$ 6.74	$ 4.62	$ 5.74	$ 5.63	$ 6.86	$ 5.36	$ 7.00

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Table 26: Continued

	Product	2011 At-sea	2011 Shoreside	2012 At-sea	2012 Shoreside	2013 At-sea	2013 Shoreside	2014 At-sea	2014 Shoreside	2015 At-sea	2015 Shoreside
Deep-Water Flatfish (GOA)	Whole Fish	$ -	$ 0.42	$ *	$ *	$ -	$ 0.45	$ -	$ 0.36	$ -	$ *
	Head And Gut	$ -	$ 0.62	$ 0.90	$ 0.64	$ 0.52	$ 0.78	$ 0.72	$ 0.63	$ *	$ *
	Kirimi	$ -	$ *	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Fillets	$ -	$ 2.01	$ -	$ *	$ -	$ 1.76	$ -	$ 2.04	$ -	$ *
	Other Products	$ *	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	All Products	$ *	$ 0.58	$ 0.90	$ 0.64	$ 0.52	$ 0.61	$ 0.72	$ 0.73	$ *	$ *
Shallow-Water Flatfish (GOA)	Whole Fish	$ *	$ 0.63	$ *	$ 0.63	$ -	$ 1.08	$ *	$ 0.58	$ -	$ 1.07
	Head And Gut	$ 0.64	$ 0.68	$ 0.77	$ 0.70	$ 0.46	$ 0.72	$ 0.41	$ 0.69	$ 0.85	$ 0.53
	Kirimi	$ -	$ *	$ -	$ *	$ -	$ *	$ -	$ *	$ -	$ 1.04
	Fillets	$ -	$ 2.06	$ -	$ 2.15	$ -	$ 1.62	$ -	$ 1.39	$ -	$ 2.37
	Other Products	$ -	$ 0.14	$ -	$ *	$ -	$ *	$ -	$ *	$ -	$ -
	All Products	$ 0.64	$ 0.78	$ 0.77	$ 0.82	$ 0.46	$ 0.98	$ 0.41	$ 0.65	$ 0.85	$ 1.02
Arrowtooth	Whole Fish	$ -	$ 0.65	$ *	$ 0.47	$ *	$ 0.64	$ 0.54	$ 0.67	$ *	$ *
	Head And Gut	$ 0.69	$ 0.54	$ 0.81	$ 0.57	$ 0.54	$ 0.45	$ 0.75	$ 0.45	$ 0.69	$ 0.45
	Kirimi	$ -	$ *	$ -	$ *	$ -	$ *	$ -	$ *	$ -	$ *
	Fillets	$ *	$ *	$ -	$ *	$ -	$ 1.74	$ -	$ *	$ -	$ *
	Other Products	$ 0.77	$ 0.85	$ 0.75	$ 0.46	$ 1.27	$ 1.39	$ 0.93	$ 0.92	$ 0.87	$ 0.70
	All Products	$ 0.70	$ 0.57	$ 0.81	$ 0.56	$ 0.55	$ 0.51	$ 0.75	$ 0.46	$ 0.69	$ 0.46
Kamchatka Flounder (BSAI)	Whole Fish	$ -	$ -	$ -	$ -	$ *	$ -	$ -	$ -	$ -	$ -
	Head And Gut	$ 0.70	$ -	$ 1.00	$ -	$ 0.55	$ -	$ 0.74	$ -	$ 0.67	$ -
	Fishmeal	$ 0.75	$ -	$ 0.66	$ *	$ 1.29	$ -	$ 0.93	$ -	$ 0.94	$ -
	All Products	$ 0.70	$ -	$ 1.00	$ *	$ 0.55	$ -	$ 0.74	$ -	$ 0.67	$ -

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Table 26: Continued

		2011		2012		2013		2014		2015	
	Product	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside	At-sea	Shoreside
Flathead Sole	Whole Fish	$ 0.59	$ 0.53	$ 0.76	$ 0.62	$ 1.38	$ 1.06	$ 0.62	$ 0.51	$ 0.44	$ 0.86
	Head And Gut	$ 0.89	$ 0.53	$ 0.93	$ 0.61	$ 0.85	$ 0.68	$ 0.70	$ 0.70	$ 0.64	$ 0.49
	Kirimi	$ -	$ *	$ -	$ *	$ -	$ *	$ -	$ 1.23	$ -	$ 1.08
	Fillets	$ *	$ 2.15	$ *	$ 2.00	$ -	$ 1.56	$ *	$ 1.36	$ 2.33	$ *
	Other Products	$ 0.82	$ 0.73	$ 0.75	$ 0.37	$ 1.35	$ 1.30	$ 0.93	$ 0.92	$ 0.87	$ 0.87
	All Products	$ 0.89	$ 0.60	$ 0.91	$ 0.59	$ 0.90	$ 0.98	$ 0.70	$ 0.66	$ 0.64	$ 0.83
Rex Sole (GOA)	Whole Fish	$ 1.12	$ 1.02	$ 1.12	$ 1.12	$ 1.21	$ 0.94	$ 1.11	$ 0.86	$ 0.77	$ 0.99
	Head And Gut	$ *	$ *	$ *	$ *	$ 1.76	$ *	$ 0.62	$ *	$ 0.95	$ *
	Kirimi	$ -	$ -	$ -	$ *	$ -	$ *	$ -	$ -	$ -	$ -
	Fillets	$ -	$ 1.83	$ -	$ *	$ -	$ 1.31	$ -	$ *	$ -	$ *
	Other Products	$ -	$ 0.74	$ -	$ *	$ -	$ *	$ -	$ *	$ -	$ -
	All Products	$ 1.12	$ 1.03	$ 1.12	$ 1.12	$ 1.21	$ 0.94	$ 1.11	$ 0.86	$ 0.77	$ 0.99
Rock Sole (BSAI)	Whole Fish	$ 0.53	$ *	$ 0.66	$ *	$ 0.50	$ *	$ 0.53	$ *	$ 0.50	$ -
	Head And Gut	$ 0.69	$ -	$ 0.80	$ -	$ 0.54	$ -	$ 0.45	$ -	$ 0.49	$ -
	Head And Gut With Roe	$ 1.05	$ -	$ 1.28	$ -	$ 0.85	$ -	$ 0.85	$ -	$ 0.89	$ -
	Fillets	$ *	$ -	$ -	$ -	$ *	$ -	$ 5.70	$ -	$ 2.78	$ -
	Other Products	$ 0.84	$ 0.74	$ 0.71	$ 0.37	$ 1.26	$ 1.30	$ 0.92	$ 0.92	$ 0.87	$ 0.87
	All Products	$ 0.77	$ 0.74	$ 0.91	$ 0.37	$ 0.58	$ 1.30	$ 0.55	$ 0.92	$ 0.55	$ 0.87
Turbot (BSAI)	Whole Fish	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ *	$ -	$ *
	Head And Gut	$ 2.65	$ *	$ 2.09	$ -	$ 1.95	$ -	$ 2.18	$ *	$ 2.15	$ -
	Other Products	$ 1.90	$ 0.70	$ 1.59	$ 0.37	$ 1.56	$ 1.33	$ 1.89	$ 0.93	$ 1.80	$ 0.88
	All Products	$ 2.45	$ 0.68	$ 1.96	$ 0.37	$ 1.86	$ 1.33	$ 2.11	$ 0.93	$ 2.06	$ 0.88

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Table 26: Continued

	Product	2011 At-sea	2011 Shoreside	2012 At-sea	2012 Shoreside	2013 At-sea	2013 Shoreside	2014 At-sea	2014 Shoreside	2015 At-sea	2015 Shoreside
Yellowfin (BSAI)	Whole Fish	$ 0.55	$ -	$ 0.63	$ *	$ 1.34	$ *	$ 0.46	$ *	$ 0.45	$ -
	Head And Gut	$ 0.65	$ -	$ 0.63	$ -	$ 0.51	$ -	$ 0.45	$ -	$ 0.48	$ -
	Kirimi	$ *	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Fillets	$ -	$ -	$ *	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other Products	$ 0.85	$ 0.85	$ 0.87	$ 0.88	$ 1.30	$ 1.30	$ 0.90	$ 0.92	$ 1.02	$ 0.87
	All Products	$ 0.63	$ 0.85	$ 0.63	$ 0.88	$ 0.58	$ 1.30	$ 0.46	$ 0.92	$ 0.48	$ 0.87
Flat Other (BSAI)	Whole Fish	$ 1.05	$ 1.40	$ 0.81	$ *	$ 0.90	$ *	$ 0.67	$ *	$ 0.51	$ *
	Head And Gut	$ 0.51	$ *	$ 0.58	$ -	$ 0.49	$ -	$ 0.49	$ -	$ 0.46	$ -
	Fillets	$ *	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other Products	$ 0.84	$ 0.74	$ 0.87	$ 0.37	$ 1.26	$ 1.30	$ 0.91	$ 0.92	$ 0.88	$ 0.87
	All Products	$ 0.56	$ 1.34	$ 0.64	$ 0.37	$ 0.57	$ 1.30	$ 0.53	$ 0.92	$ 0.47	$ 0.87
Rockfish	Whole Fish	$ 1.49	$ 0.94	$ 0.96	$ 0.98	$ 1.19	$ 0.84	$ 1.68	$ 0.69	$ 1.14	$ 0.80
	Head And Gut	$ 1.70	$ 1.74	$ 1.40	$ 1.75	$ 1.02	$ 1.32	$ 1.16	$ 1.33	$ 1.00	$ 1.43
	Other Products	$ 1.24	$ 2.76	$ 1.17	$ 3.48	$ 1.10	$ 2.85	$ 0.81	$ 2.01	$ 1.02	$ 1.97
	All Products	$ 1.69	$ 1.42	$ 1.38	$ 1.67	$ 1.03	$ 1.16	$ 1.17	$ 1.03	$ 1.00	$ 1.13
Atka Mackerel	Whole Fish	$ 0.45	$ 0.54	$ 0.63	$ 0.70	$ 0.83	$ *	$ 0.66	$ 0.60	$ 0.53	$ *
	Head And Gut	$ 1.15	$ *	$ 1.24	$ -	$ 1.33	$ -	$ 1.51	$ -	$ 1.08	$ -
	Other Products	$ 0.64	$ 0.47	$ 0.71	$ 0.36	$ 1.03	$ 1.09	$ 1.21	$ 0.51	$ 0.87	$ 0.88
	All Products	$ 1.04	$ 0.54	$ 1.13	$ 0.66	$ 1.23	$ 1.09	$ 1.38	$ 0.60	$ 1.02	$ 0.87

Notes: These estimates are based on data from both federal and state of Alaska fisheries. Prices based on confidential data have been excluded. "*" 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 27: Total product value per round metric ton of retained catch in the groundfish fisheries off Alaska by processor type, species, area and year, 2011-2015, (dollars).

		Bering Sea & Aleutian Islands					Gulf of Alaska				
	Species	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Motherships	Pollock	1,220	1,153	808	1,035	971	-	-	-	-	-
	Pacific Cod	402	965	555	388	459	-	-	-	-	-
Catcher processors	Pollock	1,190	1,206	1,037	1,037	1,044	881	658	682	497	578
	Sablefish	10,172	7,853	7,799	9,728	10,625	11,279	6,770	6,834	8,391	6,794
	Pacific Cod	1,687	1,501	1,180	1,423	1,579	1,621	1,480	1,063	1,300	1,381
	Flatfish	913	1,004	768	694	693	1,020	1,103	909	915	887
	Rockfish	1,967	1,572	1,173	1,370	1,141	2,059	1,568	1,103	1,329	1,232
	Atka Mackerel	1,484	1,584	1,681	2,019	1,391	1,694	1,856	2,075	1,828	1,508
	Other	483	624	482	460	513	1,098	1,223	1,922	1,148	2,343
Shoreside processors	Pollock	1,047	1,089	950	980	887	920	865	1,007	757	639
	Sablefish	11,258	9,152	9,913	9,570	13,167	11,319	8,246	6,744	8,380	8,307
	Pacific Cod	1,682	1,632	1,398	1,489	1,391	1,570	1,463	1,502	1,502	1,326
	Flatfish	829	741	1,102	553	564	676	799	831	700	695
	Rockfish	1,730	1,661	1,424	936	1,071	1,865	1,830	1,469	1,299	1,339
	Other	428	888	433	1,611	1,776	1,606	2,166	2,037	1,585	1,568

Notes: These estimates include the product value of 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; 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 28: Production of groundfish products in the fisheries off Alaska by species, product and area, 2011-2015, (1,000 metric tons product weight).

		Bering Sea & Aleutian Islands					Gulf of Alaska				
	Product	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Pollock	Whole Fish	1.5	1.7	1.8	1.4	1.8	0.5	0.5	0.7	0.3	2.3
	Head And Gut	44.8	29.1	41.0	37.5	25.4	14.8	19.0	21.3	29.7	30.3
	Roe	18.0	16.5	13.9	20.6	18.8	1.3	1.7	2.2	3.5	3.1
	Deep-Skin Fillets	46.2	55.5	51.6	43.7	43.8	*	*	*	*	-
	Other Fillets	115.0	91.1	119.3	132.1	123.2	5.7	5.9	5.8	8.2	9.1
	Surimi	141.0	157.1	161.7	171.3	187.7	7.1	9.9	8.6	12.3	14.6
	Minced Fish	30.4	31.0	30.7	26.1	25.2	0.5	0.6	0.2	0.2	*
	Fishmeal	52.8	52.5	53.9	56.9	61.0	0.1	*	*	*	*
	Other Products	33.3	38.2	33.0	36.0	34.0	0.6	0.6	0.8	0.5	0.3
Sablefish	Head And Gut	1.0	1.2	1.1	0.7	0.5	5.9	6.3	6.2	5.6	5.3
	Other Products	0	0.1	0	0	0	0.8	0.6	0.5	0.4	0.2
Pacific Cod	Whole Fish	1.2	1.5	2.4	1.0	0.5	1.3	1.8	1.2	0.5	0.7
	Head And Gut	88.8	104.2	97.8	100.6	100.8	17.3	15.4	6.6	13.9	19.1
	Salted/Split	*	*	-	-	-	*	-	*	-	-
	Roe	1.8	2.4	2.8	3.5	2.4	1.3	1.5	1.6	1.8	1.3
	Fillets	6.6	6.8	8.8	8.4	6.3	9.2	9.1	9.7	9.9	6.4
	Other Products	9.0	7.9	10.0	10.1	10.5	6.0	6.3	4.6	5.0	4.5
Flatfish	Whole Fish	17.4	22.5	10.5	21.6	10.3	4.1	3.5	5.2	5.5	2.3
	Head And Gut	130.1	133.8	142.6	129.2	110.1	12.0	8.4	8.6	16.9	8.6
	Kirimi	*	-	-	-	-	*	*	*	0.1	0.7
	Fillets	*	*	*	0	0	0.2	0.2	0.2	0.2	0
	Fishmeal	0	0	0	0	0	-	-	-	-	-
	Other Products	3.1	3.1	2.0	1.6	1.2	0.3	0.1	0	*	0.1
Rockfish	Whole Fish	0.7	1.3	0.5	0.5	0.5	3.0	1.9	3.3	3.8	3.9
	Head And Gut	13.4	12.3	16.3	17.5	18.8	8.9	10.4	8.6	10.1	10.4
	Other Products	0	0.1	0	0.1	0.2	0.4	0.6	0.4	0.4	0.3
Atka Mackerel	Whole Fish	5.3	5.6	2.9	3.3	3.3	-	*	-	*	*
	Head And Gut	26.9	24.2	11.1	17.1	29.1	0.5	0.4	0.5	0.5	0.5
	Other Products	0	0	0	0	0	-	*	*	-	*

Notes: These estimates include production resulting from catch from federal and state of Alaska fisheries. "*" indicates a confidential value; "-" indicates no applicable data or value. Confidential data withheld from this table are included in the grand totals in Table 25.

Source: NMFS Alaska Region At-sea and Shoreside 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 29: Production of groundfish products in the fisheries off Alaska by species, product and processing mode, 2011-2015, (1,000 metric tons product weight).

		At-sea					Shoreside				
	Product	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Pollock	Whole Fish	0.11	0.24	0.16	0.31	1.11	1.90	1.95	2.32	1.36	2.98
	Head And Gut	38.83	26.05	37.86	35.46	25.95	20.77	22.10	24.40	31.76	29.78
	Roe	11.66	9.30	8.37	11.71	12.01	7.63	8.86	7.75	12.41	9.86
	Deep-Skin Fillets	32.25	36.84	36.83	32.68	34.56	13.94	18.65	14.76	11.01	9.22
	Other Fillets	58.32	47.55	59.63	63.68	57.44	62.40	49.41	65.44	76.60	74.90
	Surimi	70.80	77.93	80.85	87.81	95.94	77.27	89.11	89.41	95.84	106.45
	Minced Fish	23.49	25.06	23.47	19.98	19.71	7.50	6.53	7.47	6.28	5.47
	Fishmeal	22.58	21.08	20.98	23.25	26.45	30.34	31.44	32.89	33.60	34.59
	Other Products	12.26	10.57	12.21	13.57	12.60	21.71	28.22	21.60	22.90	21.71
Sablefish	Head And Gut	1.03	1.08	1.05	0.78	0.64	5.83	6.44	6.30	5.51	5.17
	Other Products	0.16	0.08	0.16	0.09	0.07	0.65	0.55	0.33	0.32	0.18
Pacific Cod	Whole Fish	0.63	1.28	1.99	0.19	0.12	1.84	1.99	1.65	1.24	1.09
	Head And Gut	78.50	86.92	84.36	84.46	87.81	27.57	32.69	20.03	30.05	32.06
	Salted/Split	-	-	-	-	-	*	*	*	-	-
	Roe	0.46	0.62	0.38	0.75	0.62	2.71	3.24	3.99	4.50	3.09
	Fillets	0.71	0.32	0.28	0.15	0.20	15.08	15.52	18.21	18.12	12.47
	Other Products	4.62	3.11	4.32	3.10	5.35	10.44	11.06	10.27	12.03	9.66
Flatfish	Whole Fish	18.86	23.86	12.37	22.89	11.41	2.68	2.16	3.34	4.18	1.17
	Head And Gut	136.38	138.44	146.87	141.80	116.27	5.69	3.78	4.33	4.30	2.44
	Kirimi	*	-	-	-	-	*	*	*	0.13	0.66
	Fillets	*	*	*	0	0.01	0.19	0.19	0.22	0.16	0.04
	Fishmeal	0	0	0.01	0.01	0.01	-	*	-	-	-
	Other Products	2.46	2.23	1.61	1.30	0.97	1.01	0.89	0.41	0.28	0.27
Rockfish	Whole Fish	0.82	1.17	0.52	0.63	0.63	2.78	2.07	3.27	3.64	3.69
	Head And Gut	19.73	19.42	22.35	24.66	26.31	2.59	3.23	2.63	2.91	2.85
	Other Products	0.06	0.03	0.03	0.05	0.11	0.37	0.66	0.36	0.39	0.39
Atka Mackerel	Whole Fish	5.07	5.43	2.91	3.17	3.31	0.25	0.20	*	0.08	*
	Head And Gut	27.41	24.51	11.67	17.63	29.56	*	-	-	-	-
	Other Products	0	0	0	0	0	0	0.03	0	0	0

Notes: These estimates include production resulting from catch from federal and state of Alaska fisheries. "*" indicates a confidential value; "-" indicates no applicable data or value. Confidential data withheld from this table are included in the grand totals in Table 25.

Source: NMFS Alaska Region At-sea and Shoreside 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 30: Production and real gross value of non-groundfish products in the commercial fisheries of Alaska by species group and area of processing, 2011-2015, (1,000 metric tons product weight and $ millions.

		Bering Sea & Aleutian Islands		Gulf of Alaska		All Alaska	
	Species	Quantity	Value	Quantity	Value	Quantity	Value
2011	Salmon	48.6	$ 426.9	198.7	$ 1,105.9	247.3	$ 1,532.9
	Halibut	2.8	$ 57.1	8.2	$ 150.0	11.0	$ 207.1
	Herring	20.4	$ 22.7	21.0	$ 23.5	41.4	$ 46.2
	Crab	19.5	$ 342.4	4.6	$ 79.8	24.1	$ 422.2
	Other	*	$ *	1.3	$ 24.2	1.3	$ 24.2
	All Species	91.3	$ 849.2	233.8	$ 1,383.3	325.1	$ 2,232.5
2012	Salmon	39.8	$ 337.7	168.3	$ 1,008.8	208.1	$ 1,346.5
	Halibut	2.0	$ 35.1	8.5	$ 134.9	10.5	$ 170.0
	Herring	16.2	$ 21.1	15.4	$ 30.7	31.6	$ 51.8
	Crab	29.0	$ 382.8	4.6	$ 70.5	33.6	$ 453.3
	Other	0	$ 0	1.7	$ 34.2	1.7	$ 34.9
	All Species	87.0	$ 777.5	198.6	$ 1,279.0	285.5	$ 2,056.5
2013	Salmon	34.7	$ 363.0	290.3	$ 1,493.0	325.1	$ 1,855.9
	Halibut	1.4	$ 18.0	7.5	$ 117.1	8.9	$ 135.2
	Herring	25.5	$ 25.7	11.6	$ 22.6	37.1	$ 48.3
	Crab	24.7	$ 335.4	3.0	$ 45.9	27.7	$ 381.3
	Other	0	$ 0	1.3	$ 26.3	1.3	$ 27.1
	All Species	86.4	$ 742.9	313.7	$ 1,704.9	400.1	$ 2,447.7
2014	Salmon	58.1	$ 454.7	176.8	$ 967.6	234.9	$ 1,422.4
	Halibut	0.6	$ 8.9	5.5	$ 102.2	6.2	$ 111.1
	Herring	19.5	$ 17.0	20.4	$ 24.6	39.9	$ 41.6
	Crab	23.2	$ 327.1	3.8	$ 58.9	27.0	$ 386.0
	Other	0	$ 0	1.2	$ 19.1	1.2	$ 19.6
	All Species	101.4	$ 808.2	207.8	$ 1,172.4	309.2	$ 1,980.6
2015	Salmon	70.5	$ 418.6	270.7	$ 1,035.6	341.3	$ 1,454.2
	Halibut	3.4	$ 20.2	6.1	$ 112.2	9.5	$ 132.4
	Herring	17.7	$ 18.6	10.1	$ 11.9	27.8	$ 30.4
	Crab	25.4	$ 321.0	3.9	$ 56.5	29.3	$ 377.5
	Other	0	$ 0	1.0	$ 17.5	1.0	$ 18.1
	All Species	117.1	$ 778.9	291.8	$ 1,233.7	408.9	$ 2,012.6

Notes: These estimates include production resulting from catch in both federal and state of Alaska fisheries. The data have been adjusted to 2015 dollars by applying the GDP: chain-type price index https://research.stlouisfed.org/fred2/series/GDPCTPI. "*" 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 31: Gross product value of Alaska groundfish by area and processing mode, 2011-2015, ($ millions).

	Bering Sea & Aleutian Islands		Gulf of Alaska		All Alaska
Year	At-sea	Shoreside	At-sea	Shoreside	All Sectors
2011	1,447.4	656.1	69.0	339.2	2,511.7
2012	1,469.3	699.4	51.5	322.4	2,542.7
2013	1,221.6	629.6	36.3	292.9	2,180.4
2014	1,292.0	666.0	62.2	325.6	2,345.9
2015	1,309.5	602.4	47.7	302.7	2,262.4

Notes: These estimates include the product value of catch from both federal and state of Alaska fisheries.

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: Gross product value of Alaska groundfish by catcher/processor category, vessel length, and area, 2011-2015, ($ millions).

		Bering Sea & Aleutian Islands			Gulf of Alaska	
	Year	125-165	<125	>165	<125	>=125
Fixed Gear	2011	117.7	58.3	62.2	11.7	11.8
	2012	111.1	64.8	57.2	6.9	6.2
	2013	84.6	42.5	51.4	*	6.3
	2014	100.3	47.2	66.2	3.0	10.2
	2015	123.7	56.3	63.9	4.0	8.8
Fillet Trawl	2011	-	-	79.6	-	-
	2014	-	-	*	-	-
Head And Gut Trawl	2011	64.4	47.9	287.9	8.4	37.1
	2012	74.2	48.4	307.1	9.3	28.4
	2013	48.7	33.1	244.1	8.7	18.8
	2014	48.6	26.1	262.1	*	35.8
	2015	45.3	27.6	242.2	*	25.1
Surimi Trawl	2011	-	-	595.0	-	-
	2012	-	-	684.8	-	-
	2013	-	-	627.6	-	-
	2014	-	-	590.3	-	-
	2015	-	-	639.0	-	-
All Trawl	2011	64.4	47.9	962.5	8.4	37.1
	2012	74.2	48.4	992.0	9.3	28.4
	2013	48.7	33.1	871.7	8.7	18.8
	2014	48.6	26.1	852.4	*	35.8
	2015	45.3	27.6	881.1	*	25.1

Notes: These estimates include the product value of 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 Production Reports; ADF&G Commercial Operators Annual Reports (COAR); and NMFS Alaska Region permit data. 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: Gross product value per vessel of Alaska groundfish by catcher/processor category, vessel length, and area 2011-2015, ($ millions).

		Bering Sea & Aleutian Islands			Gulf of Alaska	
	Year	125-165	<125	>165	<125	>=125
Fixed Gear	2011	7.8	4.2	7.8	1.5	1.1
	2012	7.4	5.0	6.4	1.0	0.8
	2013	5.6	3.5	5.7	*	0.9
	2014	6.3	5.2	7.4	0.7	1.1
	2015	7.7	6.3	7.1	1.0	1.3
Fillet Trawl	2011	-	-	26.5	-	-
	2014	-	-	*	-	-
Head And Gut Trawl	2011	16.1	9.6	24.0	2.1	2.9
	2012	18.6	9.7	23.6	2.3	2.2
	2013	12.2	11.0	18.8	2.9	1.7
	2014	12.2	8.7	20.2	*	4.0
	2015	11.3	9.2	18.6	*	3.6
Surimi Trawl	2011	-	-	49.6	-	-
	2012	-	-	48.9	-	-
	2013	-	-	44.8	-	-
	2014	-	-	45.4	-	-
	2015	-	-	45.6	-	-
All Trawl	2011	16.1	9.6	35.6	2.1	2.9
	2012	18.6	9.7	36.7	2.3	2.2
	2013	12.2	11.0	32.3	2.9	1.7
	2014	12.2	8.7	31.6	*	4.0
	2015	11.3	9.2	32.6	*	3.6

Notes: These estimates include the product value of 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 Production Reports; ADF&G Commercial Operators Annual Reports (COAR); and NMFS Alaska Region permit data. 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: Gross product value of groundfish processed by shoreside processors by processor group, 2011-2015, ($ millions).

Processor Group	2011	2012	2013	2014	2015
Bering Sea Pollock	675.8	699.4	636.0	691.1	618.9
AK Peninsula/Aleutians	44.2	61.2	35.9	30.7	21.4
Kodiak	161.7	168.4	157.2	178.8	185.7
South Central	58.3	48.5	34.3	30.0	39.5
Southeastern	51.2	51.0	35.8	39.6	41.2
All Regions	991.1	1,028.6	899.2	970.2	906.7

Notes: See Table 35 for notes and source information.

Table 35: Groundfish gross product value as a percentage of all-species gross product value by shoreside processor group, 2011-2015, (percent).

Processor Group	2011	2012	2013	2014	2015
Bering Sea Pollock	72.8	75.7	74.3	79.1	71.1
AK Peninsula/Aleutians	8.8	11.8	6.9	5.5	3.9
Kodiak	46.4	46.0	41.7	55.4	49.4
South Central	13.8	10.2	5.4	6.6	8.2
Southeastern	8.3	9.8	5.7	7.7	8.8
All Regions	35.2	36.7	29.8	35.7	33.1

Notes: The data are for catch from both federal and state of Alaska fisheries. The processor groups are defined as follows: "Bering Sea Pollock" are the AFA inshore pollock processors including the two AFA floating processors. "AK Peninsula/Aleutian" are other processors on the Alaska Peninsula or in the Aleutian Islands. "Kodiak" are processors on Kodiak Island. "South Central" are processors west of Yakutat and on the Kenai Peninsula. "Southeastern" are processors located from Yakutat south.

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: Number of groundfish vessels that caught or caught and processed more than $11 million ex-vessel value or product value of groundfish and other species by area, vessel type and gear, 2015.

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Gear	Catcher Processors	All Vessels	Catcher Processors	All Vessels	Catcher Processors	All Vessels
2015	Hook & Line	-	-	2	2	2	2
	Trawl	8	8	32	32	32	32
	All Gear	8	8	34	34	34	34

Notes: Includes only vessels that fished part of federal groundfish TACs. Determination that a vessel was below the $11 million threshold was based on total revenue from catching or processing all species, not just groundfish. "*" indicates a confidential value; "-" indicates no applicable data or value.

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

Table 37a: Number of groundfish vessels that caught or caught and processed less than $11 million ex-vessel value or product value of groundfish and other species by area, vessel type and gear, 2015.

	Gear	Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Catcher Vessels	Catcher Processors	All Vessels	Catcher Vessels	Catcher Processors	All Vessels	Catcher Vessels	Catcher Processors	All Vessels
2015	Hook & Line	832	12	844	122	30	152	889	32	921
	Pot	116	-	116	47	4	51	150	4	154
	Trawl	68	2	70	100	2	102	143	3	146
	All Gear	948	14	962	258	35	293	1,105	38	1,143

Notes: Includes only vessels that fished part of federal groundfish TACs. Determination that a vessel was below the $11 million threshold was based on total revenue from catching or processing all species, not just groundfish. "*" indicates a confidential value; "-" indicates no applicable data or value.

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

Table 37b: Number of groundfish vessels that caught or caught and processed less than $11 million ex-vessel value or product value of groundfish and other species by area, vessel type and gear, 2015; entity size based on vessel revenues and affiliated group revenues.

		Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
	Gear	Catcher Vessels	Catcher Processors	All Vessels	Catcher Vessels	Catcher Processors	All Vessels	Catcher Vessels	Catcher Processors	All Vessels
2015	Hook & Line	825	2	827	118	3	121	881	5	886
	Pot	115	-	115	26	2	28	127	2	129
	Trawl	29	1	30	17	-	17	41	1	42
	All Gear	902	3	905	152	4	156	975	7	982

Notes: Includes only vessels that fished part of federal groundfish TACs. Determination that a vessel is above the $11 million threshold is based on the vessel's total revenue from catching or processing all species, not just groundfish. Entity size determination is additionally based on total vessel revenues of known affiliated groups (Amendment 80, AFA pollock, Central Gulf of Alaska rockfish, BSAI crab, and freezer longline cooperatives, as well as known corporate affiliations), whereby group revenue totaling over $11 million confers large entity status on all member vessels. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: ADF&G Commercial Operators Annual Reports (COAR); ADF&G Intent to Operate (ITO) file; NMFS Alaska Region At-sea Production Reports; CFEC gross earnings (fish tickets) file; NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region permit data; and AKFIN West Coast whiting revenue data. 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: Average revenue of groundfish vessels that caught or caught and processed more than $11 million ex-vessel value or product value of groundfish and other species, by area, vessel type, and gear, 2015, ($ millions).

		Gulf of Alaska	Bering Sea & Aleutian Islands	All Alaska
	Gear	Catcher Processors	Catcher Processors	Catcher Processors
2015	Hook & Line	-	*	*
	Trawl	18.42	31.35	31.35

Notes: Includes only vessels that fished part of federal groundfish TACs. Categories with fewer than four vessels are not reported. Averages are obtained by adding the total revenues, across all areas and gear types, of all the vessels in the category, and dividing that sum by the number of vessels in the category. Averages include revenue realized from catching or processing all species, not just groundfish. "*" indicates a confidential value; "-" indicates no applicable data or value.

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

Table 39a: Average revenue of groundfish vessels that caught or caught and processed less than $11 million ex-vessel value or product value of groundfish and other species, by area, vessel type and gear, 2015, ($ millions).

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Gear	Catcher Vessels	Catcher Processors	Catcher Vessels	Catcher Processors	Catcher Vessels	Catcher Processors
2015	Hook & Line	0.36	5.8	0.58	6.76	0.35	6.44
	Pot	0.66	-	1.95	4.58	1.02	4.58
	Trawl	1.65	*	2.95	*	2.47	*

Notes: Includes only vessels that fished part of federal groundfish TACs. Categories with fewer than four vessels are not reported. Averages are obtained by adding the total revenues, across all areas and gear types, of all the vessels in the category, and dividing that sum by the number of vessels in the category. Averages include revenue realized from catching or processing all species, not just groundfish. "*" indicates a confidential value; "-" indicates no applicable data or value.

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

Table 39b: Average revenue of groundfish vessels that caught or caught and processed less than $11 million ex-vessel value or product value of groundfish and other species, by area, vessel type and gear, 2015, ($ millions); entity size based on vessel revenues and affiliated group revenues.

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Gear	Catcher Vessels	Catcher Processors	Catcher Vessels	Catcher Processors	Catcher Vessels	Catcher Processors
2015	Hook & Line	0.35	*	0.52	*	0.34	*
	Pot	0.77	-	1.30	*	0.80	*
	Trawl	1.87	*	3.04	-	1.93	*

Notes: Includes only vessels that fished part of federal groundfish TACs. Determination that a vessel is above the $11 million threshold is based on the vessel's total revenue from catching or processing all species, not just groundfish. Categories with fewer than four vessels are not reported. Averages are obtained by adding the total revenues, across all areas and gear types, of all the vessels in the category, and dividing that sum by the number of vessels in the category. Entity size determination is additionally based on total vessel revenues of known affiliated groups (Amendment 80, AFA pollock, Central Gulf of Alaska rockfish, BSAI crab, and freezer longline cooperatives, as well as known corporate affiliations), whereby group revenue totaling over $11 million confers large entity status on all member vessels. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: ADF&G Commercial Operators Annual Reports (COAR); ADF&G Intent to Operate (ITO) file; NMFS Alaska Region At-sea Production Reports; CFEC gross earnings (fish tickets) file; NMFS Alaska Region Blend and Catch-accounting System estimates; NMFS Alaska Region permit data; and AKFIN West Coast whiting revenue data. 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: Number and total registered net tons of vessels that caught groundfish off Alaska by area and gear, 2008-2015.

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Year	Number Of Vessels	Registered Net Tons	Number Of Vessels	Registered Net Tons	Number Of Vessels	Registered Net Tons
Hook & Line	2008	668	24,272	107	15,103	711	31,658
	2009	609	22,704	77	13,862	643	29,522
	2010	633	22,283	73	12,541	658	28,260
	2011	716	23,452	78	11,148	747	28,717
	2012	726	21,710	68	10,686	764	28,760
	2013	516	17,274	66	10,966	559	24,964
	2014	551	19,314	52	10,450	582	25,340
	2015	562	18,196	52	10,319	594	25,261
Pot	2008	149	8,670	72	8,254	194	14,538
	2009	126	7,098	55	6,426	165	12,200
	2010	115	6,639	54	6,737	152	11,820
	2011	146	7,943	58	7,082	186	13,243
	2012	146	7,812	57	6,874	185	13,162
	2013	128	7,134	62	7,084	167	12,364
	2014	102	5,767	58	7,183	152	12,194
	2015	116	5,979	51	6,258	154	11,223
Trawl	2008	88	13,394	149	53,601	192	57,025
	2009	90	14,102	146	48,645	186	51,971
	2010	85	13,769	138	49,758	178	53,133
	2011	86	13,753	140	50,558	178	53,619
	2012	87	13,893	146	51,395	183	54,505
	2013	84	12,274	136	50,274	178	53,637
	2014	82	10,967	134	50,138	181	53,936
	2015	78	10,711	134	50,198	178	53,883
All Gear	2008	857	43,184	314	75,798	1,036	98,955
	2009	779	41,220	270	68,167	939	90,122
	2010	791	40,037	260	68,315	942	89,939
	2011	885	41,750	271	68,211	1,040	91,357
	2012	903	40,154	264	68,265	1,069	92,533
	2013	689	34,119	259	68,040	860	88,041
	2014	696	33,642	241	67,443	868	88,342
	2015	722	32,719	234	66,545	888	87,865

Notes: These estimates include only vessels fishing federal TACs. Registered net tons totals exclude mainly smaller vessels for which data were unavailable. Annually percentage of vessels missing is between 1-2%.

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 41: Number of vessels that caught groundfish off Alaska by area, vessel category, gear and target, 2011-2015.

			Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Year	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total	Catcher Vessels	Catcher Processors	Total
Hook & Line	Sablefish	2011	299	9	308	24	9	33	313	13	326
		2012	297	7	304	25	5	30	311	10	321
		2013	265	7	272	17	6	23	273	11	284
		2014	264	6	270	13	5	18	270	9	279
		2015	253	6	259	13	3	16	259	8	267
	Pacific Cod	2011	323	15	338	20	31	51	331	35	366
		2012	320	9	329	13	32	45	327	35	362
		2013	181	5	186	18	29	47	196	30	226
		2014	204	10	214	8	29	37	211	31	242
		2015	223	10	233	9	29	38	230	31	261
	Flatfish	2011	-	-	-	-	8	8	-	8	8
		2012	-	-	-	-	7	7	-	7	7
		2013	-	-	-	-	4	4	-	4	4
		2014	-	-	-	-	3	3	-	3	3
		2015	-	-	-	-	3	3	-	3	3
	Rockfish	2011	150	1	151	1	-	1	150	1	151
		2012	174	-	174	-	2	2	174	2	176
		2013	143	-	143	-	3	3	143	3	146
		2014	144	-	144	1	2	3	145	2	147
		2015	112	-	112	1	1	2	112	1	113
	All Groundfish	2011	697	19	716	43	35	78	710	37	747
		2012	711	15	726	34	34	68	726	38	764
		2013	506	10	516	33	33	66	524	35	559
		2014	538	13	551	21	31	52	548	34	582
		2015	520	12	532	21	31	52	531	33	564

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Table 41: Continued

		Year	Gulf of Alaska Catcher Vessels	Gulf of Alaska Catcher Processors	Gulf of Alaska Total	Bering Sea & Aleutian Islands Catcher Vessels	Bering Sea & Aleutian Islands Catcher Processors	Bering Sea & Aleutian Islands Total	All Alaska Catcher Vessels	All Alaska Catcher Processors	All Alaska Total
Pot	Pacific Cod	2011	144	1	145	47	5	52	174	5	179
		2012	144	1	145	49	5	54	176	5	181
		2013	128	-	128	56	3	59	161	3	164
		2014	100	-	100	51	4	55	143	4	147
		2015	116	-	116	44	4	48	148	4	152
Trawl	Pollock	2011	62	3	65	86	31	117	129	31	160
		2012	67	1	68	90	32	122	135	32	167
		2013	64	3	67	87	32	119	132	33	165
		2014	68	2	70	87	34	121	136	34	170
		2015	62	1	63	87	32	119	129	32	161
	Sablefish	2011	14	-	14	-	-	-	14	-	14
		2012	12	-	12	-	-	-	12	-	12
		2013	17	-	17	-	2	2	17	2	19
		2014	12	1	13	-	1	1	12	2	14
		2015	18	1	19	-	-	-	18	1	19
	Pacific Cod	2011	52	1	53	50	18	68	86	18	104
		2012	60	3	63	60	18	78	101	18	119
		2013	54	1	55	54	18	72	95	18	113
		2014	55	-	55	50	14	64	97	14	111
		2015	53	1	54	48	16	64	95	17	112
	Flatfish	2011	31	6	37	2	31	33	33	32	65
		2012	32	5	37	4	30	34	36	31	67
		2013	31	5	36	5	27	32	36	28	64
		2014	27	6	33	4	28	32	31	29	60
		2015	16	5	21	6	25	31	22	26	48

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Table 41: Continued

		Year	Gulf of Alaska Catcher Vessels	Gulf of Alaska Catcher Processors	Gulf of Alaska Total	Bering Sea & Aleutian Islands Catcher Vessels	Bering Sea & Aleutian Islands Catcher Processors	Bering Sea & Aleutian Islands Total	All Alaska Catcher Vessels	All Alaska Catcher Processors	All Alaska Total
Trawl	Rockfish	2011	26	12	38	2	16	18	28	18	46
		2012	31	16	47	2	17	19	33	20	53
		2013	30	13	43	1	16	17	31	19	50
		2014	29	9	38	3	17	20	32	19	51
		2015	28	8	36	4	14	18	32	17	49
	Atka Mackerel	2011	-	1	1	5	9	14	5	9	14
		2012	-	-	-	3	11	14	3	11	14
		2013	-	2	2	3	10	13	3	11	14
		2014	-	-	-	3	8	11	3	8	11
		2015	-	-	-	5	9	14	5	9	14
	All Groundfish	2011	69	17	86	104	36	140	141	37	178
		2012	70	17	87	110	36	146	146	37	183
		2013	70	14	84	102	34	136	143	35	178
		2014	71	11	82	100	34	134	146	35	181
		2015	68	10	78	100	34	134	143	35	178
All Gear	All Groundfish	2011	848	37	885	198	73	271	964	76	1,040
		2012	870	33	903	191	73	264	991	78	1,069
		2013	665	24	689	189	70	259	787	73	860
		2014	672	24	696	173	68	241	796	72	868
		2015	670	22	692	165	69	234	786	72	858

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 42: Number of vessels, mean length and mean net tonnage for vessels that caught groundfish off Alaska by area, vessel-length class (feet), and gear, 2011-2015, (excluding catcher-processors).

			Gulf of Alaska		Bering Sea & Aleutian Islands			All Alaska		
		Year	<60	60-125	<60	60-125	>=125	<60	60-125	>=125
Number of vessels	Hook & Line	2011	645	52	38	5	-	656	54	-
		2012	664	47	33	1	-	678	48	-
		2013	467	39	31	2	-	484	40	-
		2014	499	39	18	3	-	508	40	-
		2015	479	41	20	1	-	489	42	-
	Pot	2011	119	26	15	30	8	125	48	8
		2012	122	23	20	23	9	128	43	9
		2013	106	22	25	25	9	113	42	9
		2014	82	20	20	25	9	96	43	9
		2015	99	17	22	19	6	109	35	6
	Trawl	2011	24	45	1	75	28	24	89	28
		2012	24	46	6	74	30	25	91	30
		2013	26	44	2	71	29	26	88	29
		2014	27	44	2	69	29	27	90	29
		2015	25	43	-	71	29	25	89	29
Mean vessel length (feet)	Hook & Line	2011	43	74	47	78	-	44	74	-
		2012	44	73	48	98	-	44	73	-
		2013	45	73	43	82	-	45	73	-
		2014	45	73	46	78	-	45	73	-
		2015	45	73	45	98	-	45	74	-
	Pot	2011	53	92	57	107	135	54	100	135
		2012	54	91	57	108	134	54	100	134
		2013	54	90	56	109	135	54	100	135
		2014	54	87	58	109	135	55	99	135
		2015	54	86	57	110	137	55	99	137

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Table 42: Continued

		Year	Gulf of Alaska <60	Gulf of Alaska 60-125	Bering Sea & Aleutian Islands <60	Bering Sea & Aleutian Islands 60-125	Bering Sea & Aleutian Islands >=125	All Alaska <60	All Alaska 60-125	All Alaska >=125
Mean vessel length (feet)	Trawl	2011	58	94	58	105	155	58	101	155
		2012	57	94	56	106	157	57	101	157
		2013	58	95	58	107	156	58	102	156
		2014	58	94	58	108	156	58	102	156
		2015	58	94	-	107	156	58	102	156
Mean Registered net tons	Hook & Line	2011	25	65	32	100	-	25	68	-
		2012	24	66	36	156	-	25	68	-
		2013	26	60	32	102	-	27	62	-
		2014	26	60	38	100	-	26	63	-
		2015	26	59	35	156	-	26	62	-
	Pot	2011	44	100	69	117	147	47	109	147
		2012	45	101	69	123	145	49	112	145
		2013	48	97	68	119	145	51	109	145
		2014	47	95	74	126	145	52	112	145
		2015	45	92	72	130	158	50	112	158
	Trawl	2011	67	102	75	115	238	67	110	238
		2012	67	103	59	115	244	65	110	244
		2013	65	101	62	115	241	65	110	241
		2014	66	100	57	117	241	66	110	241
		2015	69	106	-	116	241	69	112	241

Notes: If the permit files do not report a length for a vessel, the vessel is counted in the "less than 60 feet" class. 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 43: Number of smaller hook-and-line vessels that caught groundfish off Alaska, by area and vessel-length class (feet), 2011-2015, (excluding catcher-processors).

		Year	<26	26-29	30-34	35-39	40-44	45-49	50-54	55-60	>=60
Number of vessels	Gulf of Alaska	2011	32	17	90	86	124	103	67	126	52
		2012	25	18	91	90	136	107	71	126	47
		2013	14	6	57	50	101	76	60	103	39
		2014	20	8	54	65	102	78	65	107	39
		2015	9	8	66	54	103	79	55	105	41
	Bering Sea & Aleutian Islands	2011	1	-	5	5	3	6	6	12	5
		2012	-	-	3	7	3	4	4	12	1
		2013	2	3	5	4	1	3	3	10	2
		2014	1	-	2	3	1	2	3	6	3
		2015	1	-	3	3	2	3	1	7	1
	All Alaska	2011	33	17	91	89	124	103	68	131	54
		2012	25	18	92	95	137	107	72	132	48
		2013	16	9	59	53	101	76	61	109	40
		2014	21	8	55	66	102	79	66	111	40
		2015	10	8	67	54	104	81	55	110	42

Notes: If the permit files do not report a length for a vessel, the vessel is counted in the "<26" class. "*" 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 44: Number of vessels, mean length and mean net tonnage for vessels that caught and processed groundfish off Alaska by area, vessel-length class (feet), and gear, 2011-2015.

			Gulf of Alaska					Bering Sea & Aleutian Islands					All Alaska				
		Year	<125	125-165	166-235	236-260	>260	<125	125-165	166-235	236-260	>260	<125	125-165	166-235	236-260	>260
Number of vessels	Hook & Line	2011	9	5	5	-	-	14	14	7	-	-	16	14	7	-	-
		2012	8	5	2	-	-	12	14	8	-	-	16	14	8	-	-
		2013	2	5	3	-	-	12	13	8	-	-	14	13	8	-	-
		2014	4	5	4	-	-	9	14	8	-	-	12	14	8	-	-
		2015	5	4	3	-	-	9	14	8	-	-	11	14	8	-	-
	Pot	2011	-	1	-	-	-	2	2	1	-	-	2	2	1	-	-
		2012	-	1	-	-	-	2	2	1	-	-	2	2	1	-	-
		2013	-	-	-	-	-	-	2	1	-	-	-	2	1	-	-
		2014	-	-	-	-	-	1	2	1	-	-	1	2	1	-	-
		2015	-	-	-	-	-	1	2	1	-	-	1	2	1	-	-
	Trawl	2011	4	2	9	1	1	5	4	10	2	15	6	4	10	2	15
		2012	4	2	9	1	1	5	4	10	2	15	6	4	10	2	15
		2013	3	2	8	1	-	3	4	10	2	15	4	4	10	2	15
		2014	2	3	5	1	-	3	4	10	2	15	4	4	10	2	15
		2015	2	2	5	1	-	3	4	10	2	15	4	4	10	2	15
Mean vessel length (feet)	Hook & Line	2011	94	136	176	-	-	107	144	175	-	-	102	142	176	-	-
		2012	90	136	177	-	-	108	144	176	-	-	101	142	176	-	-
		2013	68	141	175	-	-	114	142	177	-	-	107	142	177	-	-
		2014	76	139	176	-	-	113	142	177	-	-	101	141	177	-	-
		2015	95	136	174	-	-	110	142	177	-	-	105	140	176	-	-
	Pot	2011	-	165	-	-	-	101	165	166	-	-	101	165	166	-	-
		2012	-	165	-	-	-	114	165	166	-	-	114	165	166	-	-
		2013	-	-	-	-	-	-	165	166	-	-	-	165	166	-	-
		2014	-	-	-	-	-	124	165	166	-	-	124	165	166	-	-
		2015	-	-	-	-	-	124	165	166	-	-	124	165	166	-	-

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Table 44: Continued

		Year	Gulf of Alaska <125	Gulf of Alaska 125-165	Gulf of Alaska 166-235	Gulf of Alaska 236-260	Gulf of Alaska >260	Bering Sea & Aleutian Islands <125	Bering Sea & Aleutian Islands 125-165	Bering Sea & Aleutian Islands 166-235	Bering Sea & Aleutian Islands 236-260	Bering Sea & Aleutian Islands >260	All Alaska <125	All Alaska 125-165	All Alaska 166-235	All Alaska 236-260	All Alaska >260
Mean vessel length (feet)	Trawl	2011	111	146	204	238	295	116	148	204	247	306	114	147	204	244	305
		2012	115	150	204	238	295	116	148	204	247	306	115	148	204	244	305
		2013	117	146	201	238	-	122	148	204	247	306	120	147	202	244	306
		2014	114	144	207	238	-	122	148	204	247	306	119	146	205	244	306
		2015	114	150	207	238	-	122	148	204	247	306	119	148	205	244	306
Mean Registered net tons	Hook & Line	2011	106	242	562	-	-	125	294	513	-	-	118	281	534	-	-
		2012	104	241	652	-	-	117	294	478	-	-	111	280	513	-	-
		2013	144	232	533	-	-	126	307	546	-	-	128	286	543	-	-
		2014	120	232	696	-	-	112	295	546	-	-	115	278	596	-	-
		2015	115	225	608	-	-	112	295	546	-	-	113	279	563	-	-
	Pot	2011	-	128	-	-	-	123	461	192	-	-	123	350	192	-	-
		2012	-	128	-	-	-	123	461	192	-	-	123	350	192	-	-
		2013	-	-	-	-	-	-	461	192	-	-	-	461	192	-	-
		2014	-	-	-	-	-	135	461	192	-	-	135	461	192	-	-
		2015	-	-	-	-	-	135	461	192	-	-	135	461	192	-	-
	Trawl	2011	125	256	584	611	693	134	254	588	957	1,717	130	254	586	842	1,653
		2012	123	255	584	611	693	134	254	588	957	1,717	129	254	586	842	1,653
		2013	119	256	584	611	-	133	254	588	957	1,717	126	254	586	842	1,717
		2014	113	214	661	611	-	133	254	588	957	1,717	125	237	612	842	1,717
		2015	113	255	620	611	-	133	254	588	957	1,717	125	254	599	842	1,717

Notes: If the permit files do not report a length for a vessel, the vessel is counted in the "less than 125 feet" class. 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 45: Number of vessels that caught groundfish off Alaska by area, tonnage caught, and gear, 2008-2015.

		Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
	Year	<2 MT	2-25MT	>25MT	<2 MT	2-25MT	>25MT	<2 MT	2-25MT	>25MT
Hook & Line	2008	217	209	242	21	26	60	238	232	271
	2009	172	197	240	6	13	58	178	208	270
	2010	179	188	266	3	19	51	182	205	291
	2011	205	234	277	5	22	51	210	250	308
	2012	197	222	307	8	14	46	204	235	339
	2013	133	143	240	11	8	47	144	151	276
	2014	154	139	258	7	6	39	161	145	287
	2015	118	166	248	3	11	38	121	175	278
Pot	2008	8	26	115	4	2	66	12	28	160
	2009	12	23	91	1	5	49	13	28	127
	2010	8	6	101	-	5	49	8	11	133
	2011	35	9	102	1	1	56	36	10	143
	2012	18	20	108	-	-	57	18	20	150
	2013	7	18	103	2	3	57	9	21	140
	2014	5	8	89	-	4	54	5	12	136
	2015	8	8	100	1	2	48	9	10	140
Trawl	2008	1	1	86	-	3	146	1	4	191
	2009	2	2	86	-	1	145	2	3	183
	2010	1	-	84	1	-	137	2	-	176
	2011	1	5	80	-	1	139	1	6	173
	2012	1	1	85	-	5	141	1	6	182
	2013	1	1	82	-	2	134	1	3	176
	2014	2	-	80	-	1	133	2	1	179
	2015	-	1	77	-	-	134	-	1	178
All Gear	2008	226	234	414	24	30	269	250	261	587
	2009	186	218	392	6	19	247	192	235	548
	2010	188	193	423	4	24	233	192	215	570
	2011	239	244	433	6	24	241	245	262	591
	2012	216	238	472	8	19	239	223	256	637
	2013	141	162	396	12	13	236	153	175	559
	2014	161	146	398	7	11	223	168	157	568
	2015	126	175	402	4	13	217	130	186	569

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 46: Number of vessels that caught groundfish off Alaska by area, residency, gear, and target, 2011-2015.

			Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
		Year	Alaska	Other	Alaska	Other	Alaska	Other
Hook & Line	Pollock	2011	5	-	1	-	6	-
		2012	1	-	-	-	1	-
		2013	4	-	-	2	4	2
		2014	2	-	-	-	2	-
		2015	2	-	-	1	2	1
	Sablefish	2011	225	83	17	16	236	90
		2012	221	84	19	11	231	91
		2013	195	77	12	11	200	84
		2014	194	76	7	11	197	82
		2015	184	75	9	7	187	80
	Pacific Cod	2011	304	34	23	28	314	52
		2012	302	27	18	27	312	50
		2013	166	20	23	24	187	39
		2014	192	22	12	25	203	39
		2015	214	19	13	26	225	37
	Flatfish	2011	-	-	1	7	1	7
		2012	-	-	-	7	-	7
		2013	-	-	-	4	-	4
		2014	-	-	-	3	-	3
		2015	-	-	-	3	-	3
	Rockfish	2011	135	16	-	1	135	16
		2012	158	16	-	2	158	18
		2013	131	12	-	3	131	15
		2014	128	16	1	2	129	18
		2015	107	5	1	1	107	6
	All Groundfish	2011	593	123	39	39	605	142
		2012	606	121	34	34	622	143
		2013	413	103	33	33	434	125
		2014	447	104	20	32	460	122
		2015	438	94	21	32	450	115
Pot	Pacific Cod	2011	126	19	19	33	134	45
		2012	125	20	21	33	134	47
		2013	108	20	21	38	115	49
		2014	85	15	23	32	103	44
		2015	110	6	23	25	121	31
Trawl	Pollock	2011	25	41	6	111	26	135
		2012	26	42	6	116	27	140
		2013	25	42	6	113	26	139
		2014	32	38	6	115	33	137
		2015	26	37	5	114	27	134

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Table 46: Continued

		Year	Gulf of Alaska Alaska	Gulf of Alaska Other	Bering Sea & Aleutian Islands Alaska	Bering Sea & Aleutian Islands Other	All Alaska Alaska	All Alaska Other
Trawl	Sablefish	2011	6	8	-	-	6	8
		2012	5	7	-	-	5	7
		2013	6	11	-	2	6	13
		2014	6	7	-	1	6	8
		2015	8	11	-	-	8	11
	Pacific Cod	2011	18	36	6	62	18	87
		2012	25	38	7	71	25	94
		2013	25	30	5	67	25	88
		2014	30	25	2	62	30	81
		2015	28	26	3	61	28	84
	Flatfish	2011	11	26	1	32	12	53
		2012	11	26	-	34	11	56
		2013	12	24	-	32	12	52
		2014	12	21	-	32	12	48
		2015	8	13	-	31	8	40
	Rockfish	2011	12	26	-	18	12	34
		2012	14	33	1	18	15	38
		2013	14	29	-	17	14	36
		2014	14	24	-	20	14	37
		2015	11	25	-	18	11	38
	Atka Mackerel	2011	-	1	-	14	-	14
		2012	-	-	-	14	-	14
		2013	-	2	-	13	-	14
		2014	-	-	-	11	-	11
		2015	-	-	-	14	-	14
	All Groundfish	2011	27	60	8	132	28	151
		2012	28	59	8	138	29	154
		2013	29	55	7	129	30	148
		2014	34	48	6	128	35	146
		2015	30	48	6	128	31	147
All Gear	All Groundfish	2011	694	192	69	202	715	326
		2012	714	190	62	202	740	331
		2013	522	167	62	197	551	309
		2014	538	158	50	191	566	302
		2015	549	143	51	184	572	287

Notes: The target is determined based on vessel, week, processing mode, NMFS area, and gear. Vessels are classified by the residency of the owner of the fishing vessel. 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 47: Number of vessels that caught groundfish off Alaska by month, area, vessel type, and gear, 2011-2015.

			Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Gulf of Alaska	Catcher Vessels	Hook & Line	2011	90	104	192	334	202	148	137	109	187	149	35	61	697
			2012	89	129	246	335	337	204	134	148	190	137	66	41	711
			2013	61	90	167	248	231	197	109	116	97	117	69	40	506
			2014	58	96	192	234	286	136	103	121	128	97	74	46	538
			2015	78	122	207	258	298	131	94	107	133	109	57	49	520
		Pot	2011	72	110	81	-	1	-	-	1	56	53	4	25	145
			2012	64	91	132	1	1	-	-	-	42	40	27	19	145
			2013	75	73	102	23	-	-	-	-	14	16	13	12	128
			2014	57	40	87	7	2	-	-	3	38	39	22	11	102
			2015	78	77	100	51	-	-	-	-	13	17	19	24	116
		Trawl	2011	39	44	51	33	19	15	9	23	50	54	9	1	69
			2012	33	57	54	36	20	18	13	23	59	57	23	6	70
			2013	39	52	58	19	23	18	9	40	42	48	19	2	70
			2014	41	63	61	51	25	20	12	47	59	52	23	4	71
			2015	40	60	65	57	30	13	6	15	52	54	18	1	68
		All Gear	2011	199	255	308	365	222	163	146	133	291	254	48	87	848
			2012	186	270	412	370	358	222	147	170	291	231	114	66	870
			2013	173	212	317	288	254	215	118	156	153	180	101	54	665
			2014	147	199	327	291	313	156	115	171	219	185	119	61	672
			2015	192	254	360	362	328	144	100	122	198	179	94	74	670
	Catcher Processors	Hook & Line	2011	10	8	1	5	4	2	2	2	6	5	2	3	19
			2012	7	4	4	7	4	3	2	1	2	4	2	1	15
			2013	1	2	3	4	3	6	4	2	1	-	2	1	10
			2014	1	6	8	5	3	2	1	1	3	3	3	1	13
			2015	3	5	6	4	6	3	2	1	3	3	2	1	12
		Pot	2011	1	1	-	-	-	-	-	-	-	-	-	-	1
			2012	1	-	-	-	-	-	-	-	-	-	-	-	1
		Trawl	2011	-	1	3	6	1	4	14	3	2	3	2	-	17
			2012	2	1	-	5	1	1	17	6	1	2	1	1	17
			2013	-	1	3	3	2	4	13	3	1	2	4	2	14
			2014	-	-	1	5	4	3	7	6	3	7	5	1	11
			2015	-	1	1	4	4	3	9	4	4	1	2	1	10
		All Gear	2011	11	10	4	11	5	6	16	5	8	8	4	3	37
			2012	10	5	4	12	5	4	19	7	3	6	3	2	33
			2013	1	3	6	7	5	10	17	5	2	2	6	3	24
			2014	1	6	9	10	7	5	8	7	6	10	8	2	24
			2015	3	6	7	8	10	6	11	5	7	4	4	2	22

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Table 47: Continued

			Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Bering Sea & Aleutian Islands	Catcher Vessels	Hook & Line	2011	5	5	4	5	12	15	22	20	17	10	3	-	43
			2012	3	4	4	3	11	15	18	15	13	7	4	-	34
			2013	5	3	5	5	5	15	12	11	10	4	4	2	33
			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
		Pot	2011	35	12	16	6	9	6	3	4	29	32	3	-	53
			2012	38	18	9	9	5	5	3	1	22	19	5	8	52
			2013	41	23	10	12	3	3	2	2	9	16	9	21	59
			2014	41	21	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
		Trawl	2011	53	94	91	80	1	69	72	70	58	52	11	-	104
			2012	66	88	101	56	2	71	74	76	60	29	16	-	110
			2013	78	91	94	61	3	71	74	69	43	16	4	-	102
			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
		All Gear	2011	93	111	111	91	21	90	97	94	104	94	17	-	198
			2012	107	110	114	68	18	91	95	92	95	55	25	8	191
			2013	124	117	109	78	11	89	88	82	62	36	16	23	189
			2014	88	106	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
	Catcher Processors	Hook & Line	2011	23	27	29	24	15	15	23	27	30	31	28	24	35
			2012	24	27	29	25	14	22	30	30	31	28	27	29	34
			2013	26	26	25	18	13	13	21	28	27	29	28	26	33
			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
		Pot	2011	5	-	1	2	1	-	-	-	2	3	1	1	5
			2012	5	2	1	1	1	1	1	1	3	3	3	-	5
			2013	3	2	-	-	-	-	-	-	3	3	3	2	3
			2014	4	4	2	1	1	-	-	-	3	3	3	1	4
			2015	4	4	2	2	1	-	-	1	4	4	4	1	4
		Trawl	2011	27	34	33	31	21	32	32	31	33	32	25	6	36
			2012	28	33	33	19	20	33	28	30	33	20	14	4	36
			2013	28	31	32	25	19	33	28	32	31	24	13	6	34
			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
		All Gear	2011	55	61	63	57	37	47	55	58	65	65	54	31	73
			2012	57	62	63	45	35	56	59	61	67	51	44	33	73
			2013	57	59	57	43	32	46	49	60	61	56	44	34	70
			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

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Table 47: Continued

			Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
All Alaska	Catcher Vessels	Hook & Line	2011	93	107	196	339	213	161	155	128	198	157	38	61	710
			2012	91	133	250	338	346	215	150	160	202	144	70	41	726
			2013	66	93	172	253	236	210	118	126	106	121	72	42	524
			2014	63	100	197	240	291	142	111	129	135	104	78	48	548
			2015	81	124	211	261	304	137	98	110	138	116	60	50	531
		Pot	2011	101	118	92	6	10	6	3	5	84	85	7	25	181
			2012	99	105	140	10	6	5	3	1	63	57	31	27	180
			2013	112	89	112	35	3	3	2	2	23	31	22	33	164
			2014	98	61	105	26	16	1	1	4	51	52	33	23	148
			2015	105	99	121	66	1	2	2	1	25	37	28	39	150
		Trawl	2011	92	124	134	110	20	77	79	91	106	105	20	1	141
			2012	99	140	138	88	22	84	86	98	114	85	39	6	146
			2013	117	136	136	77	26	83	81	97	81	61	23	2	143
			2014	83	139	137	108	27	86	81	111	108	56	24	4	146
			2015	107	140	141	110	33	80	76	88	111	78	22	1	143
		All Gear	2011	284	346	406	453	242	244	237	224	386	345	65	87	964
			2012	289	371	508	434	373	304	239	258	379	282	138	74	991
			2013	293	315	410	363	265	296	201	225	209	212	116	77	787
			2014	234	300	426	371	333	229	193	244	288	209	133	75	796
			2015	289	358	461	431	338	219	176	199	274	230	109	90	786
	Catcher Processors	Hook & Line	2011	29	31	29	26	17	17	25	28	34	33	28	25	37
			2012	27	29	31	29	17	24	31	31	33	31	29	30	38
			2013	27	27	27	20	15	19	23	29	28	29	29	27	35
			2014	27	28	29	26	20	22	27	26	27	28	28	25	34
			2015	28	28	30	27	26	20	23	26	30	29	27	28	33
		Pot	2011	5	1	1	2	1	-	-	-	2	3	1	1	5
			2012	5	2	1	1	1	1	1	1	3	3	3	-	5
			2013	3	2	-	-	-	-	-	-	3	3	3	2	3
			2014	4	4	2	1	1	-	-	-	3	3	3	1	4
			2015	4	4	2	2	1	-	-	1	4	4	4	1	4
		Trawl	2011	27	35	34	34	22	33	35	33	34	33	27	6	37
			2012	29	33	33	20	21	34	34	33	33	21	15	5	37
			2013	28	32	33	27	20	34	30	33	32	25	14	7	35
			2014	30	34	35	23	21	32	34	34	30	20	17	5	35
			2015	34	35	34	23	20	32	32	32	28	21	15	4	35
		All Gear	2011	61	66	64	62	40	50	60	61	70	68	56	32	76
			2012	61	64	65	50	39	59	66	65	69	55	47	35	78
			2013	58	61	60	47	35	53	53	62	63	57	46	36	73
			2014	61	66	66	50	42	54	61	60	60	51	48	31	72
			2015	66	67	66	52	47	52	55	59	62	54	46	33	72

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 48: Catcher vessel (excluding catcher-processors) weeks of fishing groundfish off Alaska by area, vessel-length class (feet), gear, and target, 2011-2015.

			Gulf of Alaska		Bering Sea & Aleutian Islands			All Alaska		
		Year	<60	60-125	<60	60-125	>=125	<60	60-125	>=125
Hook & Line	Sablefish	2011	1,041	262	101	18	-	1,142	280	-
		2012	1,301	314	118	15	-	1,419	329	-
		2013	1,265	338	88	14	-	1,353	352	-
		2014	1,162	307	77	19	-	1,239	326	-
		2015	1,241	342	69	14	-	1,310	356	-
	Pacific Cod	2011	1,719	70	130	1	-	1,848	71	-
		2012	2,285	55	74	-	-	2,359	55	-
		2013	1,200	18	72	-	-	1,273	18	-
		2014	1,525	20	103	-	-	1,628	20	-
		2015	1,818	14	48	-	-	1,865	14	-
	Rockfish	2011	476	1	1	-	-	477	1	-
		2012	571	3	-	-	-	571	3	-
		2013	509	2	-	-	-	509	2	-
		2014	425	4	1	-	-	426	4	-
		2015	371	6	1	-	-	372	6	-
	All Groundfish	2011	3,244	333	232	19	-	3,476	352	-
		2012	4,161	372	192	15	-	4,353	387	-
		2013	2,988	358	160	14	-	3,148	372	-
		2014	3,114	331	181	19	-	3,295	350	-
		2015	3,431	362	117	14	-	3,548	376	-
Pot	Pacific Cod	2011	880	200	131	175	42	1,011	375	42
		2012	862	280	196	110	42	1,058	390	42
		2013	714	201	221	124	31	935	325	31
		2014	756	216	344	115	29	1,100	331	29
		2015	895	238	312	117	15	1,206	355	15

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Table 48: Continued

			Gulf of Alaska		Bering Sea & Aleutian Islands			All Alaska		
		Year	<60	60-125	<60	60-125	>=125	<60	60-125	>=125
Trawl	Pollock	2011	175	304	-	1,057	653	175	1,361	653
		2012	198	398	-	945	644	198	1,343	644
		2013	87	384	-	902	608	87	1,286	608
		2014	181	550	-	838	551	181	1,388	551
		2015	237	569	-	904	612	237	1,473	612
	Sablefish	2011	4	13	-	-	-	4	13	-
		2012	-	10	-	-	-	-	10	-
		2013	4	21	-	-	-	4	21	-
		2014	2	7	-	-	-	2	7	-
		2015	3	17	-	-	-	3	17	-
	Pacific Cod	2011	30	123	1	264	37	31	387	37
		2012	87	144	18	285	48	105	430	48
		2013	116	88	8	264	40	124	352	40
		2014	163	73	13	247	35	176	320	35
		2015	145	114	-	265	32	145	378	32
	Flatfish	2011	2	200	-	-	16	2	200	16
		2012	5	140	-	1	28	5	141	28
		2013	8	170	-	0	47	8	170	47
		2014	9	151	-	2	31	9	152	31
		2015	0	76	-	27	30	0	103	30
	Rockfish	2011	2	91	-	-	6	2	91	6
		2012	12	120	-	-	6	12	120	6
		2013	11	99	-	-	9	11	99	9
		2014	7	101	-	-	11	7	101	11
		2015	4	97	-	4	9	4	101	9

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Table 48: Continued

		Year	Gulf of Alaska <60	Gulf of Alaska 60-125	Bering Sea & Aleutian Islands <60	Bering Sea & Aleutian Islands 60-125	Bering Sea & Aleutian Islands >=125	All Alaska <60	All Alaska 60-125	All Alaska >=125
Trawl	Atka Mackerel	2011	-	-	-	3	15	-	3	15
		2012	-	-	-	-	22	-	-	22
		2013	-	-	-	-	7	-	-	7
		2014	-	-	-	-	12	-	-	12
		2015	-	-	-	5	10	-	5	10
	All Groundfish	2011	213	734	1	1,324	726	214	2,058	726
		2012	302	812	18	1,231	747	320	2,043	747
		2013	225	762	8	1,166	710	233	1,928	710
		2014	362	881	13	1,086	640	375	1,967	640
		2015	391	872	-	1,205	692	391	2,077	692
All Gear	All Groundfish	2011	4,341	1,267	364	1,605	786	4,705	2,872	786
		2012	5,326	1,465	406	1,393	800	5,732	2,858	800
		2013	3,927	1,320	389	1,340	761	4,316	2,660	761
		2014	4,235	1,430	538	1,254	684	4,773	2,684	684
		2015	4,716	1,472	435	1,354	711	5,151	2,826	711

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 49: Catcher/processor vessel weeks of fishing groundfish off Alaska by area, vessel-length class (feet), gear, and target, 2011-2015.

			Gulf of Alaska				Bering Sea & Aleutian Islands				All Alaska			
		Year	<60	60-124	125-230	>230	<60	60-124	125-230	>230	<60	60-124	125-230	>230
Hook & Line	Sablefish	2011	6	3	29	-	2	67	9	-	8	70	38	-
		2012	8	-	25	-	-	75	6	-	8	75	31	-
		2013	11	-	27	-	-	84	3	-	11	84	31	-
		2014	7	-	18	-	-	41	2	-	7	41	21	-
		2015	9	-	19	-	-	38	0	-	9	38	19	-
	Pacific Cod	2011	13	63	23	-	-	252	696	-	13	315	719	-
		2012	11	45	9	-	10	319	732	-	21	364	742	-
		2013	-	23	13	-	-	239	718	-	-	262	731	-
		2014	2	22	29	-	7	250	817	-	9	272	846	-
		2015	4	30	30	-	9	253	812	-	13	283	841	-
	Flatfish	2011	-	-	-	-	2	2	47	-	2	2	47	-
		2012	-	-	-	-	-	7	45	-	-	7	45	-
		2013	-	-	-	-	-	1	15	-	-	1	15	-
		2014	-	-	-	-	-	5	12	-	-	5	12	-
		2015	-	-	-	-	-	2	26	-	-	2	26	-
	Rockfish	2011	-	-	0	-	-	-	-	-	-	-	0	-
		2012	-	-	-	-	-	1	0	-	-	1	0	-
		2013	-	-	-	-	-	2	0	-	-	2	0	-
		2014	-	-	-	-	-	1	-	-	-	1	-	-
		2015	-	-	-	-	-	0	-	-	-	0	-	-
	All Groundfish	2011	19	66	52	-	4	321	752	-	23	387	804	-
		2012	19	45	34	-	10	402	784	-	29	447	818	-
		2013	11	23	41	-	-	326	736	-	11	349	777	-
		2014	9	22	48	-	7	298	831	-	16	320	879	-
		2015	13	30	49	-	9	293	838	-	22	323	887	-

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Table 49: Continued

			Gulf of Alaska				Bering Sea & Aleutian Islands				All Alaska			
		Year	<60	60-124	125-230	>230	<60	60-124	125-230	>230	<60	60-124	125-230	>230
Pot	Pacific Cod	2011	-	-	3	-	-	15	29	-	-	15	32	-
		2012	-	-	0	-	-	22	38	-	-	22	38	-
		2013	-	-	-	-	-	-	54	-	-	-	54	-
		2014	-	-	-	-	-	19	53	-	-	19	53	-
		2015	-	-	-	-	-	23	62	-	-	23	62	-
Trawl	Pollock	2011	-	0	0	-	-	4	11	414	-	4	11	414
		2012	-	0	-	-	-	2	5	313	-	2	5	313
		2013	-	1	0	-	-	3	14	309	-	4	14	309
		2014	-	0	0	-	-	1	14	305	-	1	14	305
		2015	-	-	1	-	-	1	6	310	-	1	6	310
	Sablefish	2013	-	-	-	-	-	0	0	-	-	0	0	-
		2014	-	0	-	-	-	-	0	-	-	0	0	-
		2015	-	0	-	-	-	-	-	-	-	0	-	-
	Pacific Cod	2011	-	-	1	-	-	4	5	1	-	4	6	1
		2012	-	4	0	-	-	6	3	5	-	10	3	5
		2013	-	-	0	-	-	5	11	5	-	5	11	5
		2014	-	-	-	-	-	0	9	12	-	0	9	12
		2015	-	0	-	-	-	1	11	9	-	1	11	9
	Flatfish	2011	-	50	17	-	-	144	405	52	-	193	422	52
		2012	-	39	10	-	-	125	402	69	-	164	412	69
		2013	-	48	12	-	-	105	401	87	-	153	412	87
		2014	-	62	27	-	-	92	415	81	-	154	442	81
		2015	-	49	16	-	-	105	395	51	-	155	411	51

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Table 49: Continued

			Gulf of Alaska				Bering Sea & Aleutian Islands				All Alaska			
		Year	<60	60-124	125-230	>230	<60	60-124	125-230	>230	<60	60-124	125-230	>230
Trawl	Rockfish	2011	-	-	29	2	-	5	24	12	-	5	53	14
		2012	-	3	26	1	-	5	25	10	-	8	51	11
		2013	-	3	27	1	-	0	40	16	-	4	66	16
		2014	-	2	29	3	-	3	34	12	-	5	63	15
		2015	-	8	30	2	-	3	36	17	-	11	66	19
	Atka Mackerel	2011	-	-	0	-	-	0	60	25	-	0	60	25
		2012	-	-	-	-	-	1	63	24	-	1	63	24
		2013	-	0	0	-	-	0	33	13	-	0	33	13
		2014	-	-	-	-	-	-	40	19	-	-	40	19
		2015	-	-	-	-	-	-	66	27	-	-	66	27
	All Groundfish	2011	-	50	47	2	-	156	505	504	-	206	552	506
		2012	-	46	36	1	-	140	498	422	-	186	534	423
		2013	-	52	39	1	-	113	498	428	-	165	537	429
		2014	-	65	56	3	-	96	513	428	-	161	569	431
		2015	-	58	47	2	-	110	513	415	-	168	560	417
All Gear	All Groundfish	2011	19	116	102	2	4	495	1,292	504	23	611	1,394	506
		2012	19	91	71	1	10	576	1,319	422	29	667	1,390	423
		2013	11	75	79	1	-	439	1,289	428	11	514	1,368	429
		2014	9	87	104	3	7	413	1,397	428	16	500	1,501	431
		2015	13	88	96	2	9	426	1,413	415	22	514	1,509	417

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 50: Total at-sea processor vessel crew weeks in the groundfish fisheries off Alaska by month and area, 2011-2015.

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Gulf of Alaska	2011	498	267	112	635	251	196	1,404	323	376	483	167	175	4,887
	2012	370	186	86	471	220	144	1,161	396	128	178	110	*	3,450
	2013	*	98	214	326	204	433	951	341	*	*	283	96	2,946
	2014	*	190	358	638	233	201	834	526	312	427	415	*	4,134
	2015	155	280	270	499	348	188	846	689	302	247	192	*	4,016
Bering Sea & Aleutian Islands	2011	6,311	13,513	13,817	8,407	3,882	7,601	13,600	11,967	12,266	14,208	5,033	2,105	112,710
	2012	6,434	13,755	15,928	4,383	3,621	10,683	11,700	12,300	11,670	5,207	3,661	2,757	102,099
	2013	4,694	13,341	16,032	4,875	3,756	8,744	9,974	13,745	8,716	5,773	4,581	2,506	96,737
	2014	4,472	13,482	16,511	4,776	4,981	8,841	11,722	14,986	8,523	4,935	4,706	2,384	100,319
	2015	7,843	13,467	12,837	5,523	5,003	7,875	10,938	14,849	9,239	6,836	3,458	2,228	100,096
All Alaska	2011	6,809	13,780	13,929	9,042	4,133	7,797	15,004	12,290	12,642	14,691	5,200	2,280	117,597
	2012	6,804	13,941	16,014	4,854	3,841	10,827	12,861	12,696	11,798	5,385	3,771	2,757	105,549
	2013	4,694	13,439	16,246	5,201	3,960	9,177	10,925	14,086	8,716	5,773	4,864	2,602	99,683
	2014	4,472	13,672	16,869	5,414	5,214	9,042	12,556	15,512	8,835	5,362	5,121	2,384	104,453
	2015	7,998	13,747	13,107	6,022	5,351	8,063	11,784	15,538	9,541	7,083	3,650	2,228	104,112

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 H1A: Catch (net landed weight) in the commercial Pacific halibut fisheries off Alaska by FMP area, 2011-2015, (hundreds of metric tons).

Year	Gulf Of Alaska	Bering Sea & Aleutian Islands	All Alaska
2011	116.48	32.52	149.00
2012	93.03	23.69	116.72
2013	86.39	17.52	103.91
2014	65.15	13.40	78.56
2015	68.29	13.98	82.27

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

Source: ADF&G/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive FT.

Table H1B: Catch (net landed weight) in the commercial Pacific halibut fisheries off Alaska by IPHC area, 2011-2015, (hundreds of metric tons).

Area	2011	2012	2013	2014	2015
2C	11.13	12.31	13.78	15.71	16.95
3A	67.95	55.40	51.70	34.94	36.49
3B	34.31	23.31	19.02	13.26	12.34
4A	10.39	7.02	5.47	3.77	6.00
4B	9.18	7.75	5.54	4.94	4.81
4CDE	16.04	10.94	8.39	5.93	5.60

Notes: 4CDE refers to Areas 4C, 4D and 4E. These estimates include catch from both federal and state of Alaska fisheries. Net weight is dressed, head-off, slime and ice deducted.

Source: ADF&G/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive FT.

Table H2: Catch (net landed weight) and percent of FMP area catch in the commercial Pacific halibut off Alaska by vessel length (feet) and FMP area, 2011-2015, (hundreds of metric tons).

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Length	Net Tons	Percent	Net Tons	Percent	Net Tons	Percent
2011	<20	0.09	0	0.32	0.01	0.41	0
	20-29	1.91	0.02	2.86	0.09	4.77	0.03
	30-39	15.15	0.13	3.77	0.12	18.92	0.13
	40-49	39.87	0.34	5.64	0.17	45.51	0.31
	50-59	37.11	0.32	10.28	0.32	47.39	0.32
	>=60	22.07	0.19	9.65	0.30	31.72	0.21
2012	<20	0.10	0	0.29	0.01	0.39	0
	20-29	1.61	0.02	2.34	0.10	3.95	0.03
	30-39	12.63	0.14	2.82	0.12	15.45	0.13
	40-49	33.37	0.36	4.62	0.19	37.99	0.33
	50-59	28.73	0.31	8.08	0.34	36.81	0.32
	>=60	16.37	0.18	5.54	0.23	21.91	0.19
2013	<20	0.09	0	0.24	0.01	0.33	0
	20-29	1.79	0.02	2.17	0.12	3.95	0.04
	30-39	12.85	0.15	2.28	0.13	15.13	0.15
	40-49	30.42	0.35	2.61	0.15	33.03	0.32
	50-59	26.49	0.31	5.96	0.34	32.45	0.31
	>=60	14.50	0.17	4.26	0.24	18.76	0.18
2014	<20	0.10	0	0.19	0.01	0.29	0
	20-29	1.92	0.03	1.52	0.11	3.44	0.04
	30-39	10.44	0.16	1.96	0.15	12.40	0.16
	40-49	23.77	0.37	1.94	0.14	25.70	0.33
	50-59	19.46	0.30	4.68	0.35	24.14	0.31
	>=60	9.11	0.14	3.12	0.23	12.23	0.16
2015	<20	0.10	0	*	*	0.10	0
	20-29	1.78	0.03	1.25	0.09	3.03	0.04
	30-39	10.99	0.16	1.71	0.12	12.70	0.16
	40-49	24.33	0.36	2.68	0.19	27.02	0.33
	50-59	21.61	0.32	5.11	0.37	26.71	0.33
	>=60	9.18	0.14	3.18	0.23	12.36	0.15

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

Source: ADF&G/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive FT; AKFIN vessel database.

Table H3: Non-halibut prohibited species catch on commercial Pacific halibut target trips off Alaska by PSC species and area, 2013-2015.

	Year	Bairdi Tanner Crab (Count)	Other King Crab (Count)	Red King Crab (Count)
	2013	-	*	-
Gulf of Alaska	2014	21	-	379
	2015	-	*	-
Bering Sea & Aleutian Islands	2013	-	635	-
	2014	-	303	-
	2015	-	730	-
	2013	-	635	-
All Alaska	2014	21	303	379
	2015	-	730	-

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

Source: AKRO PSC.

Table H4A: Ex-vessel value and price in the commercial Pacific halibut off Alaska by FMP area, 2011-2015, ($ millions and $/lb net weight, respectively).

	Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
Year	Value	Price	Value	Price	Value	Price
2011	162.89	6.34	43.60	6.08	206.49	6.29
2012	117.32	5.72	26.80	5.13	144.13	5.60
2013	95.75	5.03	16.66	4.32	112.41	4.91
2014	89.54	6.23	15.77	5.34	105.31	6.08
2015	94.34	6.27	17.68	5.74	112.02	6.18

Notes: See notes on Table H4B.

Source: ADF&G fish tickets / CFEC gross earnings.

Table H4B: Ex-vessel value and price in the commercial Pacific halibut fisheries off Alaska by IPHC area, 2011-2015, ($ millions and $/lb net weight, respectively).

		2011	2012	2013	2014	2015
2C	Value	15.71	16.24	15.67	21.55	23.58
	Price	6.40	5.98	5.16	6.22	6.31
3A	Value	94.80	70.08	58.05	48.58	50.75
	Price	6.33	5.74	5.09	6.31	6.31
3B	Value	47.97	28.62	20.20	17.83	16.67
	Price	6.34	5.57	4.82	6.10	6.13
4A	Value	14.81	8.23	5.32	4.79	7.94
	Price	6.47	5.32	4.41	5.76	6.00
4B	Value	12.23	8.60	5.14	5.89	6.03
	Price	6.04	5.04	4.21	5.41	5.69
4CDE	Value	20.97	12.35	8.02	6.65	6.93
	Price	5.93	5.12	4.34	5.09	5.62

Notes: Values and prices are for catch from both federal and state of Alaska fisheries. Price is calculated as landed value divided by net weight. Net weight is dressed, head-off, slime and ice deducted.

Source: ADF&G fish tickets / CFEC gross earnings.

Table H5: Ex-vessel value and average value per vessel in the commercial Pacific halibut fisheries off Alaska by FMP area and vessel length (feet), 2011-2015, ($ millions and $ thousands, respectively).

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Length	Value	Avg. Value/Vessel	Value	Avg. Value/Vessel	Value	Avg. Value/Vessel
2011	<20	0.13	6.11	0.29	4.83	0.42	5.16
	20-29	2.68	19.71	3.05	20.34	5.73	20.18
	30-39	21.00	66.89	4.61	104.85	25.62	74.25
	40-49	55.50	159.47	7.93	330.39	63.42	180.18
	50-59	52.22	357.67	14.11	486.65	66.33	436.40
	>=60	30.97	533.94	13.60	485.78	44.57	685.70
2012	<20	0.13	5.31	0.31	6.44	0.44	6.14
	20-29	2.07	17.42	2.27	15.77	4.34	16.58
	30-39	15.87	53.61	3.17	67.39	19.03	57.33
	40-49	42.26	123.56	5.31	230.97	47.57	136.70
	50-59	36.25	249.99	9.24	318.73	45.49	301.27
	>=60	20.46	401.22	6.50	282.65	26.96	464.88
2013	<20	0.10	5.26	0.20	3.84	0.30	4.27
	20-29	2.00	16.98	2.09	13.40	4.09	15.00
	30-39	14.18	53.11	2.10	53.87	16.28	54.82
	40-49	33.60	107.34	2.42	151.31	36.02	112.91
	50-59	29.45	216.58	5.66	195.28	35.12	247.31
	>=60	16.16	336.65	4.18	199.28	20.34	383.85
2014	<20	0.14	6.01	0.19	12.00	0.33	8.69
	20-29	2.64	21.84	1.39	26.73	4.03	23.44
	30-39	14.24	52.34	2.17	65.86	16.41	55.62
	40-49	32.39	107.97	2.30	143.81	34.69	114.49
	50-59	26.92	197.96	5.74	249.69	32.67	233.32
	>=60	12.73	295.98	3.97	233.41	16.70	362.94
2015	<20	0.14	8.48	*	*	0.18	6.50
	20-29	2.49	23.45	1.43	47.72	3.92	29.02
	30-39	15.07	57.74	2.02	80.98	17.10	61.49
	40-49	33.48	118.31	3.36	186.50	36.84	128.36
	50-59	29.92	212.23	6.63	255.05	36.56	250.39
	>=60	12.82	320.58	4.19	220.72	17.02	386.74

Notes: Values are for catch from both federal and state of Alaska fisheries. Excludes vessels in the Annette Island commercial Pacific halibut fishery. Length is measured in feet.

Source: ADF&G/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive FT; AKFIN vessel database.

Table H6: Port rank by ex-vessel value, ex-vessel value, price and percent of statewide value in the commercial Pacific halibut fisheries off Alaska by port, 2011-2015, ($ millions and $/lb net weight).

	Port	2011	2012	2013	2014	2015
Rank	Homer	1	2	1	1	2
	Kodiak	2	1	2	2	1
	Seward	3	3	3	3	3
	Dutch Harbor	4	4	5	6	4
	Sitka	7	5	6	5	6
	Juneau	9	8	4	7	5
	St Paul Island	5	7	9	13	11
	Petersburg	10	6	7	4	7
	Sand Point	6	9	14	12	13
	Yakutat	12	10	8	10	9
Ex-vessel Value	Homer	37.76	26.93	24.24	18.51	17.25
	Kodiak	36.24	27.59	16.60	15.94	17.28
	Seward	23.20	15.77	14.79	11.56	12.76
	Dutch Harbor	*	10.94	*	*	*
	Sitka	8.54	*	6.02	*	*
	Juneau	7.16	5.90	6.86	5.79	*
	St Paul Island	*	*	*	*	*
	Petersburg	6.19	6.36	5.56	7.62	7.01
	Sand Point	*	*	*	*	*
	Yakutat	*	*	*	*	4.07
Price	Homer	6.02	5.50	4.95	6.05	6.11
	Kodiak	6.49	5.64	4.88	6.32	6.23
	Seward	6.27	5.83	5.07	6.20	6.20
	Dutch Harbor	*	5.25	*	*	*
	Sitka	6.61	*	5.06	*	*
	Juneau	6.06	5.69	5.44	6.12	*
	St Paul Island	*	*	*	*	*
	Petersburg	6.46	6.07	5.18	6.24	6.52
	Sand Point	*	*	*	*	*
	Yakutat	*	*	*	*	6.48

Continued on next page.

Table H6: Continued

	Port	2011	2012	2013	2014	2015
Precent State Value	Homer	18 %	19 %	22 %	18 %	15 %
	Kodiak	18 %	19 %	15 %	15 %	15 %
	Seward	11 %	11 %	13 %	11 %	11 %
	Dutch Harbor	*	8 %	*	*	*
	Sitka	4 %	*	5 %	*	*
	Juneau	3 %	4 %	6 %	5 %	*
	St Paul Island	*	*	*	*	*
	Petersburg	3 %	4 %	5 %	7 %	6 %
	Sand Point	*	*	*	*	*
	Yakutat	*	*	*	*	4 %

Notes: Displays only the 10 Alaska ports with the highest average ex-vessel value. Values and prices are for catch from both federal and state of Alaska fisheries. Price is calculated as landed value divided by net weight. Net weight is dressed, head-off, slime and ice deducted. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: ADF&G fish tickets / CFEC gross earnings.

Table H7: First wholesale production volume, value and price in the commercial Pacific halibut fisheries off Alaska by product, 2011-2015, (1000s of metric tons, millions $ and $/lb net weight, respectively).

	Year	Quantity	Value	Price
Head and Gut	2011	7.71	127.39	7.49
	2012	6.70	105.24	7.12
	2013	6.46	92.69	6.51
	2014	4.80	81.92	7.73
	2015	5.38	90.76	7.66
Fillet	2011	2.61	65.33	11.36
	2012	1.94	53.20	12.47
	2013	1.66	35.78	9.80
	2014	0.88	25.53	13.23
	2015	1.11	34.82	14.21
Other Products	2011	0.67	1.76	1.19
	2012	1.85	4.22	1.03
	2013	0.83	2.90	1.58
	2014	0.50	2.47	2.23
	2015	3.05	6.86	1.02
All Products	2011	10.99	194.48	8.03
	2012	10.49	162.65	7.03
	2013	8.94	131.37	6.66
	2014	6.18	109.92	8.06
	2015	9.54	132.45	6.30

Notes: Landings, values and prices include both federal and state of Alaska fisheries. Price is calculated as landed value divided by net weight. Net weight is dressed, head-off, slime and ice deducted.

Source: ADF&G Commercial Operators Annual Report, data compiled by AKFIN in Comprehensive ENCOAR PROD.

Table H8: First wholesale value of shoreside processors and percentage share of statewide wholseale value in the commercial Pacific halibut fisheries off Alaska by region, 2011-2015, (millions $).

	Year	Value	Percent
AK Peninsula/Aleutians	2011	60.63	31 %
	2012	41.33	25 %
	2013	19.79	15 %
	2014	10.21	9 %
	2015	20.47	15 %
Kodiak	2011	44.50	23 %
	2012	33.70	21 %
	2013	22.22	17 %
	2014	20.74	19 %
	2015	21.39	16 %
Southcentral	2011	43.38	22 %
	2012	48.82	30 %
	2013	51.27	39 %
	2014	37.15	34 %
	2015	40.85	31 %
Southeast	2011	42.46	22 %
	2012	36.25	22 %
	2013	36.25	28 %
	2014	40.31	37 %
	2015	44.73	34 %
Southwest/ Other AK	2011	1.95	1 %
	2012	2.49	2 %
	2013	1.63	1 %
	2014	1.35	1 %
	2015	4.92	4 %

Notes: Values are for catch from both federal and state of Alaska fisheries. Includes Pacific halibut processed by shoreside processors only.

Source: ADF&G Commercial Operators Annual Report, data compiled by AKFIN in Comprehensive ENCOAR PROD.

Table H9: Number of vessels and median length (feet) for vessels catching Pacific halibut commercially off Alaska by FMP area and vessel length class, 2011-2015.

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Year	Vessels	Median Length	Vessels	Median Length	Vessels	Median Length
<20	2011	21	18	61	18	82	18
	2012	25	17	48	18	72	18
	2013	19	17	53	18	71	18
	2014	23	18	16	18	38	18
	2015	16	18	12	18	27	18
20-29	2011	136	26	150	24	284	24
	2012	119	25	144	24	262	24
	2013	118	25	156	24	273	24
	2014	121	25	52	26	172	26
	2015	106	25	30	28	135	26
30-39	2011	314	34	44	32	345	34
	2012	296	34	47	32	332	34
	2013	267	34	39	32	297	34
	2014	272	34	33	32	295	34
	2015	261	35	25	33	278	34
40-49	2011	348	45	24	47	352	45
	2012	342	45	23	48	348	45
	2013	313	45	16	49	319	45
	2014	300	45	16	48	303	45
	2015	283	45	18	48	287	45
50-59	2011	146	57	29	58	152	58
	2012	145	58	29	58	151	58
	2013	136	58	29	58	142	58
	2014	136	57	23	58	140	57
	2015	141	57	26	58	146	57
≥60	2011	58	73	28	76	65	75
	2012	51	72	23	78	58	74
	2013	48	71	21	76	53	73
	2014	43	72	17	76	46	72
	2015	40	72	19	76	44	73

Notes: Excludes vessels in the Annette Island commercial Pacific halibut fishery. Length is measured in feet.

Source: ADF&G/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive FT; AKFIN vessel database.

Table H10: Number of vessels catching Pacific halibut commercially off Alaska by FMP area and thousands of pounds caught, 2011-2015.

	Landings	2011	2012	2013	2014	2015
Gulf of Alaska	<1	158	142	112	129	107
	1-9	411	395	360	371	327
	10-24	175	191	189	203	210
	25-49	113	109	114	115	118
	50-74	51	64	58	55	52
	75-99	41	37	38	22	33
	100-199	73	40	30	-	-
	>=200	1	-	-	-	-
Bering Sea & Aleutian Islands	<1	118	126	141	21	15
	1-9	109	91	91	63	38
	10-24	36	30	27	30	30
	25-49	19	26	28	25	30
	50-74	21	20	20	12	9
	75-99	13	10	3	4	4
	100-199	18	11	4	2	4
	>=200	2	-	-	-	-
All Alaska	<1	274	267	250	148	117
	1-9	496	461	435	414	352
	10-24	191	205	198	211	212
	25-49	116	114	118	111	114
	50-74	50	62	59	64	61
	75-99	37	39	37	38	52
	100-199	107	74	58	8	9
	>=200	9	1	-	-	-

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

Source: ADF&G fish tickets / CFEC gross earnings.

Table H11: Number of vessel catching Pacific halibut commercially off Alaska and the percentage of yearly catch in area by FMP area and month, 2011-2015.

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Month	Vessels	Percent	Vessels	Percent	Vessels	Percent
2011	Mar-Apr	312	20 %	10	2 %	317	16 %
	May	394	19 %	39	14 %	420	18 %
	Jun	321	15 %	209	19 %	524	16 %
	Jul	242	10 %	243	21 %	474	13 %
	Aug	351	15 %	123	19 %	444	16 %
	Sep	314	11 %	73	12 %	366	11 %
	Oct	219	7 %	50	11 %	261	8 %
	Nov	82	2 %	13	2 %	93	2 %
2012	Mar-Apr	276	17 %	3	2 %	279	14 %
	May	332	15 %	22	9 %	348	14 %
	Jun	334	16 %	154	16 %	479	16 %
	Jul	223	10 %	210	24 %	422	13 %
	Aug	361	17 %	106	27 %	444	19 %
	Sep	279	10 %	68	16 %	336	12 %
	Oct	233	13 %	22	6 %	251	11 %
	Nov	68	1 %	7	1 %	75	1 %
2013	Mar-Apr	256	19 %	6	3 %	262	16 %
	May	304	20 %	17	11 %	317	18 %
	Jun	298	16 %	192	16 %	482	16 %
	Jul	197	9 %	226	28 %	413	12 %
	Aug	300	15 %	75	18 %	361	15 %
	Sep	283	12 %	62	13 %	331	12 %
	Oct	219	8 %	25	9 %	236	8 %
	Nov	79	2 %	10	2 %	87	2 %
2014	Mar-Apr	288	26 %	2	2 %	290	22 %
	May	310	20 %	25	15 %	325	19 %
	Jun	234	11 %	46	18 %	270	12 %
	Jul	168	7 %	81	27 %	243	11 %
	Aug	302	16 %	88	21 %	371	17 %
	Sep	257	12 %	44	12 %	288	12 %
	Oct	194	7 %	14	4 %	201	6 %
	Nov	42	1 %	6	1 %	48	1 %
2015	Mar-Apr	263	22 %	4	3 %	266	18 %
	May	357	24 %	19	13 %	369	22 %
	Jun	243	11 %	60	20 %	295	13 %
	Jul	165	8 %	57	18 %	217	10 %
	Aug	237	12 %	69	23 %	289	14 %
	Sep	291	14 %	45	14 %	327	14 %
	Oct	184	7 %	17	9 %	195	7 %
	Nov	54	1 %	4	1 %	58	1 %

Notes: Includes catch from both federal and state of Alaska fisheries.

Source: ADF&G fish tickets / CFEC gross earnings.

Table H12: Total vessel days fishing Pacific halibut commercially off Alaska by area, 2011-2015.

Area	2011	2012	2013	2014	2015
Gulf of Alaska	16,159	14,818	14,633	12,842	12,549
Bering Sea & Aleutian Islands	6,397	5,110	4,339	2,894	2,744
All Alaska	22,166	19,747	18,754	15,520	15,059

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

Source: ADF&G fish tickets / CFEC gross earnings.

Table H13: Crew days fishing Pacific halibut commercially off Alaska by month and area, 2011-2015.

	Year	Mar-Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Gulf of Alaska	2011	10,415	12,079	8,254	6,446	8,286	6,937	4,678	1,333
	2012	8,304	9,431	8,200	5,796	8,708	6,495	6,243	814
	2013	8,546	10,247	7,777	4,859	7,350	6,589	5,928	1,300
	2014	9,918	9,426	5,754	3,601	6,301	5,476	4,179	499
	2015	9,274	10,725	4,904	3,028	5,018	6,386	4,433	733
Bering Sea & Aleutian Islands	2011	967	2,271	4,754	6,219	4,457	2,952	2,062	637
	2012	455	1,429	3,391	5,338	4,693	2,758	1,067	212
	2013	563	1,042	3,166	5,244	2,428	2,291	1,266	224
	2014	242	1,480	1,611	3,397	2,412	1,373	653	121
	2015	416	1,533	2,111	2,206	2,474	1,536	1,185	133
All Alaska	2011	11,221	14,181	12,983	12,454	12,154	9,616	6,621	1,923
	2012	8,759	10,822	11,483	10,938	13,131	9,133	7,271	1,026
	2013	9,109	11,207	10,807	10,011	9,632	8,670	7,029	1,460
	2014	10,160	10,670	7,224	6,904	8,497	6,775	4,754	620
	2015	9,618	12,126	6,894	5,139	7,252	7,787	5,459	866

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

Source: ADF&G fish tickets / CFEC gross earnings.

5. ECONOMIC PERFORMANCE INDICES FOR THE NORTH PACIFIC GROUNDFISH FISHERIES

5.1. Introduction

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

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

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

The primary tools we will use to analyze market performance are Figures 5.2-5.11. The index figures in Figures 5.2-5.11 are designed to help the reader visualize changes in the indices and relate the changes to shifts in aggregate value, prices, and quantities. All indices use 2013 as the base year for the index. All calculations and statistics are made using nominal U.S. dollars (i.e., not adjusted for inflation).[1] Aggregate indices are located in the upper-left panel and the value share decomposition of the aggregate index is below in the lower-left panels of the figures. Changes in the indices have been color coded to indicate the relevance in determining aggregate index movements. The relevance of a change in the price index in year t is calculated by $(year - on - year\ growth\ rate) * (share\ weight) = (I_t/I_{t-1} - 1) * \tilde{w}(t)$ where I_t is the level of the index and $\tilde{w}^i(t) = \frac{p_t * q_t}{\sum_i p_t * q_t}$ is the year t value share. When the value $(year - on - year\ growth\ rate) * (share\ weight)$ is roughly zero, indicating little to no change or influence on the aggregate index, it is colored blue. When this value is less than -0.1, the index is colored red to indicate that it has had a significant negative impact on the aggregate index. When this value is greater than 0.1, the index is colored green, indicating a significant positive impact on the aggregate index. Shades in between these colors indicate intermediate impacts. The indices can take on these "significant colors" if the percentage change is large and/or the value share is large. The value share plot in the upper-right corner of each figure helps to discern the difference. For each sector and market, two decompositions are presented. The wholesale market is decomposed by species and product type, and the ex-vessel market is decomposed by species and gear type. To help relate the different decompositions, bar graphs in the lower-right panel of each figure show the composition of one factor (e.g., product type) for each relevant category of the other factors (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 presented and discussed in remaining sections. The BSAI at-sea wholesale indices are in Section 5.2, the BSAI shoreside indices are in Section 5.3, and the GOA indices are in Section 5.4. The discussion explicitly references the plots in Figures 5.2-5.11.

[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.

5.2. Economic Performance of the BSAI At-Sea Sector

BSAI At-Sea Wholesale Market

Highlights in 2015

- Small increase in the aggregate value index which was driven more by quantity than by price. Quantity indices at high levels for most species but aggregate price below average 2003-2015 . Aggregate value index is 11% above the 2003-2015 average.
- Atka mackerel quantity index returned to roughly 2003-2012 average and value index near peak. Cod quantity increased and was near peak. Pollock quantity index was stable and at peak. Substantial decrease in the flatfish quantity index and the low price index resulted in value index that was below average.
- Mixed price movement across species with decreasing indices in rockfish and Atka mackerel and increases in cod. Soft prices in pollock fillets and H&G were offset by increases in surimi with the net effect of little change in pollock price and value indices.

The BSAI at-sea sector is the largest, by measure of wholesale value, of the sectors (Figure 5.1). Wholesale value in the BSAI at-sea region increased 1.4% between 2014 and 2015. While lower than the levels seen in 2011 and 2012, the value index, at 107 in 2015, remains above the levels seen prior to 2008 and above the average (97) (Figure 5.2). Value in this region is largely concentrated in the pollock fisheries, which are carried out by the AFA catcher/processors and motherships had a value share of 59% in 2015. The cod fisheries are carried out by long-line catcher/processors and trawlers and had the second largest value share at value stood at 21%. The fisheries for flatfish, are carried out by the Amendment 80 fleet and comprised 11%. The fisheries for Atka mackerel and rockfish (primarily Pacific ocean perch) are also carried out by the Amendment 80 fleet and had value shares of 5.6% and 3.2%, respectively. Non-pollock species are primarily processed into the headed-and-gutted (H&G) product type (Figure 5.3). As a result, the share of value from H&G products is the largest in the region at 42% in 2015 and has grown over the last decade as species such as flatfish have become a larger source of value. Pollock is processed into a variety of product forms, the most significant of which are surimi, fillets (including deep-skin fillets) and roe. Increasing meal and oil prices and production have resulted in substantial increases in value for these ancillary product forms since 2009.

Quantity indices track effective economic production of wholesale market goods over time. The aggregate quantity index shows that in 2015 total production in this sector increased 1.2% from 2014. The pollock quantity index increased 0.18% in 2015 and the quantity index remains at a level comparable to 2014 (Figure 5.2). Between 2008 and 2010 conservation reductions in the pollock total allowable catch (TAC) account for the lows in the pollock quantity index over these years. Across species notable changes in 2015 were observed flatfish and atka mackerel. The significant reduction in Atka mackerel production up to 2013 were the result of reduction in the total allowable catch (TAC) due to area closures for Steller sea lions. Recent increases in TAC reflect the continued health of the stock and expanded fishing opportunities in the Aleutian Islands. The Atka mackerel quantity index increased 65% in 2015. Production of flatfish has steadily increased over the last 10 years, in part because of increased efficiences following rationalization of the A80 fleet in 2007. The flatfish quantity index decreased 20% in 2015 were related to poor fishing conditions early in the year and voluntary efforts to reduce Pacific halibut PSC at the request of the NPFMC. The H&G quantity index remained unchanged as decreases in flatfish production were offset by increases in Atka mackerel and to a less extent cod and rockfish (Figure 5.3). The fillet quantity index (which is largely comprised of pollock fillets) decreased 4.5% as more pollock was processed into surimi saw a 9.2% increase in the surimi quantity index. Demand for surimi was strong in 2015 as global production from warm-water species decreased while fillet markets have become increasingly competitive with high pollock catch volumes in the U.S. and Russia. Roe (pollock) quantity index remained basically unchanged in 2015; over the long-term production remains below pre-2008 levels. Production of meal and oil has also been increasing since 2009, a sign that processors are responding to increasing prices maximizing the value trimmings.

The aggregate price index showed no change in 2015. However, the static aggregate index was the net effect of variation in prices across species. The prices of products which are exported in high volume to Japan were affected by a significant depreciation in the value of the Yen relative to the Dollar in 2015. This was a factor in the 28% decrease in the Atka mackerel price index (Figure 5.2). The cod price index which increased 8.3% as demand for cod H&G has been strong in the U.S. and Europe. Strong demand and global supply constrains contributed to the 5.4% increases in the surimi price index (Figure 5.3).

Commensurate with the increasing quantity index, the aggregate value index rose 1.4% in 2015. The change in value across species was most notable for cod and Atka mackerel and flatfish. The cod value index increased 14% as both price and quantity indices rose While the cod price index is not high by historical norms, quantities are high, leaving the value index at its highest level over 2003-2015. The value index for flatfish fell (19%) for the third consecutive year after trending up fairly consistently between 2003 and 2011. While the decreasing price index was the driver of declining value over 2013-2014 the 2015 decrease was the result of reductions in the quantity index. Since 2013 there has been virtually no growth in fillet or roe value indicies, however, the surimi and meal and oil have performed well. The surimi value index has increased 20% and meal and oil while still a comparatively small share of value has grow 9.6%.

Indices indicate that the BSAI at-sea sector remained economically healthy in 2015 (Figure 5.3). Aggregate price index has been stagnant for two years. There has been some growth in the quantity index and it remains at a high level. TACs for 2016 and the market environment suggest similar conditions in 2016.

5.3. Economic Performance of the BSAI Shoreside Sector

BSAI Shoreside Wholesale Market

Highlights in 2015

- Significant reduction in the value index brought the value index down to roughly its average level.
- Decreases in the cod quantity index, pollock price index and fillet price index were the primary drivers of the decrease in aggregate value.

Value in the BSAI shoreside wholesale market decreased 9.6% in 2015. Groundfish value in this sector is highly concentrated in pollock, which in 2015 comprised 84% of the total value (Figure 5.4). Pollock processing mainly derives value from fillets (40% of value) and surimi (34% of value) (Figure 5.5). As with the at-sea sector, the significance in value share of roe has been steadily decreasing over time, and in 2015 4.6% of this sector's value came from roe (an increase over 2013). The remainder of value across species is divided between cod at 14% and sablefish at 1%. In contrast to the BSAI at-sea sector, cod value is diversified outside of H&G into fillets. Relative to the at-sea sector, the 7.1% share of value from H&G products is small, largely because of the minimal catch of non-pollock, non-cod species.

The aggregate quantity index dropped 5.5% to 102 in 2015, but remains at a high level. The quantity index for pollock, the most important species in the region, was basically unchanged (Figure 5.4). Primary driver of the drop in aggregate quantity index was the 23% decrease in the cod quantity index. The decrease in the cod largely accounts for the 24% decrease in the H&G quantity index and the 9.4% decrease in the fillet quantity index (Figure 5.5). Surimi was the sole source of positive product growth with a in the quantity index. 9.9%.

Aggregate prices in the shoreside sector fell in 2015 as shown by the 4.3% decrease in the index. The aggregate change is largely be attributed to a 5.6% drop in the pollock price index (Figure 5.4). The largest factor in the declining pollock price was the 6.3% drop in the fillet price index (Figure 5.5). Pin-bone-out (PBO) fillets, which are the focus of the shoreside's fillet production, have faced downward price pressure because of the significnat volume on the market.

The decreases in the quantity and price indicies resulted in a 9.6% decrease in the aggregate value index. The aggregate change is a reflection of value decreases in both pollock and cod. The pollock value index fell 7.1% as result of decreases in the pollock price index which was, in turn, largely the result of the drop in the fillet price index. The cod index fell 22% as a result of a drop in the cod quantity index (Figure 5.4). The current level of the aggregate value index is at roughly the average, suggesting that on a broader time scale the sector is neither over or under performing. With production quantities near highs for both pollock and cod, increasing prices (in particular pollock prices) will be critical to value growth in the BSAI shoreside sector. Because of the high concentration of the BSAI shoreside sector in pollock, groundfish value in this sector is highly exposed to changes in the TAC or prices of the product forms in which it is concentrated (e.g., fillets and surimi). Diversification across product types, as with pollock and cod, will continue to buffer this sector against product-specific shocks in price or demand, but broad scale shocks to a pollock or whitefish will adversely affect groundfish revenues in this sector.

BSAI Shoreside Ex-Vessel Market

Highlights in 2015

- Moderate reduction in the value index but index remains above its average level.
- Pollock value index basically unchanged as increases in the quantity index were offset by decreases in the price index. Cod value index decreased with decreases in both quantity and price indices

The BSAI ex-vessel market consists of catcher vessels that sell their catch to shoreside processors who process the catch into products that are sold on the first-wholesale market. Thus, the distribution of value share across species in the ex-vessel market (Figure 5.6), as expected, is similar to the wholesale distribution (Figure 5.4). Analysis of the ex-vessel market provides additional insight into the gear types (Figure 5.7) used to harvest delivered catch. Difference in quantity indices across species can, in part, be attributed product recovery rates as wholesale production is measured in product weight and ex-vessel production is measured in round retained weight.[2] Differences between price indices of species relate to the premium on wholesale processing and negotiations between catcher vessels and wholesale processors. Comparing the ex-vessel market to the wholesale market also provides insight into pass-through of value from the wholesale to the ex-vessel market.

As in the wholesale market, value share in the ex-vessel market is focused in pollock, with 85% of the value coming from pollock alone (Figure 5.6) in 2015. The value share from cod and sablefish were 13% and 1.7%, respectively. Though pollock has remained the dominant species, across the last ten years value share has fluctuated somewhat between pollock and cod. Almost all of the catch in the sector and consequent value in this sector comes from trawl gear (92%). Trawl gear is used to harvest pollock and a large portion of the cod harvest (Figure 5.7). Most of the remaining harvest of cod is carried out using pot gear, which accounted for 6.2% of the total value share. Hook-and-line gear, which targets sablefish and cod, accounted for 1.5% of value in 2015. The share of value across gear types has remained essentially constant over the last few years.

The aggregate quantity index, which is an index of catch deliveries to shoreside processors, decreased 1.2% in 2015. Quantity indices show that pollock catcher vessel quantities are below their levels prior to 2007 (Figure 5.6). The pollock quantity index remained basically flat increasing a mere 2.6%. Decreasing quantity indices were observed for cod, down 13%, and sablefish, down 43%. Sablefish catch is at its lowest level though it is a comparatively small component of this sector. The gear-type quantity indices show that hook-and-line quantity index increased 38% as more cod was caught by this gear-type (Figure 5.7). The pot quantity index decreased slightly (16%).

The aggregate ex-vessel price index decreased 3.5%. The decrease was combined result the decreases for all three species across all three gear types (Figures 5.6 and 5.7). The pollock price index fell 2.3% commensurate with a similar drop seen at the wholesale level. The cod price index fell 9.2% in contrast to the wholesale cod price index which was basically flat. Differences between ex-vessel and wholesale year-over-year price movements can be the result of changes in the value-added premium to processing, inefficiencies in the bargaining power and price negotiations between catcher vessels and processors and over/undershooting of the price in the previous year. Similar price changes occurred across gear-type price indices (Figure 5.7).

The aggregate value index in the BSAI shoreside ex-vessel market decreased 4.7%. Because pollock is such a large share of the value, changes in the ex-vessel pollock value typically drive aggregate value. However, in 2015 the pollock value index was basically unchanged and decrease in aggregate value was primarily the result of the 21% decrease in the cod value index where both quantity and price indices declined. Sablefish also contributed to the negative growth in value with a 47% drop in the value index. Despite the decreasing value and prices in 2015, on the broader time scale the aggregate ex-vessel value index at 100 is slightly above the 2003-2015 average of 96. In contrast to the wholesale side which is approximately at the average. Groundfish revenues in the BSAI shoreside ex-vessel sector is highly concentrated in pollock. Thus, groundfish value is high when

[2] Ex-vessel indices are constructed using catch that is counted against a the federal total allowable catch (TAC).

the market for pollock is strong and catches are stable. The current level of pollock (and sablefish) production is below its peak over the last decade thus there seems some, albiet limited, potential for future growth in production when the TAC allows. However, broader market prices and the pass through of value from the wholesale market for pollock will continue to be the large factors determining the economic health of this sector.

5.4. Economic Performance of the GOA Sector

GOA Wholesale Market

Highlights in 2015

- Decreases in the production of flatfish and cod had a significant impact on aggregate quantity index despite the increased production of pollock.
- Prices indices were stagnant or decreasing slightly for almost all species.
- The value indices were decreasing or essentially unchanged for all species. Despite the decrease the aggregate value index remains above average.

In terms of the distribution of value, the GOA is diversified with a sizable share of value coming from five different key species or species complexes: pollock, cod, flatfish, rockfish and sablefish (Figure 5.8). Among these five, three species account for the majority of value; in 2015 pollock had a value share of 30%, cod 29%, and sablefish 24%. Composition bar graphs show that cod and pollock output is distributed across multiple product forms. Fillets are an important product type with in this sector a 19% value share (Figure 5.9). This is particularly true for cod where fillets make up a large portion of the production quantities. H&G products had the largest share of total value (61%). Sablefish, flatfish, and rockfish are processed almost exclusively as H&G, and H&G pollock made up a comparatively larger share of production in this sector than in the BSAI. Surimi is also a significant product form for pollock with 7.9% of the total value. The GOA is the only sector where the "other" product type comprises a significant portion of value with a of value share of 8.9%.[3]

The aggregate quantity index fell 6% in 2015. Overall, the aggregate quantity remained high in 2015 with peak levels in pollock and high levels of cod production. The decomposition of the index across species shows that the decrease was primarily the result of decreases in flatfish, down 48%, and cod, down 8.3% (Figure 5.8). The production decrease were the result of decreased catches due to a closure in the GOA non-rockfish, non-pollock fisheries from May 3rd to Aug 10th because they reached their Chinook salmon bycatch limit. The pollock quantity index rose 8.1% and the sablefish quantity index decreased 5% though the decline had only a marginal impact on aggregate production. Composition bar graphs show that the cod quantity index decrease was the result of a shift in production to the lower-valued H&G product types. Commensurate with the increase in pollock production the surimi index rose 18%. The fillet quantity index decreased 22% as result of decreased cod fillet production.

The aggregate price index fell 3.8% in 2015. Since 2011 the aggregate price index has fallen 21%. The 7.7% decrease in pollock was the primary component in the declining aggregate price index

[3] The "other" product type includes whole fish minced meat, and ancillary products such as heads, stomachs, bones, etc.

because of its importance in the region (30% value share) (Figure 5.8). The cod price index also fell 5%, while price indices for most remaining species were mostly unchanged. The 10% decrease in the fillet price index was major factor in the declining pollock and cod price indices. Increased competition on the global market as a result of high catch volumes of pollock and cod internationally have put downward pressure on fillet prices, particularly in the last few years.

The decrease in both the quantity index and the price index resulted in a 9.6% in the aggregate value index increase. Value indices were decreasing or flat for all species but the change in value came in subtly different ways (Figure 5.8). The most significant decreases were in flatfish and cod value indices which declined 47% and 13%, respectively, because of the mid-year closures for these fisheries. Corresponding to the decrease in cod value the fillet value index fell 30%. Despite the decrease in the flatfish value the value from H&G remained unchanged as increases in rockfish and cod compensated. For pollock quantity increases counteracted the decline in price resulting in value index that was essentially unchanged.

Looking at the GOA wholesale sector over a longer time horizon, aggregate value remains above the 2003-2015 average. The primary drivers of this success have been pollock and cod. Diversification across product types and species has likely contributed to the strength of this sector throughout the decade. Though the market's sources of value are fairly diversified increases in production quantities have been the driver of growth and prices have declined in aggregate since 2011. Broad scale changes in "whitefish" markets could still have large effects on this sector. Increasing the relative share of higher valued product forms down the line could help buoy value in this sector down the line should production decline.

GOA Ex-Vessel Market

Highlights in 2015

- Decreases in the production of flatfish and cod had a significant impact on aggregate quantity index despite the increased production of pollock.
- Prices indices were stagnant or decreasing slightly for most all species except for pollock and sablefish.
- The value indices were decreasing or essentially unchanged for most species except for pollock and rockfish. Despite the decrease the aggregate value index remains above average.

Because the delivery of catch feeds production and sales to the wholesale market, trends in the GOA wholesale sector are largely reflected in the ex-vessel market.[4] Value from deliveries distributed across sablefish, cod, pollock, flatfish, and rockfish (Figures 5.10 and 5.11). Sablefish has a much larger value share in the ex-vessel market, where it accounted for 46% of 2015 value, than in the wholesale market, where it accounted for only 24% of 2015 value. The difference in relative value share between the wholesale and ex-vessel markets comes from differences in the relative prices of the three primary species. The much larger value share for sablefish in the ex-vessel market indicates that the ex-vessel price for sablefish is much closer to the wholesale price than it is for either pollock or cod; this is largely because most sablefish is minimally processed into H&G products while more

[4] Ex-vessel indices are constructed using catch that is counted against a the federal total allowable catch (TAC).

value is added to the cod and pollock catch by processing it into products like fillets or surimi. Value shifted towards pollock in 2015 bringing its value share to 23%. Hook-and-line gear accounts for the largest fraction of value (49%) largely because it is used in the harvest of sablefish, though the value share from trawl gear is a close second at 44%. Despite the distribution of value across gear types, trawl gear accounted for over 85% of the total quantity (weight) delivered to processors.

The aggregate quantity index decreased 2.5% but remains at a high level. Catches increased for pollock and to a lesser extent rockfish, as displayed by the quantity indices (Figure 5.10). The pollock quantity index increase (17%) brings the index to a decadal high. The trawl quantity index, which is largely made up of pollock catch, was basically flat as pollock increases were offset by decreases from flatfish (Figure 5.11). Cod is caught in substantial quantities by pot gear, and hook-and-line and trawl, however, most of the 5.1% decrease in the cod quantity index came from the hook-and-line gear type. The decreases in flatfish and cod were the result of decreased catches due to a closure in the GOA non-rockfish, non-pollock fisheries from May 3rd to Aug 10th because they reached their Chinook salmon bycatch limit. The 3.8% decrease in the sablefish quantity index contributed to the hook-and-line quantity index falling 4.6%. The quantity index for the "Other" species group was at low levels with catch at roughly two-thirds the levels seen over the past five years.

The aggregate ex-vessel price index was essentially flat, increasing a mere 0.78% in 2015 (Figure 5.10). The slight increase in the aggregate price was the net effect an increase the sablefish price index while the price indices for all other species remained essentially flat. The 4.4% increase in sablefish price index occurred despite a stagnant wholesale price index. The price indices change across gear types were commensurate with the changes across species (Figure 5.11). The price index for hook-and-line gear 3.8% rose with the increases in sablefish and cod. The pot gear price index and trawl price indices were essentially flat.

The aggregate value index decreased 1.8% in 2015 driven by a decrease in the aggregate quantity index. The value index grew for pollock, but was decreasing or flat for all other species (Figure 5.10). The most significant decreases were in flatfish and cod value indices which declined 46% and 6.6%, respectively, because of the mid-year closures for these fisheries. The small increase in the sablefish ex-vessel price index offset the decrease in the quantity index leave the ex-vessel value index for sablefish essentially unchanged.

Between 2004 and 2011 the rise in the price index and comparatively lower volatility in the quantity index translated to an upward-trending value index. Between 2005 and 2008 price increases were largely driven by cod and from 2009-2011 by sablefish. Since 2011 prices have dropped considerably, mostly as a result of sablefish. The aggregate quantity index has increased since 2010 and is at the highest level observed, mostly as a result of increased pollock catch. While the diversity across species has helped support the sector when negative shocks occur, with roughly 50% of the sectors value coming from sablefish the performance of this fishery is a critical component of value in the sector. The quantity index of sablefish is at a low and total allowable catch projections through 2016 aren't increasing. A return of sablefish catches could be a source of future value growth in this sector. Additionally, prices in the ex-vessel sector are intrinsically connected to prices in the wholesale sector, and strong prices in the first-wholesale market in the future should translate into strong ex-vessel prices and value.

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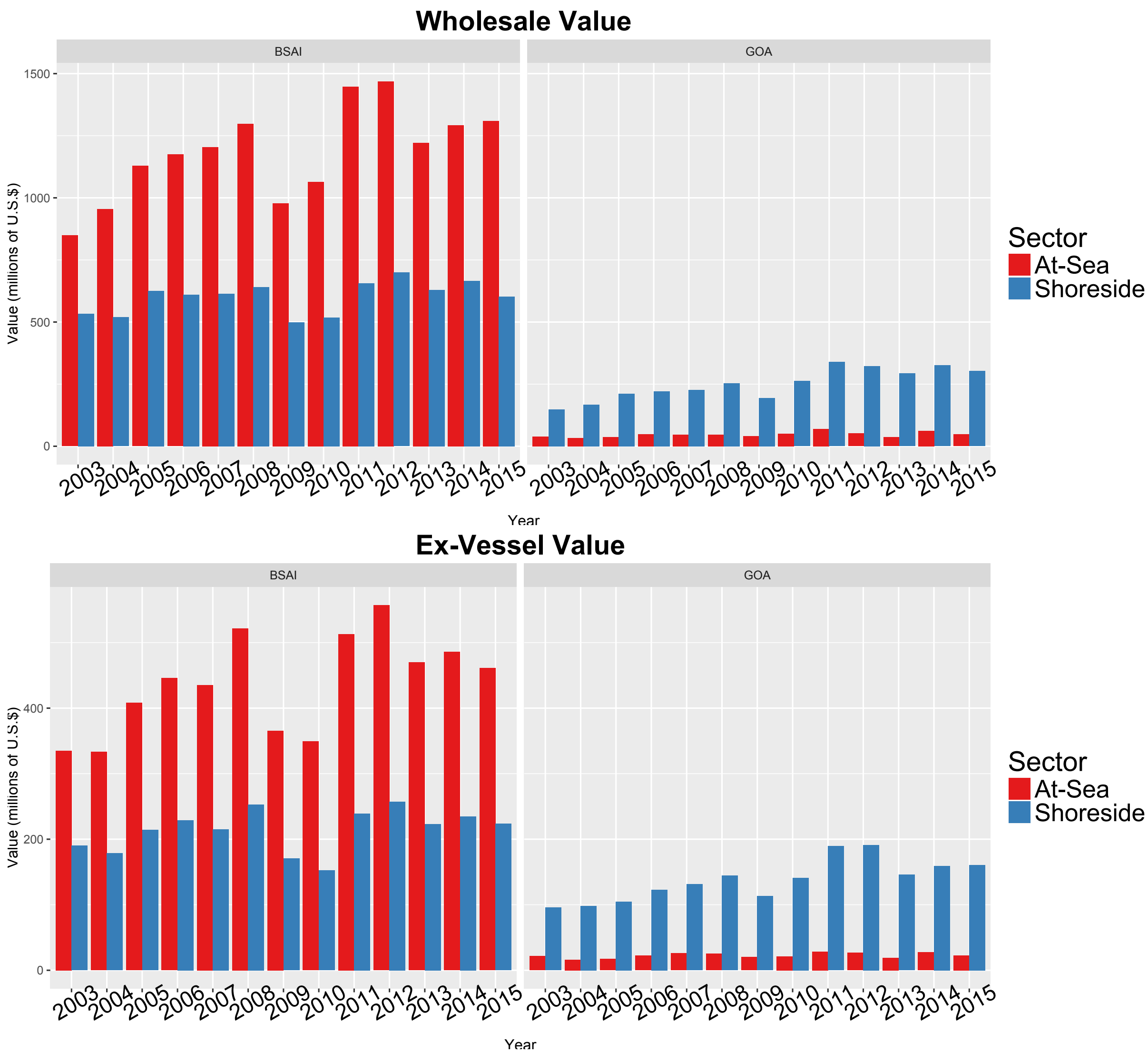

Figure 5.1: Wholesale and ex-vessel value by region and sector 2003-2015.
Source: NMFS Alaska Region's Catch-accounting system (CAS) and Weekly Production Report (WPR) estimates; Alaska Department of Fish and Game (ADF&G) Commercial Operator's Annual Report (COAR), National Marine Fisheries Service. P.O. Box 15700, Seattle, WA 98115-0070.

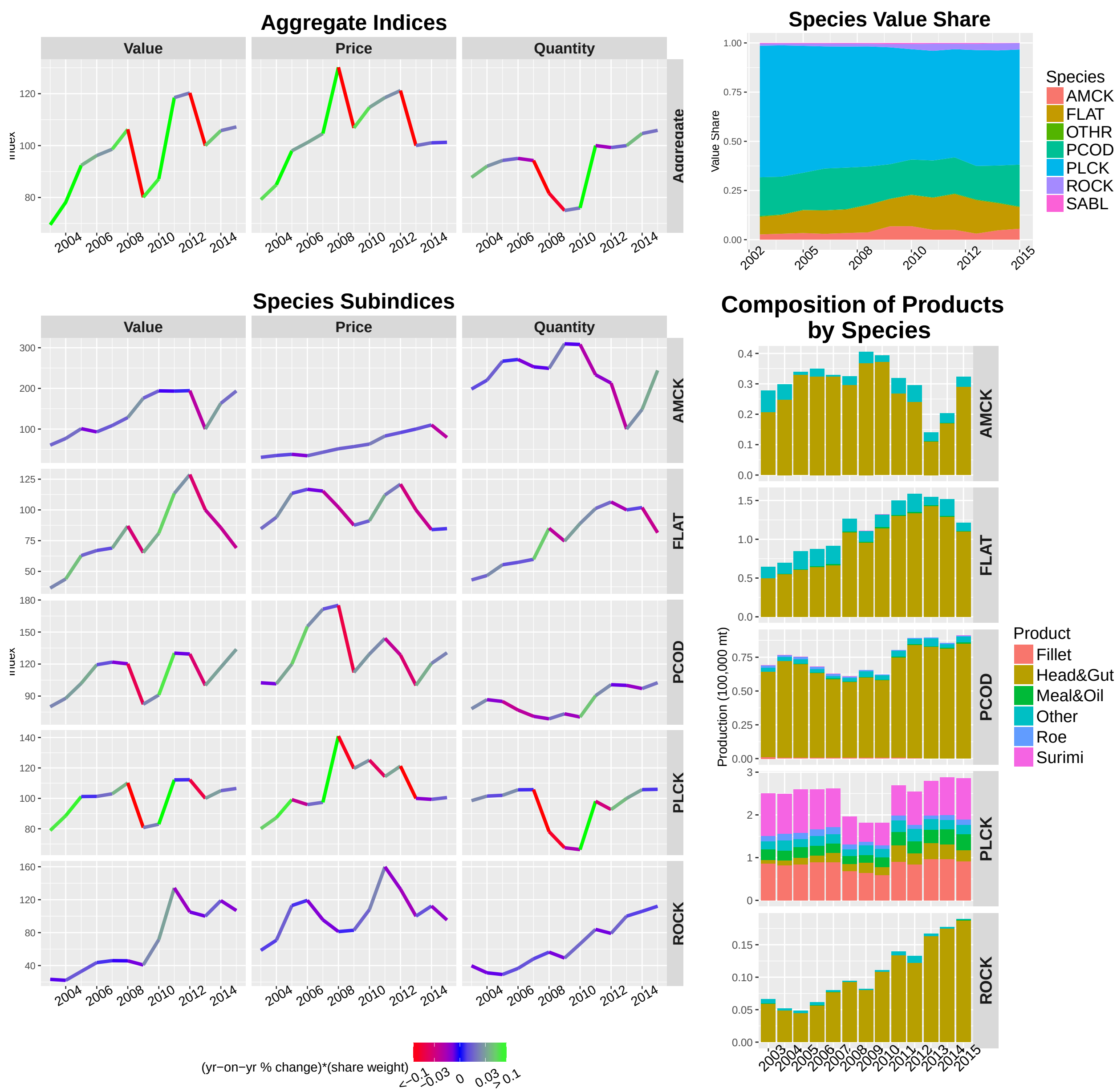

Figure 5.2: BSAI at-sea wholesale market: species decomposition 2003-2015 (Index 2013 = 100). **Notes:** Index values for 2010-2015, notes and source information for the indices are on Table 5.1. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

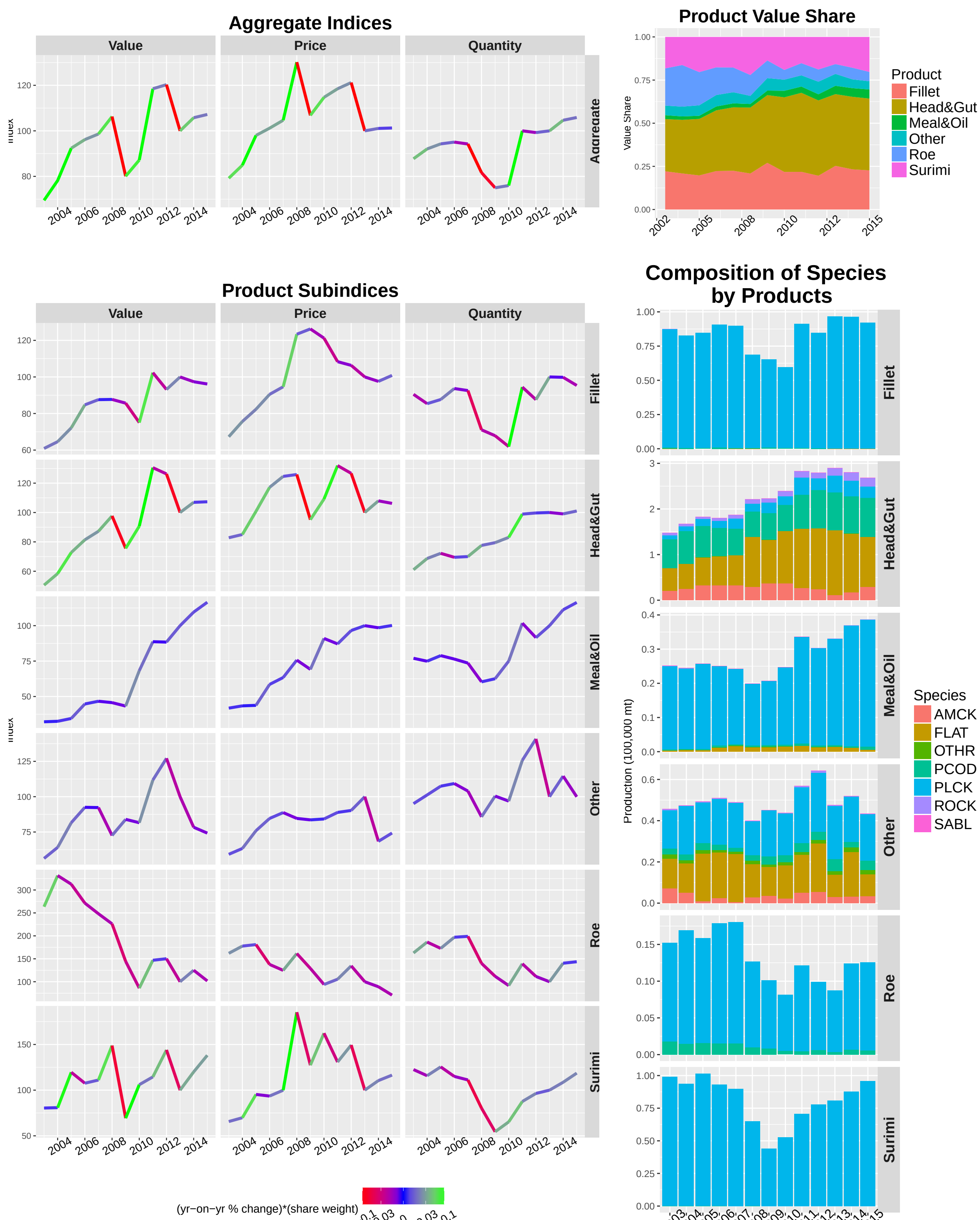

Figure 5.3: BSAI at-sea wholesale market: product decomposition 2003-2015 (Index 2013 = 100). **Notes:** Index values for 2010-2015, notes and source information for the indices are on Table 5.2. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

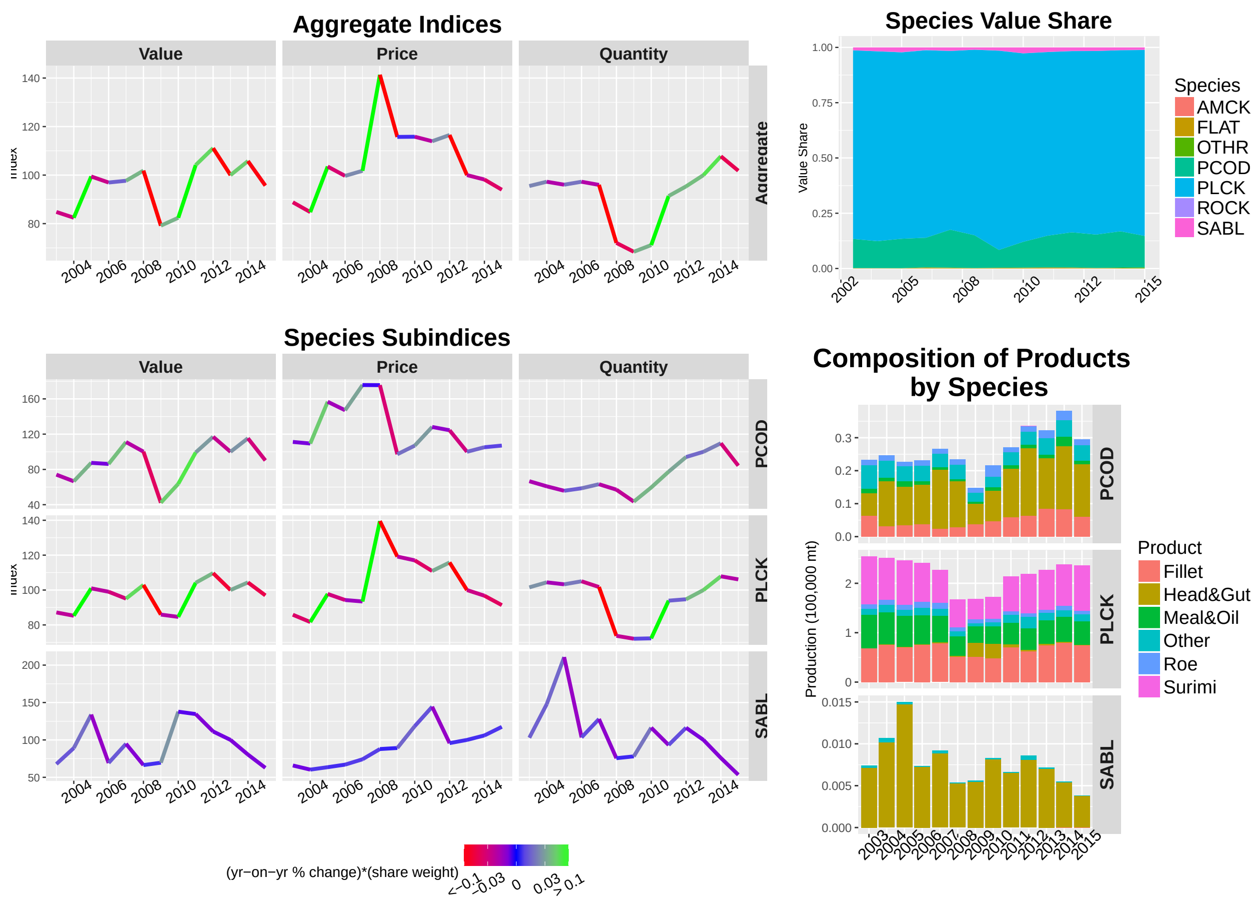

Figure 5.4: BSAI shoreside wholesale market: species decomposition 2003-2015 (Index 2013 = 100). **Notes:** Index values for 2010-2015, notes and source information for the indices are on Table 5.3. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

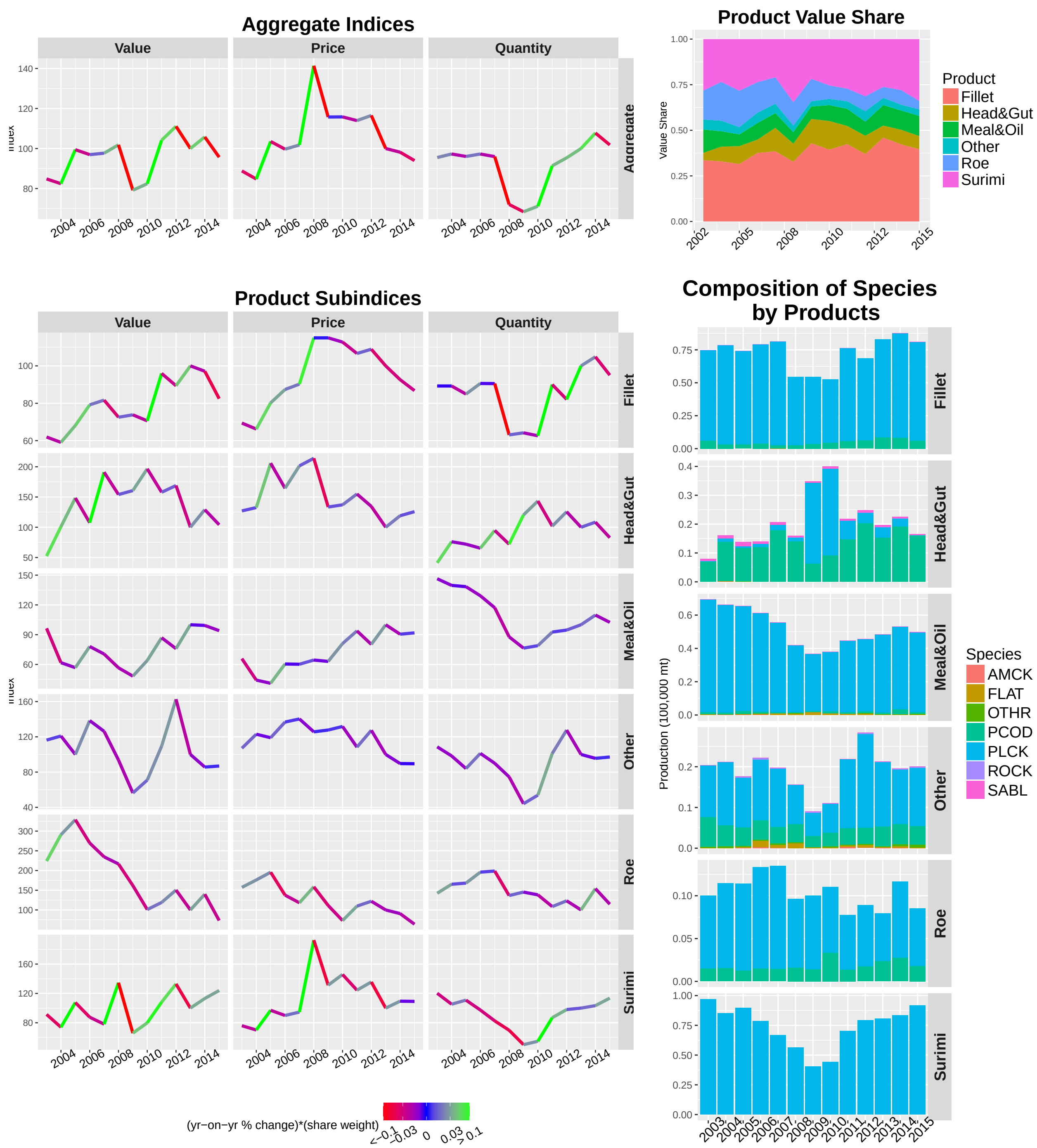

Figure 5.5: BSAI shoreside wholesale market: product decomposition 2003-2015 (Index 2013 = 100). **Notes:** Index values for 2010-2015, notes and source information for the indices are on Table 5.4. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

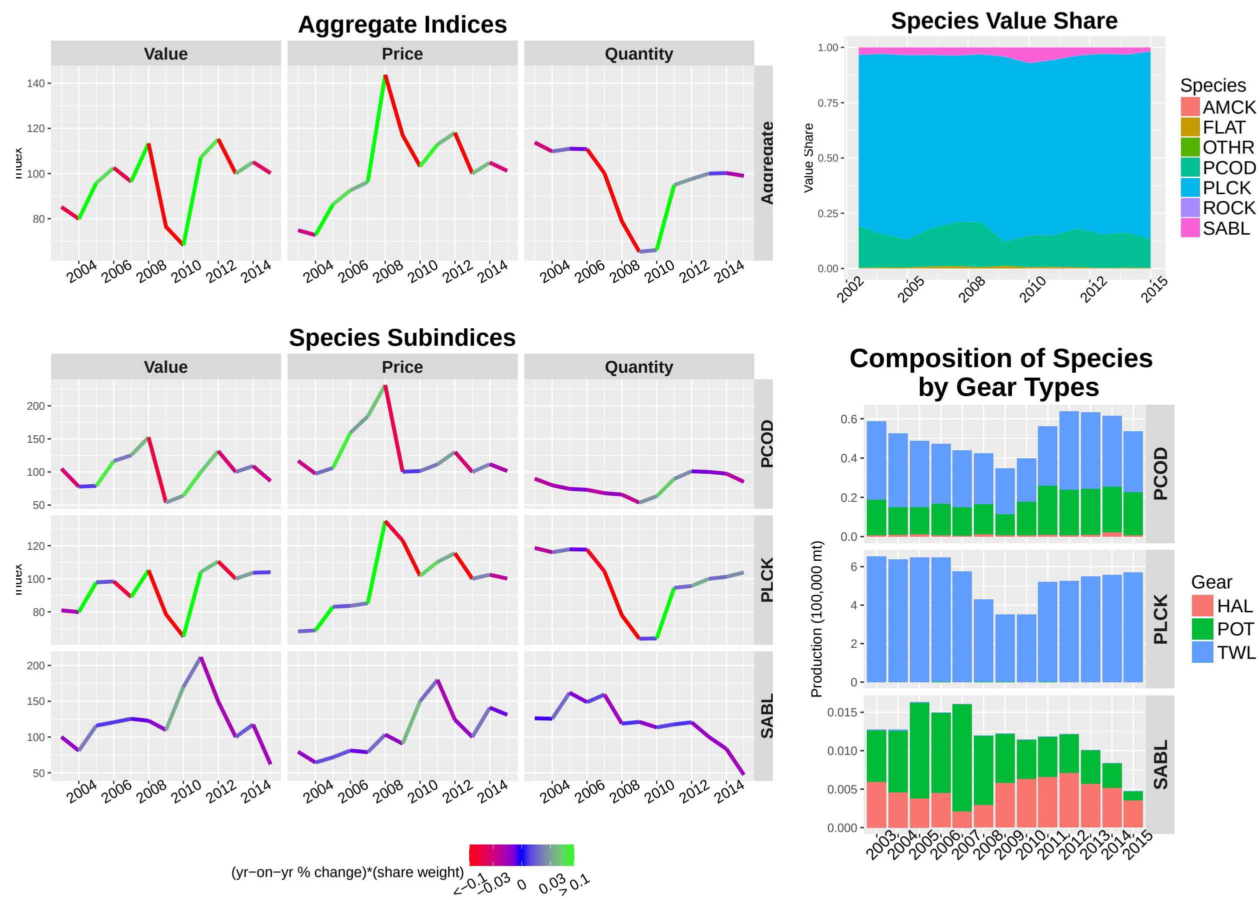

Figure 5.6: BSAI shoreside ex-vessel market: species decomposition 2003-2015 (Index 2013 = 100). **Notes:** Index values for 2010-2015, notes and source information for the indices are on Table 5.5. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

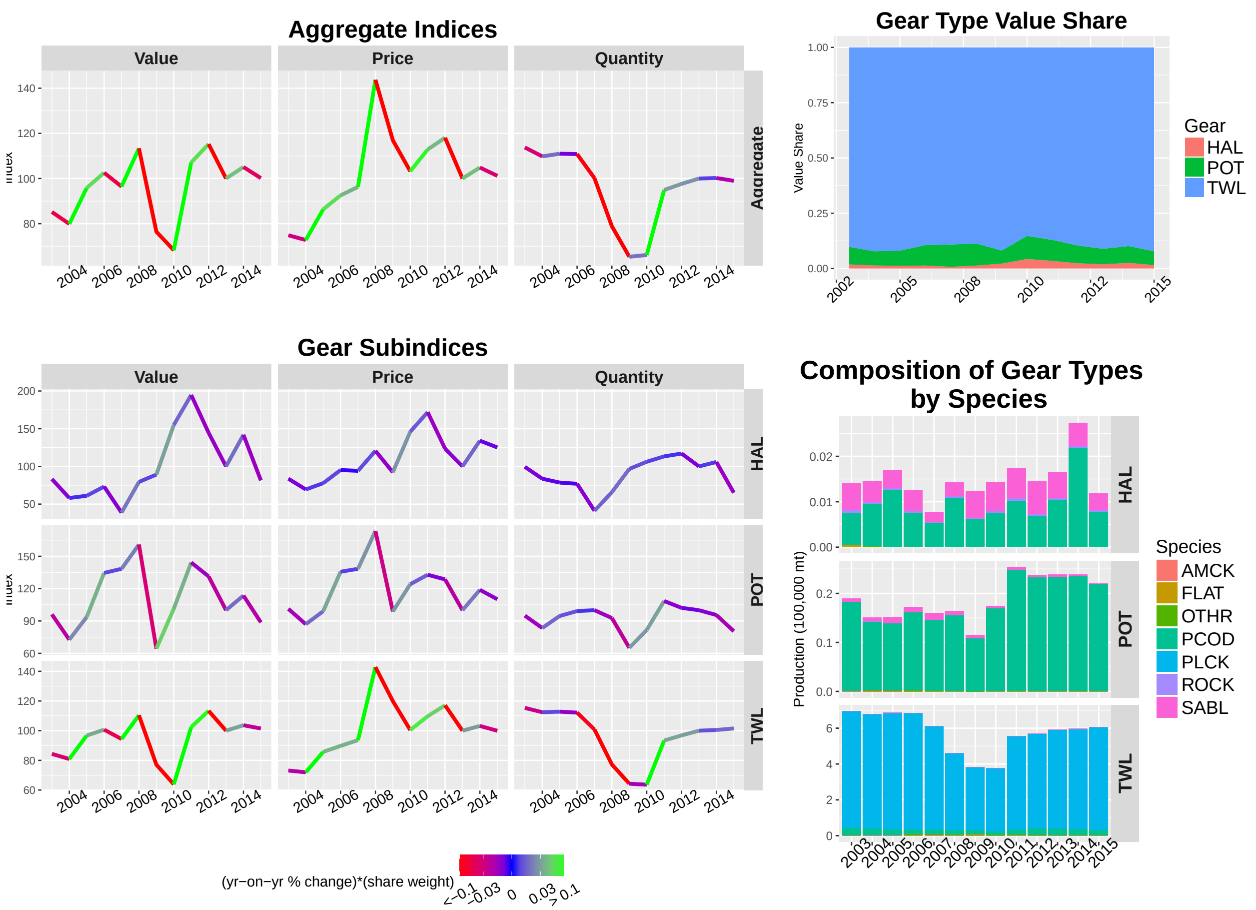

Figure 5.7: BSAI shoreside ex-vessel market: gear decomposition 2003-2015.

Notes: Index values for 2010-2015, 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.

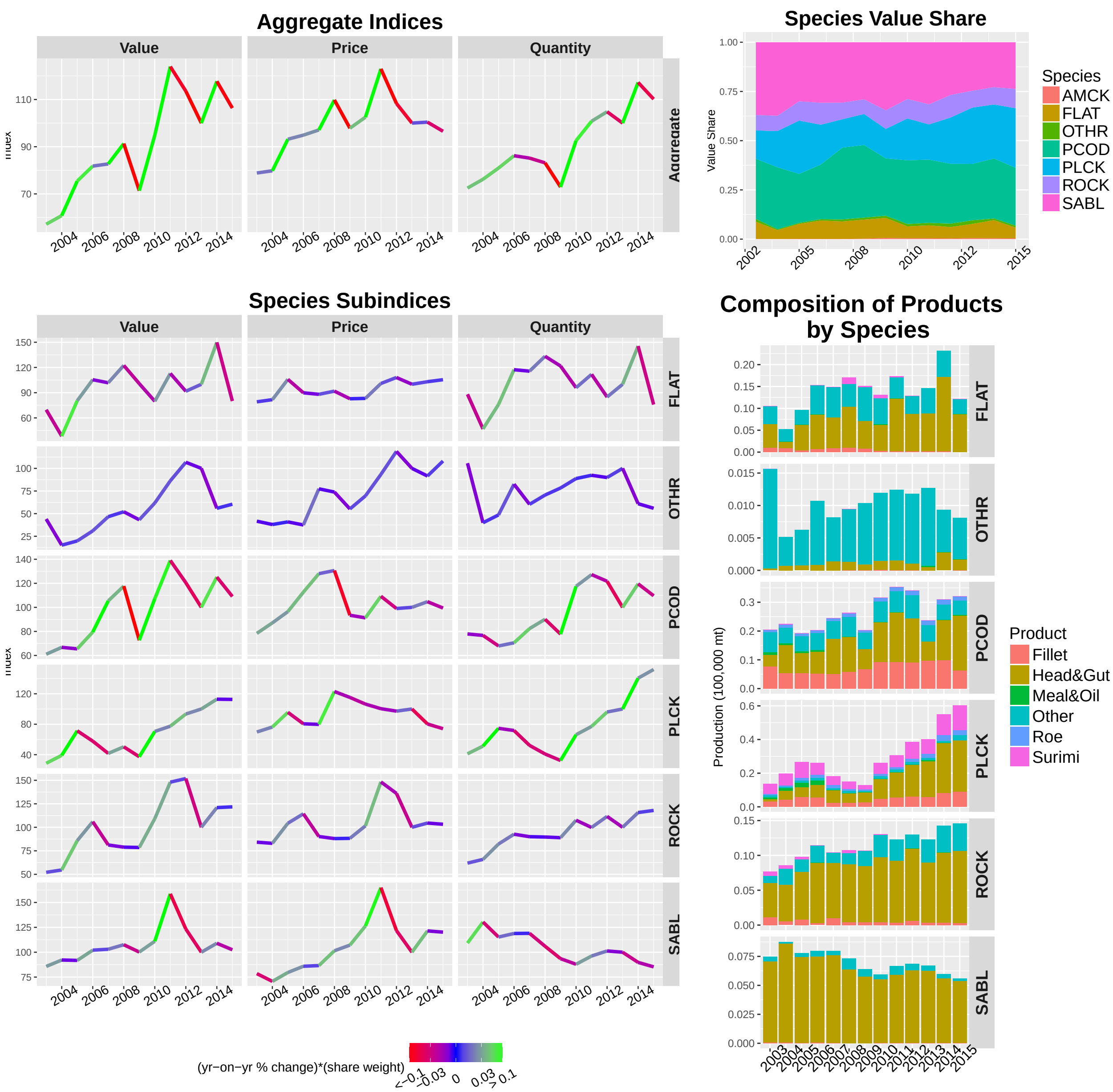

Figure 5.8: GOA wholesale market: species decomposition 2003-2015.

Notes: Index values for 2010-2015, 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.

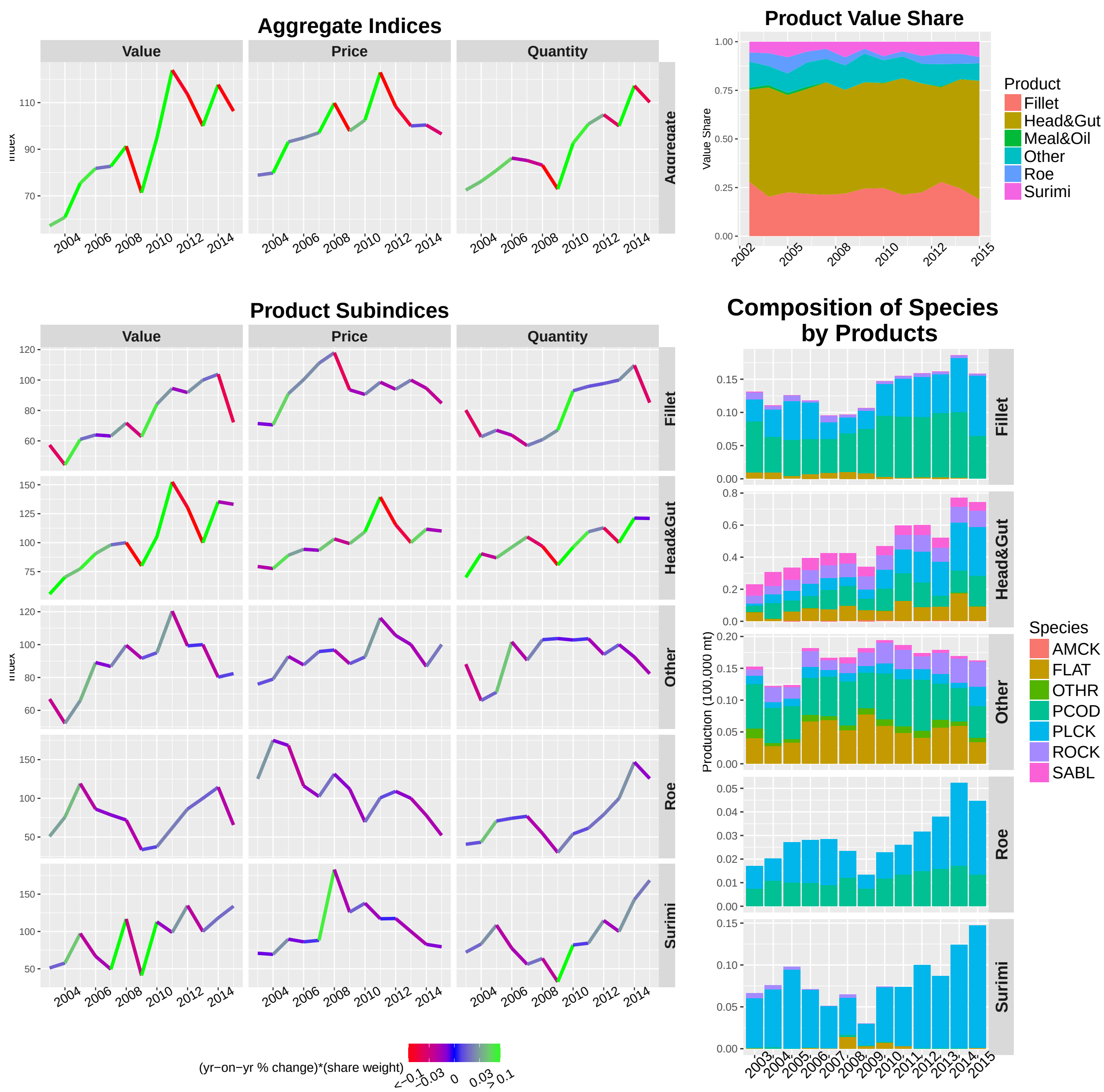

Figure 5.9: GOA wholesale market: product decomposition 2003-2015.

Notes: Index values for 2010-2015, 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.

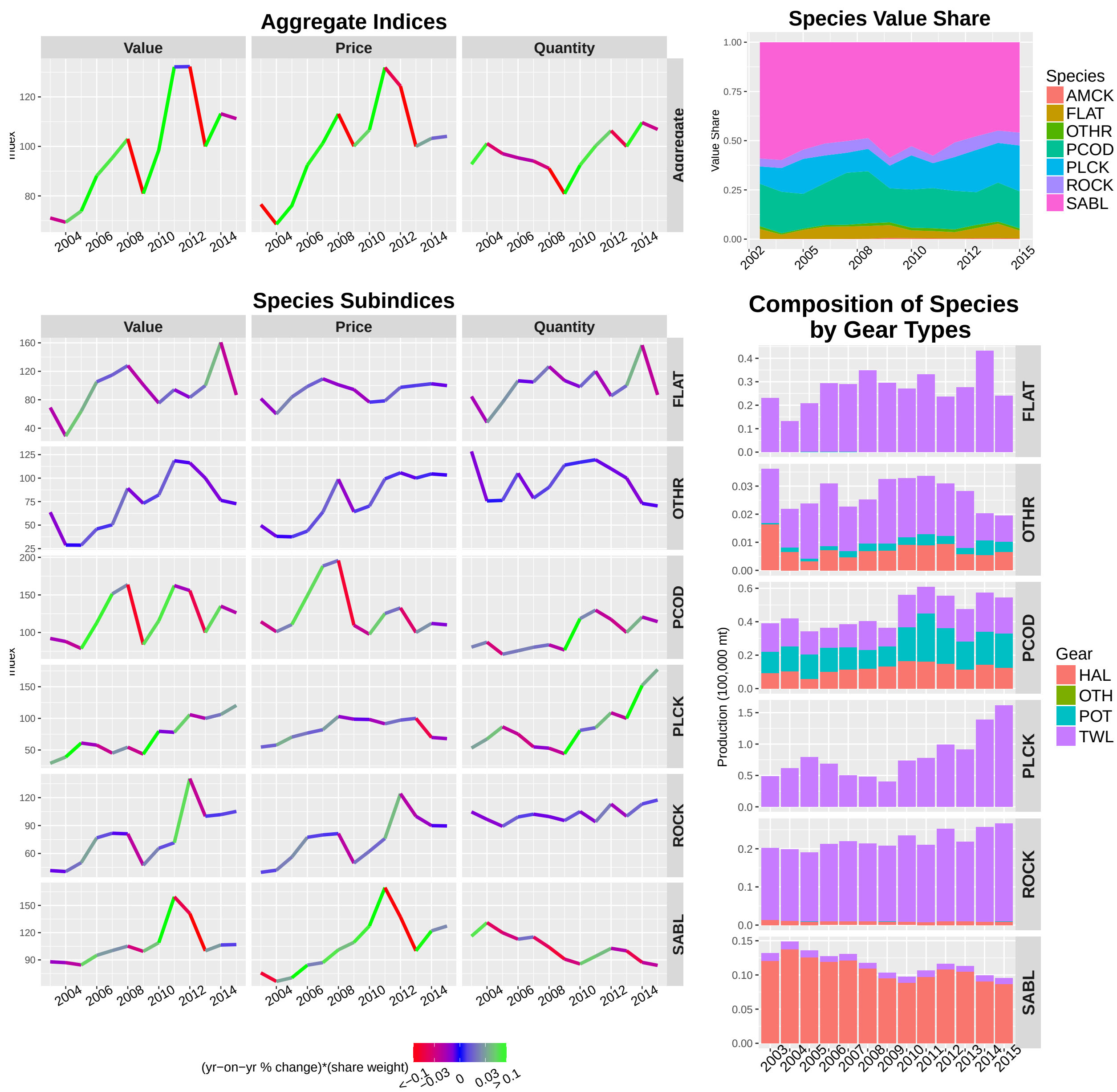

Figure 5.10: GOA ex-vessel market: species decomposition 2003-2015.

Notes: Index values for 2010-2015, 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.

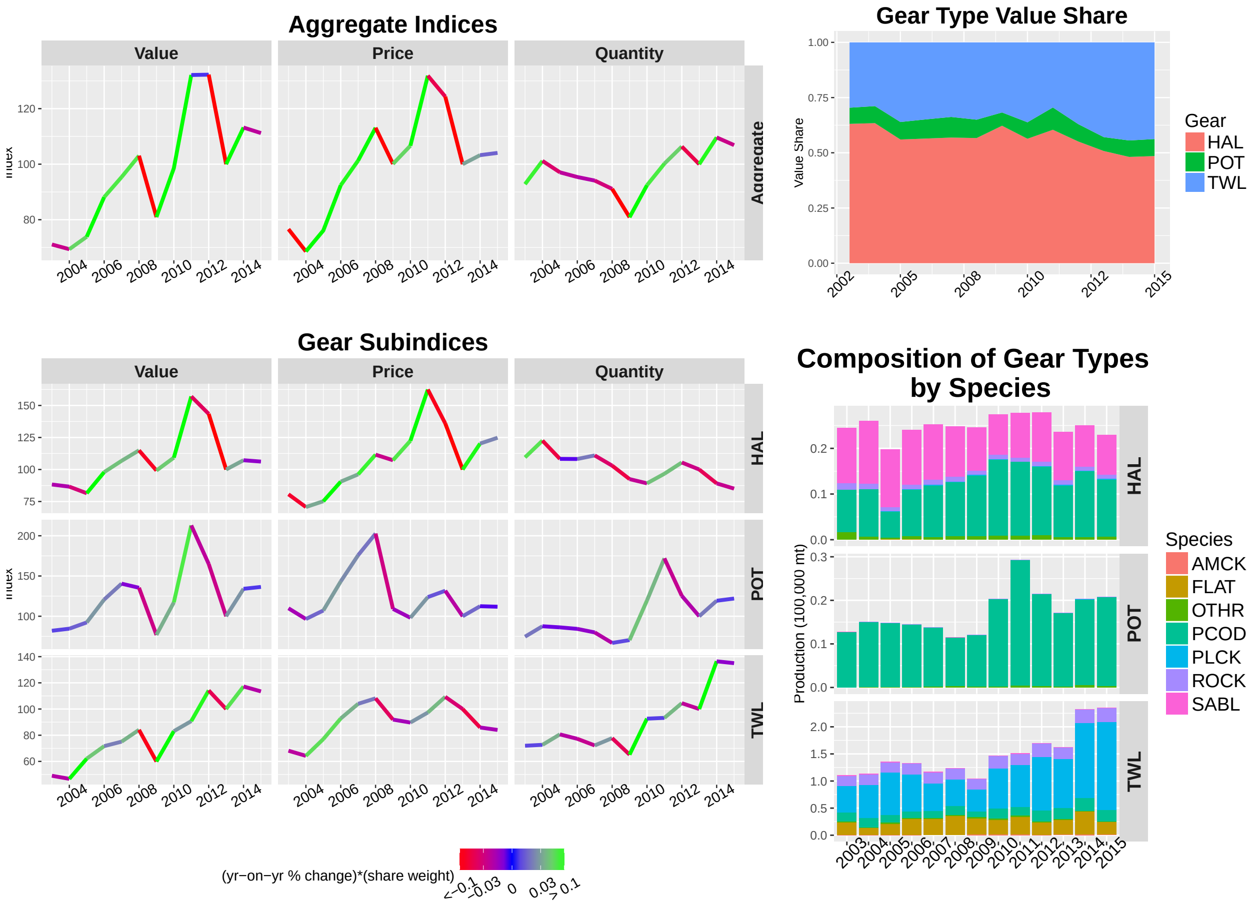

Figure 5.11: GOA ex-vessel market: gear decomposition 2003-2015 (Index 2013 = 100). **Notes:** Index values for 2010-2015, notes and source information for the indices are on Table 5.10. Index coloring indicates its influence on aggregate index movements, see Section 5.1 for details.

Table 5.1: Species Indices and Value Share for the BSAI At-Sea First-Wholesale Market 2010-2015.

Species	Index Type	2010	2011	2012	2013	2014	2015
Aggregate	Value	87.17	118.49	120.28	100.00	105.76	107.20
Aggregate	Price	114.72	118.48	121.19	100.00	101.06	101.25
Aggregate	Quantity	75.99	100.00	99.24	100.00	104.65	105.87
AMCK	Value	193.91	193.35	194.40	100.00	163.21	193.66
AMCK	Price	62.95	82.80	91.29	100.00	110.08	79.30
AMCK	Quantity	308.01	233.50	212.94	100.00	148.26	244.21
AMCK	Value Share	0.07	0.05	0.05	0.03	0.05	0.06
FLAT	Value	81.06	113.41	128.75	100.00	85.55	69.08
FLAT	Price	91.15	112.12	120.91	100.00	83.95	84.79
FLAT	Quantity	88.93	101.15	106.48	100.00	101.91	81.48
FLAT	Value Share	0.16	0.16	0.18	0.17	0.14	0.11
PCOD	Value	91.02	130.24	129.37	100.00	117.00	133.87
PCOD	Price	129.35	144.11	128.53	100.00	120.58	130.58
PCOD	Quantity	70.37	90.37	100.66	100.00	97.04	102.52
PCOD	Value Share	0.18	0.19	0.18	0.17	0.19	0.21
PLCK	Value	83.01	112.14	112.26	100.00	105.04	106.49
PLCK	Price	125.16	114.32	121.22	100.00	99.33	100.53
PLCK	Quantity	66.32	98.09	92.61	100.00	105.75	105.93
PLCK	Value Share	0.56	0.56	0.55	0.59	0.58	0.59
ROCK	Value	71.58	134.25	105.09	100.00	118.90	106.85
ROCK	Price	107.96	159.92	132.88	100.00	112.30	95.33
ROCK	Quantity	66.31	83.95	79.09	100.00	105.88	112.09
ROCK	Value Share	0.03	0.04	0.03	0.03	0.04	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 2010-2015.

Product	Index Type	2010	2011	2012	2013	2014	2015
Aggregate	Value	87.17	118.49	120.28	100.00	105.76	107.20
Aggregate	Price	114.72	118.48	121.19	100.00	101.06	101.25
Aggregate	Quantity	75.99	100.00	99.24	100.00	104.65	105.87
Fillet	Value	75.04	102.34	93.13	100.00	97.39	96.15
Fillet	Price	121.22	108.35	106.34	100.00	97.58	100.84
Fillet	Quantity	61.91	94.45	87.58	100.00	99.81	95.34
Fillet	Value Share	0.22	0.22	0.20	0.25	0.23	0.23
Head&Gut	Value	90.70	130.52	126.28	100.00	106.92	107.31
Head&Gut	Price	109.17	131.95	126.66	100.00	107.94	106.22
Head&Gut	Quantity	83.08	98.91	99.70	100.00	99.06	101.02
Head&Gut	Value Share	0.43	0.46	0.44	0.42	0.42	0.42
Meal&Oil	Value	68.23	88.67	88.40	100.00	109.57	116.51
Meal&Oil	Price	90.98	87.13	96.57	100.00	98.53	100.13
Meal&Oil	Quantity	75.00	101.77	91.54	100.00	111.20	116.36
Meal&Oil	Value Share	0.04	0.04	0.04	0.05	0.05	0.05
Other	Value	81.59	111.78	127.15	100.00	78.37	74.23
Other	Price	84.22	88.88	90.25	100.00	68.41	74.27
Other	Quantity	96.88	125.77	140.89	100.00	114.57	99.94
Other	Value Share	0.06	0.06	0.07	0.07	0.05	0.05
Roe	Value	86.11	146.82	150.16	100.00	125.08	101.80
Roe	Price	93.97	105.47	134.64	100.00	89.10	70.88
Roe	Quantity	91.63	139.21	111.52	100.00	140.39	143.61
Roe	Value Share	0.06	0.07	0.07	0.06	0.07	0.05
Surimi	Value	105.97	114.53	144.01	100.00	119.99	138.15
Surimi	Price	162.32	130.79	149.40	100.00	110.48	116.45
Surimi	Quantity	65.28	87.57	96.39	100.00	108.61	118.63
Surimi	Value Share	0.19	0.15	0.19	0.16	0.18	0.20

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 2010-2015.

Species	Index Type	2010	2011	2012	2013	2014	2015
Aggregate	Value	82.41	104.13	111.10	100.00	105.78	95.68
Aggregate	Price	115.81	113.96	116.52	100.00	98.17	93.98
Aggregate	Quantity	71.16	91.37	95.34	100.00	107.75	101.81
PCOD	Value	63.70	99.23	117.00	100.00	115.33	90.19
PCOD	Price	106.99	128.15	124.42	100.00	105.16	107.05
PCOD	Quantity	59.53	77.43	94.04	100.00	109.67	84.26
PCOD	Value Share	0.12	0.14	0.16	0.15	0.16	0.14
PLCK	Value	84.61	104.16	109.69	100.00	104.38	96.94
PLCK	Price	117.01	110.90	115.82	100.00	96.76	91.35
PLCK	Quantity	72.30	93.92	94.71	100.00	107.87	106.11
PLCK	Value Share	0.85	0.83	0.82	0.83	0.82	0.84
SABL	Value	137.76	134.57	111.31	100.00	80.42	62.72
SABL	Price	118.40	144.34	95.71	100.00	105.97	117.46
SABL	Quantity	116.36	93.23	116.29	100.00	75.89	53.40
SABL	Value Share	0.03	0.02	0.02	0.02	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 2010-2015.

Product	Index Type	2010	2011	2012	2013	2014	2015
Aggregate	Value	82.41	104.13	111.10	100.00	105.78	95.68
Aggregate	Price	115.81	113.96	116.52	100.00	98.17	93.98
Aggregate	Quantity	71.16	91.37	95.34	100.00	107.75	101.81
Fillet	Value	70.58	95.97	89.37	100.00	97.13	82.47
Fillet	Price	112.73	106.63	108.91	100.00	92.63	86.76
Fillet	Quantity	62.61	90.00	82.06	100.00	104.86	95.05
Fillet	Value Share	0.39	0.42	0.37	0.46	0.42	0.40
Head&Gut	Value	196.62	157.82	168.99	100.00	129.08	104.16
Head&Gut	Price	137.09	154.99	134.47	100.00	119.02	125.82
Head&Gut	Quantity	143.42	101.83	125.68	100.00	108.45	82.79
Head&Gut	Value Share	0.16	0.10	0.10	0.07	0.08	0.07
Meal&Oil	Value	63.98	86.91	75.90	100.00	99.32	94.04
Meal&Oil	Price	81.06	93.82	80.19	100.00	90.48	91.81
Meal&Oil	Quantity	78.93	92.63	94.65	100.00	109.77	102.43
Meal&Oil	Value Share	0.09	0.09	0.08	0.11	0.11	0.11
Other	Value	70.89	109.47	162.68	100.00	85.69	86.87
Other	Price	131.75	108.29	127.41	100.00	89.66	89.46
Other	Quantity	53.81	101.09	127.68	100.00	95.57	97.10
Other	Value Share	0.03	0.04	0.06	0.04	0.03	0.04
Roe	Value	101.01	119.06	150.54	100.00	139.93	73.27
Roe	Price	73.02	109.70	122.13	100.00	90.78	63.88
Roe	Quantity	138.33	108.54	123.26	100.00	154.14	114.70
Roe	Value Share	0.07	0.07	0.08	0.06	0.08	0.05
Surimi	Value	79.95	108.15	132.94	100.00	113.12	123.96
Surimi	Price	145.80	124.39	135.62	100.00	109.45	109.12
Surimi	Quantity	54.83	86.94	98.03	100.00	103.35	113.60
Surimi	Value Share	0.25	0.27	0.31	0.26	0.28	0.34

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 2006-2015.

Species	Index Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aggregate	Value	102.56	96.43	113.35	76.44	68.24	107.11	115.25	100.00	105.09	100.18
Aggregate	Price	92.56	96.29	143.74	116.95	103.20	112.85	118.07	100.00	104.87	101.20
Aggregate	Quantity	110.81	100.15	78.86	65.36	66.13	94.92	97.62	100.00	100.21	98.99
PCOD	Value	116.52	125.09	152.41	53.78	64.26	99.97	131.59	100.00	108.93	86.34
PCOD	Price	159.38	184.13	231.42	100.39	101.41	111.59	130.23	100.00	111.72	101.49
PCOD	Quantity	73.10	67.93	65.86	53.57	63.36	89.59	101.04	100.00	97.51	85.07
PCOD	Value Share	0.17	0.20	0.20	0.11	0.14	0.14	0.17	0.15	0.16	0.13
PLCK	Value	98.37	89.02	105.12	78.52	65.10	104.09	110.45	100.00	103.66	103.95
PLCK	Price	83.64	85.23	134.84	123.11	101.75	110.14	115.47	100.00	102.45	100.12
PLCK	Quantity	117.62	104.45	77.95	63.78	63.98	94.50	95.65	100.00	101.18	103.83
PLCK	Value Share	0.78	0.75	0.76	0.84	0.78	0.79	0.78	0.82	0.80	0.85
SABL	Value	120.59	125.47	122.71	109.79	170.08	211.62	149.56	100.00	117.44	61.89
SABL	Price	81.10	78.77	103.38	90.66	149.98	179.87	124.09	100.00	140.98	131.07
SABL	Quantity	148.68	159.29	118.69	121.10	113.40	117.65	120.52	100.00	83.30	47.22
SABL	Value Share	0.03	0.04	0.03	0.04	0.07	0.06	0.04	0.03	0.03	0.02

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

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

Table 5.6: Gear Indices and Value Share for the BSAI Shoreside Ex-Vessel Market 2006-2015.

Gear	Index Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aggregate	Value	102.56	96.43	113.35	76.44	68.24	107.11	115.25	100.00	105.09	100.18
Aggregate	Price	92.56	96.29	143.74	116.95	103.20	112.85	118.07	100.00	104.87	101.20
Aggregate	Quantity	110.81	100.15	78.86	65.36	66.13	94.92	97.62	100.00	100.21	98.99
HAL	Value	73.26	38.72	79.45	89.16	154.94	194.72	144.60	100.00	141.93	81.50
HAL	Price	95.19	94.13	120.68	92.26	145.94	171.94	123.51	100.00	134.08	125.17
HAL	Quantity	76.96	41.14	65.84	96.64	106.17	113.25	117.08	100.00	105.85	65.11
HAL	Value Share	0.01	0.01	0.01	0.02	0.04	0.03	0.02	0.02	0.03	0.02
POT	Value	134.57	138.37	160.86	64.34	101.37	144.25	131.38	100.00	113.58	88.73
POT	Price	135.68	138.36	173.44	98.82	124.10	132.89	128.58	100.00	118.89	110.17
POT	Quantity	99.19	100.01	92.75	65.10	81.69	108.55	102.18	100.00	95.53	80.54
POT	Value Share	0.09	0.10	0.10	0.06	0.10	0.09	0.08	0.07	0.08	0.06
TWL	Value	100.69	94.39	110.37	77.11	63.88	102.41	113.39	100.00	103.67	101.45
TWL	Price	89.77	93.65	142.86	119.95	100.42	109.71	117.11	100.00	103.18	99.95
TWL	Quantity	112.17	100.79	77.26	64.29	63.61	93.35	96.83	100.00	100.47	101.50
TWL	Value Share	0.89	0.89	0.89	0.92	0.85	0.87	0.90	0.91	0.90	0.92

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 2010-2015.

Species	Index Type	2010	2011	2012	2013	2014	2015
Aggregate	Value	94.87	123.94	113.54	100.00	117.70	106.36
Aggregate	Price	102.49	122.96	108.32	100.00	100.40	96.54
Aggregate	Quantity	92.57	100.79	104.82	100.00	117.23	110.17
FLAT	Value	79.81	112.89	91.69	100.00	149.87	80.07
FLAT	Price	83.20	100.96	108.06	100.00	103.05	105.45
FLAT	Quantity	95.92	111.82	84.85	100.00	145.44	75.93
FLAT	Value Share	0.06	0.07	0.06	0.07	0.09	0.05
OTHR	Value	61.76	86.25	106.75	100.00	55.87	60.44
OTHR	Price	69.60	93.36	118.74	100.00	91.57	108.06
OTHR	Quantity	88.75	92.38	89.90	100.00	61.01	55.94
OTHR	Value Share	0.01	0.01	0.02	0.02	0.01	0.01
PCOD	Value	107.24	138.99	120.49	100.00	125.21	109.04
PCOD	Price	91.28	109.23	99.02	100.00	104.72	99.45
PCOD	Quantity	117.49	127.25	121.68	100.00	119.57	109.65
PCOD	Value Share	0.32	0.32	0.30	0.29	0.30	0.29
PLCK	Value	70.52	77.41	93.40	100.00	112.88	112.61
PLCK	Price	106.45	100.40	97.21	100.00	80.33	74.14
PLCK	Quantity	66.24	77.11	96.08	100.00	140.52	151.88
PLCK	Value Share	0.21	0.18	0.24	0.29	0.27	0.30
ROCK	Value	109.22	148.01	151.84	100.00	120.95	121.76
ROCK	Price	101.55	148.26	136.07	100.00	104.53	103.23
ROCK	Quantity	107.55	99.83	111.60	100.00	115.71	117.95
ROCK	Value Share	0.10	0.10	0.11	0.09	0.09	0.10
SABL	Value	111.03	158.64	123.33	100.00	108.99	102.47
SABL	Price	126.32	164.94	121.78	100.00	121.41	120.16
SABL	Quantity	87.90	96.18	101.27	100.00	89.77	85.28
SABL	Value Share	0.29	0.32	0.27	0.25	0.23	0.24

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 2010-2015.

Product	Index Type	2010	2011	2012	2013	2014	2015
Aggregate	Value	94.87	123.94	113.54	100.00	117.70	106.36
Aggregate	Price	102.49	122.96	108.32	100.00	100.40	96.54
Aggregate	Quantity	92.57	100.79	104.82	100.00	117.23	110.17
Fillet	Value	84.15	94.52	91.78	100.00	103.84	72.18
Fillet	Price	90.55	98.61	93.94	100.00	94.63	84.76
Fillet	Quantity	92.93	95.85	97.70	100.00	109.73	85.16
Fillet	Value Share	0.25	0.21	0.23	0.28	0.25	0.19
Head&Gut	Value	105.09	152.48	130.38	100.00	135.33	133.13
Head&Gut	Price	109.39	139.36	115.54	100.00	111.65	110.07
Head&Gut	Quantity	96.07	109.41	112.85	100.00	121.21	120.95
Head&Gut	Value Share	0.54	0.60	0.56	0.49	0.56	0.61
Other	Value	95.10	120.37	99.25	100.00	80.21	82.37
Other	Price	92.50	116.20	105.59	100.00	86.74	100.05
Other	Quantity	102.81	103.59	94.00	100.00	92.48	82.33
Other	Value Share	0.12	0.11	0.10	0.11	0.08	0.09
Roe	Value	37.55	61.87	86.19	100.00	114.42	65.65
Roe	Price	69.54	100.67	109.07	100.00	77.99	52.27
Roe	Quantity	54.01	61.46	79.02	100.00	146.72	125.58
Roe	Value Share	0.02	0.03	0.04	0.05	0.05	0.03
Surimi	Value	112.89	98.66	134.65	100.00	118.10	133.86
Surimi	Price	137.89	116.98	117.35	100.00	82.73	79.46
Surimi	Quantity	81.87	84.33	114.74	100.00	142.75	168.45
Surimi	Value Share	0.07	0.05	0.07	0.06	0.06	0.08

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 2006-2015.

Species	Index Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aggregate	Value	88.14	95.35	103.04	80.96	98.55	132.12	132.24	100.00	113.20	111.21
Aggregate	Price	92.41	101.33	113.11	100.10	106.66	131.88	124.35	100.00	103.25	104.06
Aggregate	Quantity	95.38	94.10	91.10	80.88	92.40	100.19	106.35	100.00	109.63	106.87
FLAT	Value	105.18	114.83	128.04	100.93	75.26	94.20	83.20	100.00	160.69	86.69
FLAT	Price	98.63	109.41	101.02	94.31	76.61	78.43	97.43	100.00	102.48	99.84
FLAT	Quantity	106.65	104.95	126.75	107.02	98.25	120.11	85.39	100.00	156.81	86.82
FLAT	Value Share	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.05	0.07	0.04
OTHR	Value	45.86	50.34	89.14	73.08	82.14	118.50	116.22	100.00	76.39	72.74
OTHR	Price	43.63	63.97	98.77	64.21	70.27	99.15	105.70	100.00	104.49	103.26
OTHR	Quantity	105.10	78.69	90.25	113.82	116.89	119.51	109.95	100.00	73.11	70.44
OTHR	Value Share	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01
PCOD	Value	112.80	151.42	163.73	84.06	115.66	162.49	155.75	100.00	135.10	126.13
PCOD	Price	149.15	188.42	195.90	109.65	97.63	125.19	132.70	100.00	112.03	110.20
PCOD	Quantity	75.63	80.36	83.58	76.66	118.46	129.79	117.37	100.00	120.60	114.46
PCOD	Value Share	0.21	0.26	0.26	0.17	0.19	0.20	0.20	0.17	0.20	0.19
PLCK	Value	57.72	45.10	54.46	43.45	79.58	77.95	105.88	100.00	106.16	120.50
PLCK	Price	76.82	82.12	103.02	98.71	98.25	91.44	97.27	100.00	69.84	67.99
PLCK	Quantity	75.14	54.92	52.86	44.01	80.99	85.25	108.85	100.00	152.01	177.24
PLCK	Value Share	0.14	0.10	0.11	0.12	0.17	0.13	0.17	0.21	0.20	0.23
ROCK	Value	76.80	81.73	81.09	47.32	65.56	71.58	140.52	100.00	101.77	105.22
ROCK	Price	77.40	79.96	81.36	49.61	62.41	76.12	124.26	100.00	89.94	89.60
ROCK	Quantity	99.23	102.21	99.67	95.38	105.04	94.03	113.09	100.00	113.15	117.43
ROCK	Value Share	0.06	0.06	0.05	0.04	0.05	0.04	0.07	0.07	0.06	0.07
SABL	Value	95.03	100.29	105.13	99.40	108.96	159.42	141.01	100.00	106.43	106.88
SABL	Price	84.24	87.07	101.13	109.35	127.38	169.58	137.27	100.00	121.93	127.27
SABL	Quantity	112.81	115.19	103.95	90.91	85.54	94.01	102.72	100.00	87.29	83.98
SABL	Value Share	0.51	0.50	0.49	0.59	0.53	0.58	0.51	0.48	0.45	0.46

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 2006-2015.

Gear	Index Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aggregate	Value	88.14	95.35	103.04	80.96	98.55	132.12	132.24	100.00	113.20	111.21
Aggregate	Price	92.41	101.33	113.11	100.10	106.66	131.88	124.35	100.00	103.25	104.06
Aggregate	Quantity	95.38	94.10	91.10	80.88	92.40	100.19	106.35	100.00	109.63	106.87
HAL	Value	97.94	106.79	114.95	99.21	109.26	157.05	143.43	100.00	107.24	106.19
HAL	Price	90.51	96.21	111.59	107.23	122.47	162.43	135.98	100.00	120.25	124.79
HAL	Quantity	108.21	110.99	103.01	92.51	89.21	96.68	105.47	100.00	89.18	85.09
HAL	Value Share	0.56	0.57	0.57	0.62	0.56	0.60	0.55	0.51	0.48	0.49
POT	Value	120.72	140.47	135.37	76.77	117.29	212.84	165.00	100.00	134.07	136.42
POT	Price	143.24	175.87	202.67	109.10	98.11	123.80	131.66	100.00	112.44	111.82
POT	Quantity	84.28	79.87	66.80	70.37	119.55	171.92	125.32	100.00	119.23	121.99
POT	Value Share	0.09	0.09	0.08	0.06	0.07	0.10	0.08	0.06	0.07	0.08
TWL	Value	71.67	75.09	84.10	59.93	83.10	90.76	114.19	100.00	117.20	113.46
TWL	Price	92.78	103.99	108.16	91.93	89.69	97.34	109.31	100.00	85.91	84.03
TWL	Quantity	77.25	72.21	77.76	65.19	92.65	93.24	104.47	100.00	136.43	135.03
TWL	Value Share	0.35	0.34	0.35	0.32	0.36	0.29	0.37	0.43	0.44	0.44

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 FIRST-WHOLESALE PRICE PROJECTIONS

6.1. Introduction

The most recent year for which first-wholesale prices (Table 26) are available is 2015. These prices are 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 (October 2016), the most recent COAR data available was for the previous year, 2015. To provide recent information, current (i.e., 2016) prices are estimated ("nowcast") using export prices, estimated global catch, and exchanges rates through 2016 and COAR first-wholesale prices through 2015. Furthermore, first-wholesale prices are projected out over the next 4 years (2017-2020). The 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 Table 26 in Section 4 of this document. With the notable exception that estimates are made for all Alaska, and no distinction is made between at-sea and shoreside prices. This corresponds with the export data which make no distinction between sectors, only the custom district of origin. Export data were constrained to exports originating from states Washington and Alaska which tended to provide a better estimate of first-wholesale prices.

Table 6.1 summarizes the price projections for the six years spanning 2013-2018. Prices between 2013-2015 are realized (actual) first-wholesale prices. The summary data provided for the years 2016-2018 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, 2016, display a modest degree of volatility with most confidence bounds within ±5-10% of the projected price. 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. Section 6.4 examines the individual product price projections for 2016-2020. For these projections a more detailed characterization of the forecast distribution is given by the mean, median and 40%, 60%, 80%, and 90% confidence bounds. Figures plot the price projection results as well as historical realized prices.

6.2. Tabular Summary of Price Projection Results

Species	Product	stat.	2013	2014	2015	2016	2017	2018
pollock	surimi	mean	1.006	1.09	1.115	1.197	1.225	1.29
pollock	surimi	conf.int.90				[1.17,1.23]	[1.11,1.35]	[1.16,1.44]
pollock	roe	mean	3.254	2.787	2.148	2.32	2.664	2.65
pollock	roe	conf.int.90				[2.28,2.36]	[2.42,2.94]	[2.28,3.1]
pollock	fillet	mean	1.376	1.304	1.285	1.245	1.266	1.277
pollock	fillet	conf.int.90				[1.24,1.25]	[1.18,1.35]	[1.16,1.41]
pollock	deep-skin fillet	mean	1.622	1.595	1.557	1.523	1.531	1.536
pollock	deep-skin fillet	conf.int.90				[1.52,1.53]	[1.46,1.6]	[1.44,1.65]
pollock	head and gut	mean	0.729	0.634	0.622	0.741	0.69	0.749
pollock	head and gut	conf.int.90				[0.72,0.76]	[0.65,0.74]	[0.7,0.81]
pacific cod	fillet	mean	2.997	2.91	2.654	2.778	2.821	2.841
pacific cod	fillet	conf.int.90				[2.75,2.81]	[2.65,3.02]	[2.57,3.16]
pacific cod	head and gut	mean	1.047	1.257	1.347	1.333	1.343	1.352
pacific cod	head and gut	conf.int.90				[1.31,1.36]	[1.24,1.46]	[1.21,1.52]
pacific cod	other products	mean	0.699	0.779	0.863	0.797	0.767	0.808
pacific cod	other products	conf.int.90				[0.78,0.81]	[0.72,0.82]	[0.72,0.91]
sablefish	head and gut	mean	5.774	6.932	6.945	7.721	8.14	8.266
sablefish	head and gut	conf.int.90				[7.57,7.87]	[7.68,8.67]	[7.63,8.97]
yellowfin (bsai)	head and gut	mean	0.506	0.455	0.484	0.458	0.463	0.467
yellowfin (bsai)	head and gut	conf.int.90				[0.45,0.47]	[0.43,0.5]	[0.43,0.51]
rock sole (bsai)	head and gut with roe	mean	0.855	0.854	0.891	0.955	0.921	0.897
rock sole (bsai)	head and gut with roe	conf.int.90				[0.94,0.97]	[0.85,0.99]	[0.82,0.99]
rock sole (bsai)	head and gut	mean	0.541	0.445	0.493	0.494	0.508	0.512
rock sole (bsai)	head and gut	conf.int.90				[0.48,0.51]	[0.46,0.56]	[0.45,0.58]
greenland turbot (bsai)	head and gut	mean	1.951	2.183	2.149	2.292	2.269	2.289
greenland turbot (bsai)	head and gut	conf.int.90				[2.22,2.36]	[2.03,2.54]	[2.02,2.6]
arrowtooth	head and gut	mean	0.545	0.748	0.692	0.709	0.851	0.877
arrowtooth	head and gut	conf.int.90				[0.67,0.74]	[0.74,0.98]	[0.75,1.01]
flathead sole	head and gut	mean	0.848	0.702	0.635	0.65	0.679	0.699
flathead sole	head and gut	conf.int.90				[0.63,0.67]	[0.63,0.73]	[0.62,0.78]
rex sole (goa)	whole fish	mean	1.21	1.108	0.766	0.8	0.917	0.946
rex sole (goa)	whole fish	conf.int.90				[0.78,0.82]	[0.86,0.98]	[0.86,1.04]

shallow-water flatfish (goa)	fillet	mean	1.618	1.39	2.373	2.42	2.196	2.209
shallow-water flatfish (goa)	fillet	conf.int.90				[2.38,2.46]	[2,2.42]	[1.95,2.5]
atka mackerel	head and gut	mean	1.326	1.509	1.08	1.215	1.24	1.26
atka mackerel	head and gut	conf.int.90				[1.17,1.26]	[1.12,1.38]	[1.09,1.46]
rockfish	head and gut	mean	1.054	1.177	1.042	1.121	1.156	1.158
rockfish	head and gut	conf.int.90				[1.08,1.16]	[1.05,1.27]	[1.01,1.34]

Table 6.1: Groundfish Product Price Projection Summary

6.3. Summary of Price Projection Methods

Current year prices (2016) were nowcast using export prices which are available with a minimal time lag of up to three months. Export prices through August 2016 were available for the current nowcasts. The 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. Nowcast models also incorporate 2016 exchange rate data and global catch estimates when they were determined to increase predictability. Global catch estimates for 2016 were obtained from the 2016 International Groundfish Forum. Because of the strength of the relationship between first-wholesale and export prices nowcasts were made with comparatively higher precision than projections of future prices. Only a small component of the future first-wholesale prices (2015-2018) was forecastable, a feature that is common in price forecasts for commodities. Price projections were primarily made using models that estimate long-run returns and deviations from their long-run value. Estimates were made more robust by using a suite of canonical time series models to capture different aspects of the time series signal. The primary suite of models used were within the class of ARMA time series models (Hamilton, 1994). Two exponential smoothing models were also used, however, these tended to contribute little to the price projections (Hyndman & Athanasopoulos, 2013). Changes in price return volatility (a measure of the dispersion of the return distribution) over time were also modeled. Confidence bounds for the estimated models were constructed using residual resampling methods. Simulations created a probabilistic distribution of potential returns that are consistent with historical deviations from the models. Price projections from the suite of models were then combined using weights that were determined by model fit. Prices were calculated from returns and statistics such as the mean and percentiles for confidence bounds were calculated from the forecast distribution. A detailed description of the price projection methods will be available in the NOAA Technical Memorandum (Fissel, 2014).

6.4. First-Wholesale Product Price Projections

6.4.1 Alaska Pollock

In the North Pacific fisheries 62% of the wholesale production and 61% of the wholesale value came from Alaska pollock in 2015 (Table 25). Pollock is caught by catcher processors who process their catch at-sea, and by catcher vessels who deliver their catch to shoreside processors (Table 25). 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).

The pollock surimi price peaked in 2008 when supply was constrained by a temporary decline in the U.S. Alaska pollock quota (Figures 6.1 and 5.3). Subsequent price declines are, in part, attributable to the Alaska pollock catch returning to more normal levels since 2011 (Table 1). Competition from the production of surimi from non-Pollock species, may also account for some of the recent price trends (Seafoodnews, 2012; Undercurrent, 2014a), in particular, from the growth in surimi production from warm-water fish of southeast Asia. Surimi is consumed globally, but Asian markets dominate the demand for surimi and demand has remained strong. Consumer demand and exchange rates can also influence Alaska pollock surimi prices. In recent years U.S. surimi exports to South Korea have grown and in 2013 surpassed exports to Japan. However some of the surimi exported to South Korean is ultimately re-exported to Japan (Undercurrent, 2014b) (Table E.2). In recent

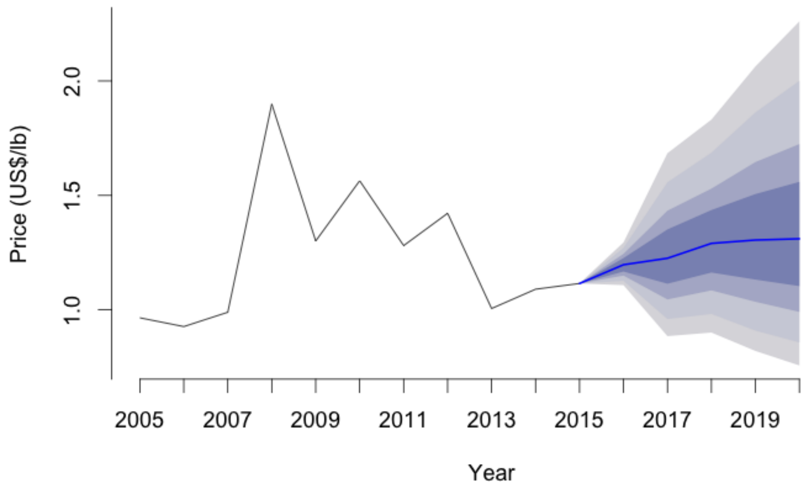

Figure 6.1: Pollock Surimi Price Projections and Confidence Bounds

Table 6.2: Projected Mean, Probability Bounds of First-wholesale Pollock Surimi Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	1.11	1.13	1.15	1.17	1.20	1.20	1.23	1.24	1.27	1.29
2017	0.89	0.96	1.05	1.11	1.23	1.23	1.35	1.43	1.56	1.68
2018	0.90	0.98	1.09	1.16	1.29	1.30	1.44	1.53	1.69	1.83
2019	0.82	0.91	1.04	1.13	1.30	1.31	1.51	1.65	1.86	2.06
2020	0.76	0.86	0.99	1.10	1.31	1.32	1.56	1.72	2.00	2.26

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
19.89	19.85	19.90	19.90	19.90	19.90

years, increases in Russian pollock production have put pressure of pollock head-and-gut and fillet prices and surimi has remained a comparatively stable product type for Alaska pollock producers.

The production of pollock surimi increased substantially in 2015 and the first-wholesale price increased to $1.12/lb. This price is at the lower bound of last year's estimated 95% confidence bounds for the 2015 price which were $1.12/lb and $1.24/lb with a median of $1.18/lb. Appreciation of the U.S. dollar relative to foreign currencies likely played a role in the lower than expected price. This year's estimates have been improved to be more robust to exchange rate movement. The current first-wholesale surimi 2016 price projection 90% confidence bounds are $1.11/lb and $1.27/lb with a median of $1.20 (Figure 6.1; Table 6.2). Surimi export prices tend to provide a reasonably good prediction of the state of surimi prices. The lower bound of the 2016 90% confidence is close to the realized 2015 price indicating that 2016 prices will likely increase. These projections are consistent with production data through Oct. 2016 which show a small increase in year-over-year surimi production and media reports indicate weakly increasing prices in 2016. For 2017 and beyond, if prices are consistent with estimated trends then prices will fluctuate around a slightly increasing trend. Volatility projections suggest that the recent level of volatility will persist in the near-term and are consistent with the historical average.

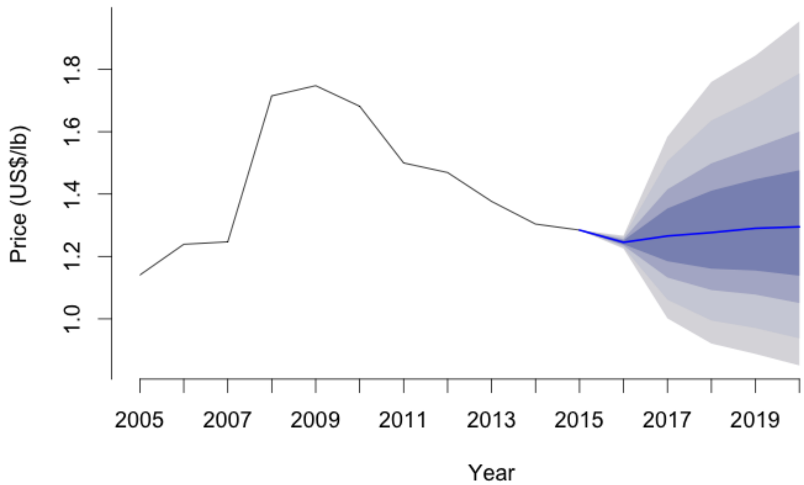

Figure 6.2: Pollock Fillet Price Projections and Confidence Bounds

Table 6.3: Projected Mean, Probability Bounds of First-wholesale Pollock Fillet Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	1.23	1.23	1.24	1.24	1.25	1.25	1.25	1.26	1.26	1.27
2017	1.00	1.06	1.13	1.18	1.27	1.27	1.35	1.42	1.51	1.58
2018	0.92	0.99	1.09	1.16	1.28	1.28	1.41	1.50	1.64	1.76
2019	0.89	0.97	1.08	1.16	1.29	1.29	1.45	1.55	1.70	1.84
2020	0.85	0.94	1.05	1.14	1.30	1.29	1.48	1.60	1.79	1.95

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
14.64	14.64	14.64	14.64	14.64	14.64

The U.S. and Russia are the two major pollock producers globally, and much of Russia's catch is exported to China and is re-processed as twice-frozen fillets. Prior to 2008 the U.S. accounted for over 50% of the global pollock catch. The price of pollock fillets peaked in 2009 when reductions in harvest quotas constrained supply (ASMI, 2014a). In 2008-2010 and Russia's share of global catch increased to over 50% and the U.S. share decreased to 35%. By 2011-2012 U.S. catch had returned to close to pre-2008 levels, while Russian catch remains high. The high supply of pollock has put downward pressure on fillet prices in recent years. Additionally, The U.S. was the only producer of MSC certified pollock until 2013 when roughly 50% of the Russian catch became MSC certified. The MSC certification of Russian-caught pollock enabled access to segments of European and U.S. fillet markets, which has put continued downward pressure on prices (Fishchoice, 2014a; Undercurrent, 2013a).

The production of pollock fillets decreased 6% and the price decreased 1% to \$1.28/lb in 2015. Substantial amounts of supply and exchange rates contributed to difficult price negotiations with international buyers. The 2015 realized price of \$1.28/lb was close to last year's projection which had a median of \$1.29 and was well within confidence bounds of ±\$0.06. Current projections for the 2016 fillet price have 90% confidence bounds of \$1.23/lb to \$1.27/lb with a median of to \$1.25/lb

(Figure 6.2). These estimates indicated that it's likely that next year's reported prices for 2016 will show a decrease. These estimates are consistent with currently available market information. Production data through Oct. 2016 show that year-over-year fillet production is down and media reports indicate that small fish and increased production from Russia have put downward pressure on 2016 fillet prices. Estimates of fillet prices for 2017 and beyond indicate that based on previous trends fillet prices may increase slightly but not substantially. Volatility projections indicate that there is no expected change in the future volatility.

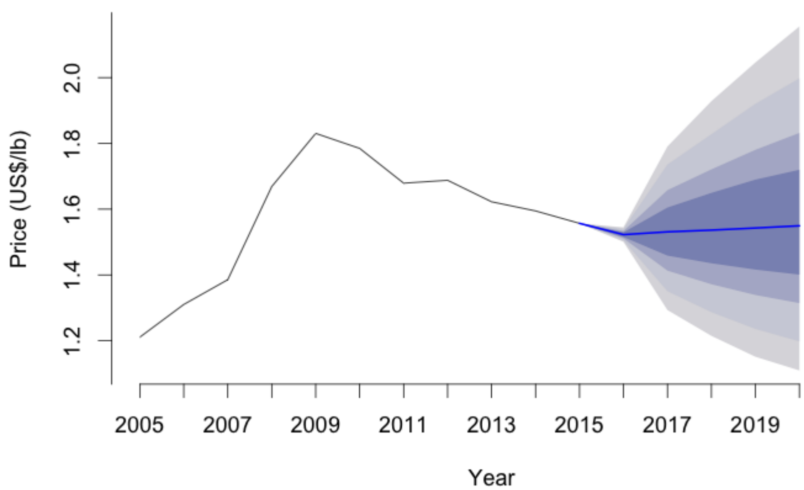

Figure 6.3: Pollock Deep-skin-fillet Price Projections and Confidence Bounds

Table 6.4: Projected Mean, Probability Bounds of First-wholesale Pollock Deep-skin-fillet Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	1.50	1.51	1.51	1.52	1.52	1.52	1.53	1.53	1.54	1.54
2017	1.29	1.35	1.41	1.46	1.53	1.54	1.60	1.66	1.74	1.79
2018	1.21	1.29	1.37	1.44	1.54	1.54	1.65	1.72	1.83	1.93
2019	1.15	1.24	1.34	1.42	1.54	1.55	1.69	1.78	1.92	2.05
2020	1.11	1.20	1.31	1.40	1.55	1.55	1.72	1.83	2.00	2.16

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

Pollock Deep-skin-fillet Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
10.60	10.60	10.60	10.60	10.60	10.60

The volume of deep-skin fillets produced in 2015 was basically unchanged from 2014 levels. Deep-skin fillet prices decreased 2% to $1.56/lb in 2015. This was consistent with last year's estimate which had 90% confidence bounds of $1.55/lb and $1.67/lb. Current estimates for the 2016 deep-skin fillet price have 90% confidence bounds of $1.50/lb to $1.54/lb with a median estimate of $1.52/lb (Figure 6.3). These estimates indicated that it's likely that next year's reported prices for 2016 will show a decrease. These estimates are largely consistent with currently available market information. Production data through Oct. 16 indicate an increase in year-over-year production data, but media reports continue to indicate that there substantial downward pressure on prices in 2016. Mean estimates of deep-skin fillet prices for 2016 and beyond indicate that based on the historical trend deep-skin fillet prices may increase slightly but not substantially. Volatility estimates indicate that return volatility is consistent with the historical average.

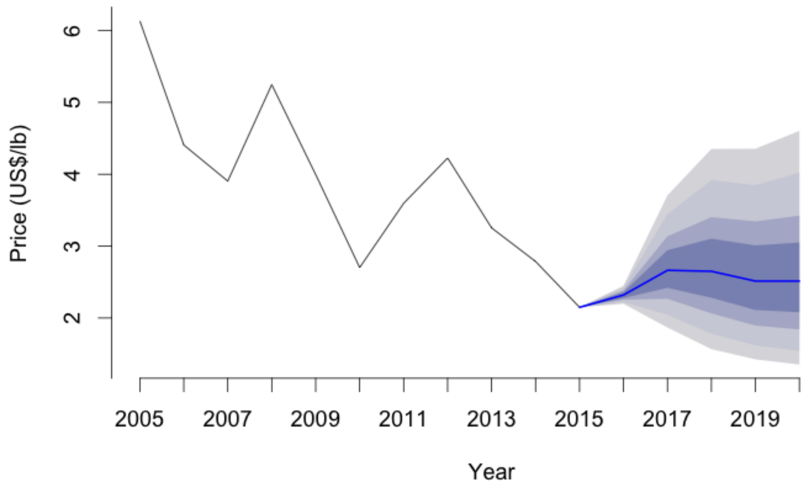

Figure 6.4: Pollock Roe Price Projections and Confidence Bounds

Table 6.5: Projected Mean, Probability Bounds of First-wholesale Pollock Roe Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	2.20	2.22	2.26	2.28	2.32	2.32	2.36	2.38	2.42	2.45
2017	1.87	2.05	2.27	2.42	2.66	2.68	2.94	3.14	3.44	3.71
2018	1.57	1.78	2.06	2.28	2.65	2.67	3.10	3.40	3.91	4.35
2019	1.43	1.62	1.90	2.11	2.51	2.52	3.01	3.34	3.85	4.35
2020	1.35	1.54	1.84	2.08	2.51	2.53	3.05	3.42	4.02	4.60

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
22.08	21.36	21.78	21.94	22.01	22.05

Pollock roe prices have displayed a downward trend in recent years (Figures 6.4, and 5.3; Table 26). Stagnant demand for the product in Japan and a weak yen are thought to be the significant factors in this trend (ASMI, 2014a; Seafoodnews, 2014a). Japan, the largest importer of pollock roe, experienced a significant drop in the value of the yen versus the dollar in 2015. The volume of pollock roe produced by Alaska and Russia combined has been high in recent years which has put further downward pressure on pollock roe prices (Seafoodnews, 2014b).

Pollock roe production decreased 9% in 2015 and prices decreased 23% to $2.15/lb. The weakness in the Yen against the U.S. Dollar has been cited as a factor in the 2015 price drop. Additionally, the Japanese Yen has remained strong against the Russian Ruble, which makes Russian products relatively cheaper than U.S. products for Japanese buyers. Also, the high production volume may have contributed to a carryover of roe inventory in Asian markets, which puts downward pressure on prices. Industry reports further indicate that harvests yielded comparatively more over-mature lower grade roe in 2015 which also contributed to low prices.[1] While last year's projection correctly estimated a decreasing price in 2015, the realized price of $2.15/lb is considerably below the range of prices projected which had 90% confidence bounds of $2.40/lb and $2.62/lb and a median of $2.51/lb. The first-wholesale pollock roe price is projected to rebound somewhat in 2016 with 90% confidence bounds of $2.20/lb and $2.45/lb, and a median of $2.32/lb (Figure 6.4). The lower bound of the 2015 confidence interval is above the 2015 price which indicates that an increase in roe prices is likely. Production data through Oct. 2016 indicate that 2016 roe production is down year-over-year. Media reports indicate the reduced supply from both the U.S. and Russia is a result of low roe yields which have driven up 2016 roe prices. Additionally, the Yen has appreciated against the dollar in 2016 relative to 2015. This information is consistent with this year's price projections. Projections beyond 2016 indicate some potential reversion to slightly higher prices in 2017 and beyond. There is considerable volatility in roe returns. The asymmetry in the confidence bounds indicates a greater potential for larger increases in the future price than large decreases. Confidence bounds show that in spite of the considerable uncertainty in roe prices it is unlikely that roe prices will return to levels as high as those observed prior to 2007 over the next four years.

[1] `www.pspafish.net/index.php/april-27-2015`, accessed Nov.15, 2016.

6.4.2 Pacific Cod

Since 2007 global cod catch has grown from approximately 1.2 million t to 1.85 million t in 2014. Catch in the Barents Sea is approximately 1.3 million t and U.S. catch has been over 300 thousand t since 2011. European Atlantic cod and U.S. Pacific cod remain the two major sources supplying the cod market over the past decade accounting for roughly 75% and 20%, respectively. Global cod supplies affect cod prices and the volume of cod has resulted in prices that have fluctuated around $1.25/lb for head-and-gut since 2009. The supply of whitefish cod substitutes can also influence Pacific cod prices. The ability of producers to substitute between groundfish species including cod, haddock, and pollock, potentially link prices across the markets for these species (Undercurrent, 2013b,c, 2014c).

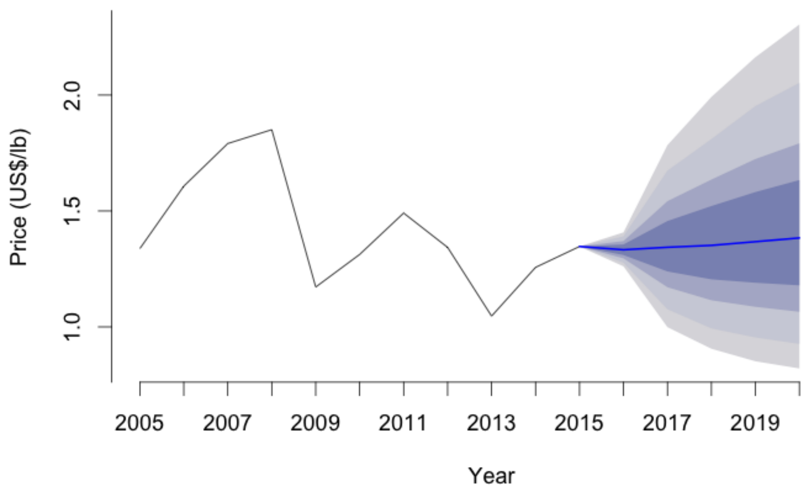

Figure 6.5: Pacific-cod Head-and-gut Price Projections and Confidence Bounds

Table 6.6: Projected Mean, Probability Bounds of First-wholesale Pacific-cod Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	1.26	1.28	1.30	1.31	1.33	1.33	1.36	1.37	1.39	1.41
2017	1.00	1.08	1.17	1.24	1.34	1.35	1.46	1.54	1.67	1.78
2018	0.91	0.99	1.11	1.21	1.35	1.36	1.52	1.64	1.81	1.99
2019	0.85	0.95	1.09	1.19	1.37	1.37	1.58	1.72	1.95	2.16
2020	0.82	0.93	1.07	1.18	1.38	1.39	1.63	1.79	2.05	2.30

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

Pacific-cod Head-and-gut Return Volatility Projections					
Hist. Avg.	2017	2018	2019	2020	Long-run
18.42	18.42	18.42	18.42	18.42	18.42

Production of Pacific cod H&G increased 5% in 2015 and prices rose 7% to $1.35/lb. The 2015 price was on the upper bound of the 95% confidence interval from last year's projection which ranged from $1.18/lb to $1.35/lb with a median of $1.27/lb. Significant amount of cod are sold late in the year which can reduce the accuracy of cod price projections, which are based on information information through August. The 2016 price projections indicate that the H&G price will remain essentially unchanged with 90% confidence bounds ranging from $1.26 to $1.41 and a median price estimate of $1.33/lb (Figure 6.5). Production data through 2015 show little change in the year-over-year production of H&G and media reports indicate that cod prices were weak early in the year but have show increases later. Current projection are consistent with this information though they may not fully reflect the late year increases reported by the media. H&G price projections for 2016 and beyond do not display a significant trend up or down, but do display wide range of potential future prices reflecting the significant historical and projected volatility in the H&G cod price.

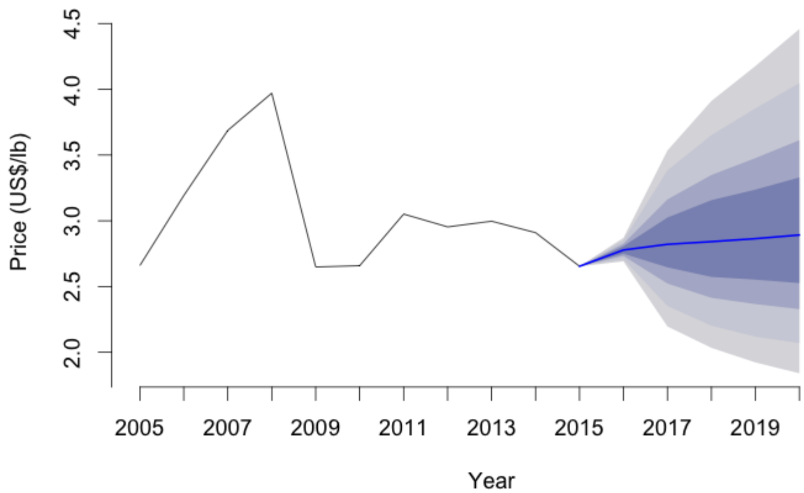

Figure 6.6: Pacific-cod Fillet Price Projections and Confidence Bounds

Table 6.7: Projected Mean, Probability Bounds of First-wholesale Pacific-cod Fillet Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	2.69	2.71	2.73	2.75	2.78	2.78	2.81	2.83	2.85	2.87
2017	2.20	2.35	2.52	2.65	2.82	2.84	3.02	3.16	3.38	3.53
2018	2.03	2.20	2.41	2.57	2.84	2.86	3.16	3.35	3.65	3.91
2019	1.92	2.12	2.37	2.55	2.86	2.88	3.24	3.48	3.85	4.18
2020	1.84	2.07	2.33	2.53	2.89	2.92	3.33	3.61	4.05	4.46

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
15.61	15.62	15.62	15.62	15.62	15.62

Production of Pacific cod fillets decreased in 2015 as prices dropped 9% to $2.65/lb. Last year’s price projection projected a decrease, however, the realized 2015 prices was below last year’s estimated 95% confidence interval $2.66/lb and $2.81/lb. The current projections for the 2016 first-wholesale cod fillet have 90% confidence bounds of $2.69/lb and $2.87/lb with a median of $2.78/lb (Figure 6.6). These estimates indicate that 2016 prices will likely show and increase. These estimates are consistent with market information which indicate that strong demand has resulted in increased 2016 prices. Projections of cod fillet prices in 2017 and beyond display a slightly increasing trend but the wide confidence bounds indicate considerable uncertainty. Volatility estimates indicated that future volatility is expected to be inline with the historical average.

6.4.3 Sablefish

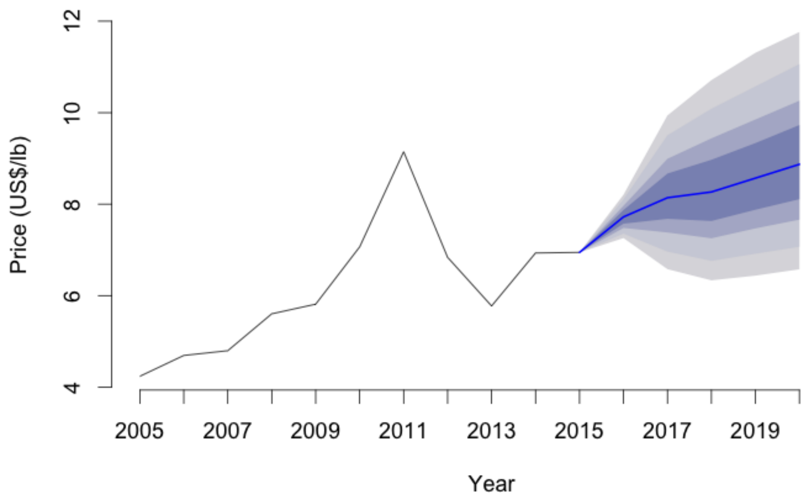

Figure 6.7: Sablefish Head-and-gut Price Projections and Confidence Bounds

Table 6.8: Projected Mean, Probability Bounds of First-wholesale Sablefish Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	7.26	7.36	7.48	7.57	7.72	7.72	7.87	7.96	8.10	8.21
2017	6.58	6.96	7.38	7.68	8.14	8.16	8.67	8.99	9.50	9.94
2018	6.34	6.76	7.25	7.63	8.27	8.27	8.97	9.44	10.08	10.71
2019	6.44	6.92	7.47	7.88	8.57	8.59	9.33	9.85	10.57	11.31
2020	6.58	7.07	7.66	8.11	8.87	8.91	9.73	10.26	11.06	11.76

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
13.38	12.59	13.03	12.98	13.04	12.63

The U.S. accounts for roughly 90% of global sablefish catch and Alaska accounts for roughly 75%-80% of the U.S. catch. The H&G product type is only product produced in significant quantities at the first-wholesale level comprising approximately 97% of the value from sablefish products. The sablefish first-wholesale price went from $4.80/lb in 2007, to a high of $9.14/lb in 2011 and subsequently dropped to $5.77/lb in 2013 (Figure 6.7). Lower prices in 2012 were likely the result of inventory that was carried over from 2011, and diminished international demand (Arctic Sounder, 2013; Undercurrent, 2013). The continued decline in prices through 2013 may be attributable to the weakening of the yen and persistent excess inventory as buyers and sellers settle on a lower market clearing price (Fishchoice, 2014b; NFCS, 2014). With excess inventory depleted, prices in 2013 were brought down to a level where inventories could move more rapidly. As the primary global producer of sablefish the significant supply reductions in Alaska have had a market impact that has generally resulted in higher wholesale and export prices. Most sablefish caught and produced is exported. The sablefish supply was constrained in 2014 by the 10% reduction in the 2014 Alaskan sablefish quota which put upward pressure on prices (Fishchoice, 2014b). While further supply reductions continued through 2015, the strength of the US dollar puts downward pressure on the price of exported goods as it increases prices for foreign importers.

Sablefish H&G production in 2015 decreased correspondingly with the sablefish TAC. The realized price of sablefish H&G in 2015 was basically unchanged increasing $0.02/lb to $6.95/lb. Price projections from last year's report had 90% confidence bound of $6.92/lb to $7.95/lb with a median of $7.42/lb, placing the realized price within the projected range but at the lower end of the interval. This year's estimates have been improved to be more robust to exchange rate movement. This year's price projections for the 2016 first-wholesale sablefish H&G price have 90% confidence bounds of $7.26/lb to $8.21/lb with a median of $7.72/lb which imply that a price increase in 2016 is highly likely (Figure 6.7). The increase implied by the model is the result of strengthening foreign currencies and further reductions in the sablefish supply. The model projects that if prices revert to their historical trend they will continue to increase at a gradual pace through 2020. Volatility is expected to remain constant at recent levels.

6.4.4 Atka Mackerel

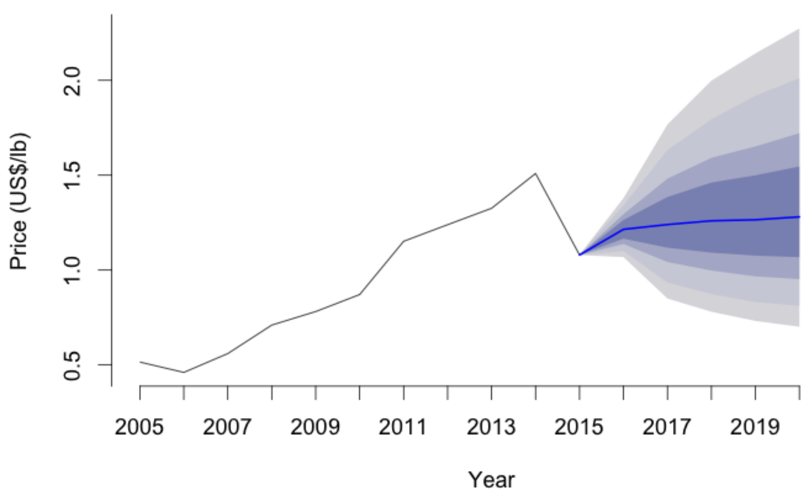

Figure 6.8: Atka-mackerel Head-and-gut Price Projections and Confidence Bounds

Atka mackerel is predominantly caught in the Aleutian Islands, and almost exclusively by the Amendment 80 Fleet. The U.S. (Alaska), Japan and Russian are the major producers of Atka mackerel. Approximately 90% of the Alaska caught Atka mackerel production volume is processed as head-and-gut (H&G) (Table 25) which is almost entirely exported to Japan and South Korea. In recent years the U.S. catch catch has been down due to area closures to protect endangered 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. Landings of Hokkaido origin Atka mackerel, have also declined steadily since 2008 (Minato-Tsukiji, 2012a). In 2012, the Hokkaido Atka Mackerel quota was set to be cut by 30% over a three-year period to protect declining stocks and restore the population of juvenile fish (Minato-Tsukiji, 2010).

Table 6.9: Projected Mean, Probability Bounds of First-wholesale Atka-mackerel Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	1.07	1.10	1.14	1.17	1.21	1.21	1.26	1.29	1.34	1.38
2017	0.85	0.94	1.04	1.12	1.24	1.25	1.38	1.48	1.63	1.77
2018	0.78	0.87	1.00	1.09	1.26	1.26	1.46	1.59	1.79	2.00
2019	0.73	0.83	0.97	1.08	1.27	1.27	1.50	1.65	1.92	2.14
2020	0.70	0.81	0.95	1.07	1.28	1.28	1.55	1.72	2.01	2.27

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
23.41	21.68	21.04	20.26	19.22	27.12

Reductions in supply of Mackerel in both Japan and Alaska contributed to the observed price increases between 2008 and 2012. Japanese landings of Atka mackerel continued to stagnate through 2014 as the stocks continue to decline (Undercurrent, 2014d).

The Atka mackerel first-wholesale H&G production increase 67% in 2015 and price decreased 28% to $1.08/lb. Price projections from last year's had 95% confidence bounds of $1.48/lb and $1.80/lb with a median of $1.63/lb placing the realized 2015 price well below last year's estimated range of prices for 2015. Paradoxically, the export price for Atka mackerel H&G rose 2%. The U.S.-Japanese exchange rate was a likely factor in the 2015 first-wholesale price decrease as the value of the Dollar increased 12.5% over the Yen between 2014 and 2015 and Japan constitutes roughly 70% of the export value. Current projections for the 2016 Atka mackerel H&G price have 90% confidence bounds of $1.07/lb to $1.38/lb with a median of $1.21/lb (Figure 6.7). These estimates indicated that it's likely that next year's reported prices for 2016 will show an increase. The increase in the projected price is the result of the strengthening of the Yen in 2016 as captured by the model. In 2017 and beyond prices are the model shows a slightly increasing trend.

6.4.5 Flatfish

The two largest flatfish species in terms of market value and volume are yellowfin and rock sole. In 2008, these two species accounted for 75% of total flatfish value and 72% of flatfish volume (ASMI, 2010). The Alaska flatfish fishery became MSC certified in 2010 and received the Responsible Fishery Management (RFM) certification in 2014 (Undercurrent, 2014e). Certification provides access to some markets and may enhance value. The Alaska flatfish undergo relatively low fishing pressure and harvests of the are routinely below their TAC. In 2008, Amendment 80 rationalized the non-pollock groundfish fisheries (which includes the BSAI flatfish fisheries) by instituting a catch-share system that annually allocates a set percentage of the quota to vessels, based on historic catch levels (Tradex, 2007). Amendment 80 also mandated improved retention and utilization of fishery resources, which contributed to lowered discard and bycatch rates (Fishwatch, 2014a,b).

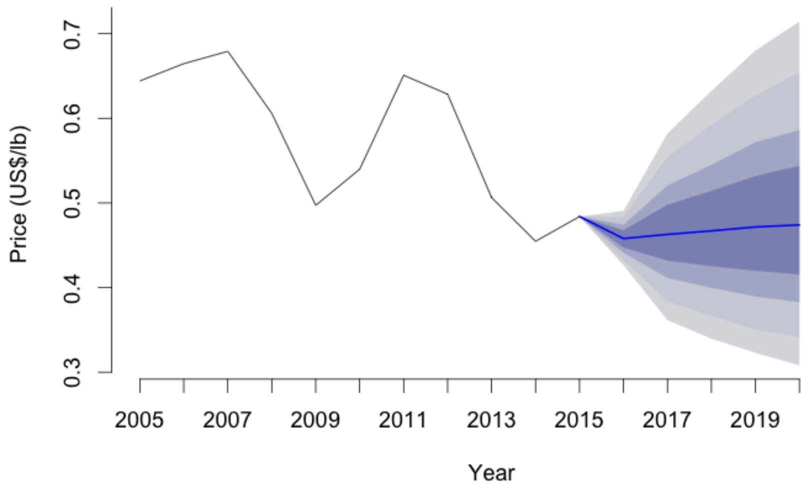

Figure 6.9: Yellowfin (BSAI) Head-and-gut Price Projections and Confidence Bounds

Table 6.10: Projected Mean, Probability Bounds of First-wholesale Yellowfin (BSAI) Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	0.43	0.43	0.44	0.45	0.46	0.46	0.47	0.47	0.48	0.49
2017	0.36	0.38	0.41	0.43	0.46	0.46	0.50	0.52	0.55	0.58
2018	0.34	0.37	0.40	0.43	0.47	0.47	0.51	0.54	0.59	0.63
2019	0.32	0.35	0.39	0.42	0.47	0.47	0.53	0.57	0.63	0.68
2020	0.31	0.34	0.38	0.42	0.47	0.48	0.54	0.59	0.65	0.71

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
12.60	14.74	13.12	14.19	13.09	13.52

Yellowfin Sole

In the BSAI the yellowfin sole fishery is the largest flatfish fishery by volume. In 2011 the fishery received MSC certification and in 2014 the multi-species Alaska flatfish fishery became RFM certified (Undercurrent, 2014f). Yellowfin sole is primarily exported to Asian markets and reports have indicated that demand is expected to increase with growth in the middle class population (AK Seafood Coop., 2012; Newsminer, 2012; Tradex, 2011). The yellowfin TAC is influenced by the 2 million ton groundfish cap in the BSAI. The TAC is not typically a binding constraint on the fishery, though industry may react to TAC changes. The supply of first-wholesale yellowfin sole products increased between 2010 and 2013 as catch rose 28%. Over this time, yellowfin H&G price increased in 2011 but fell to $ 0.45/lb in 2014. Catch decreased in 2015 as reductions in the TAC precluded harvests at 2014 levels, however, the fishery still only harvested 85% of the 2015 TAC and prices, while not high relative to recent history, were up from 2014. The decreased catch in BSAI flatfish fisheries was also related to poor fishing conditions early in the year and voluntary efforts to reduce Pacific halibut PSC at the request of the NPFMC.

The 2015 first-wholesale price for yellowfin sole H&G was $0.48/lb, an increase of $0.03/lb from 2014. This price is consistent withe the price projection from last year's report that estimated that prices would remain flat with 90% confidence bounds of $0.43/lb and $0.48/lb and a median of $0.46/lb. This year's projection for yellowfin sole H&G estimate a median price of $0.46/lb in 2016 with 90% confidence of $0.43/lb and $0.49/lb (Figure 6.9). Yellowfin sole is a species that has a distinct export definition and substantial share of production is exported. Projections for future prices show continued marginal increases going forward as prices revert back to the recent price levels.

Rock Sole

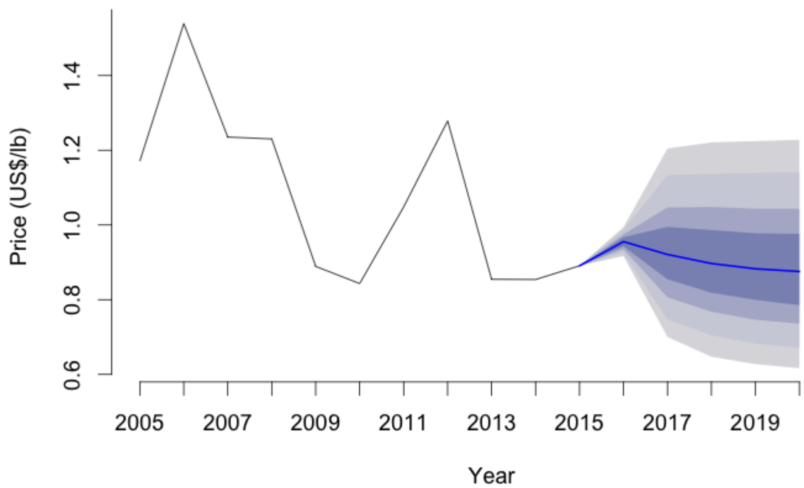

Figure 6.10: Rock-sole (BSAI) Head-and-gut-with-roe Price Projections and Confidence Bounds

Table 6.11: Projected Mean, Probability Bounds of First-wholesale Rock-sole (BSAI) Head-and-gut-with-roe Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	0.92	0.93	0.94	0.94	0.96	0.96	0.97	0.97	0.99	0.99
2017	0.70	0.75	0.81	0.85	0.92	0.92	0.99	1.05	1.13	1.20
2018	0.65	0.71	0.77	0.82	0.90	0.90	0.99	1.05	1.14	1.22
2019	0.63	0.68	0.75	0.80	0.88	0.89	0.98	1.04	1.14	1.22
2020	0.62	0.67	0.74	0.79	0.88	0.88	0.98	1.04	1.14	1.23

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
17.26	17.25	17.25	17.25	17.24	17.24

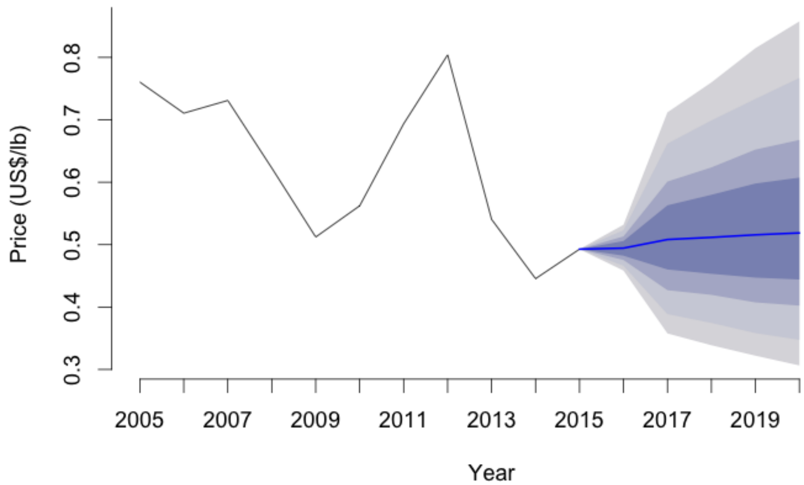

Figure 6.11: Rock-sole (BSAI) Head-and-gut Price Projections and Confidence Bounds

Table 6.12: Projected Mean, Probability Bounds of First-wholesale Rock-sole (BSAI) Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	0.46	0.47	0.48	0.48	0.49	0.49	0.51	0.51	0.52	0.53
2017	0.36	0.39	0.43	0.46	0.51	0.51	0.56	0.60	0.66	0.71
2018	0.34	0.37	0.42	0.45	0.51	0.51	0.58	0.62	0.70	0.76
2019	0.32	0.36	0.41	0.45	0.52	0.52	0.60	0.65	0.73	0.81
2020	0.31	0.35	0.40	0.44	0.52	0.52	0.61	0.67	0.77	0.86

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
22.52	21.74	22.40	22.61	22.69	22.74

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 6.10 and 6.11). H&G rock sole with roe is primarily sold to Japan and H&G without roe is primarily exported to China for secondary processing (Iquique, 2014). Some of the rock sole exported to China is filleted and re-exported to the U.S. (Pac. Seafoods, 2014). In 2012, the price for rock sole (H&G without roe) increased from the previous year because of strong demand in European markets and a supply shortage (Minato-Tsukiji, 2012b). Prices dropped in 2013 reverting back to roughly 2010 levels for both H&G with roe and H&G (without roe)products. The rock sole export definition does not distinguish between H&G with roe and H&G (without roe) which may reduce the accuracy of the product specific projections.

The price of rock sole H&G with roe in 2015 increased $0.04/lb to $0.85/lb. This was slightly below last year's median projected rock sole H&G with roe price of $0.89/lb and was well within the 90% confidence bounds of $0.81/lb and $1.00/lb. This year's rock sole H&G with roe price is projected to increase to $0.96/lb in 2015 with 90% confidence bounds at $0.92/lb and $0.99/lb (Figure 6.10).

The price projection for 2017 and beyond revert back to the 2014 price range, though confidence bounds are significant.

The rock sole H&G (without roe) price in 2015 decreased to \$0.04/lb to \$0.49/lb. This was above last year's median projected price of \$0.44/lb and was at the upper bound of the estimated 90% confidence bound which were \$0.40/lb and \$0.49/lb. This year's projections estimate the 2016 rock sole H&G (without roe) median price will remain unchanged at \$0.49/lb with confidence bounds ranging from \$0.46/lb to \$0.53/lb (Figure 6.11). The price projection for 2016 and beyond does not exhibit a significant trend and remains basically flat, though confidence are quite large.

Arrowtooth Flounder

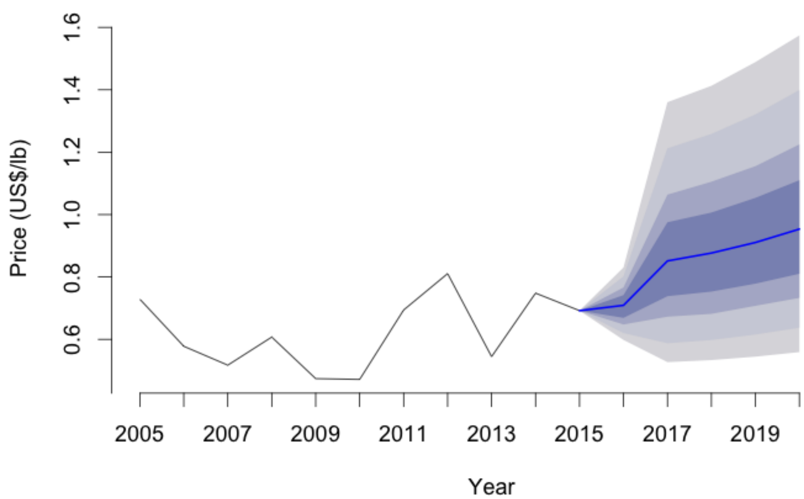

Figure 6.12: Arrowtooth Head-and-gut Price Projections and Confidence Bounds

Table 6.13: Projected Mean, Probability Bounds of First-wholesale Arrowtooth Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	0.60	0.62	0.65	0.67	0.71	0.70	0.74	0.77	0.80	0.83
2017	0.53	0.59	0.67	0.74	0.85	0.85	0.98	1.06	1.21	1.36
2018	0.53	0.60	0.68	0.75	0.88	0.88	1.01	1.11	1.26	1.41
2019	0.54	0.62	0.71	0.78	0.91	0.91	1.05	1.15	1.32	1.49
2020	0.56	0.64	0.73	0.81	0.95	0.96	1.11	1.22	1.40	1.57

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

Arrowtooth Head-and-gut Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
29.25	28.89	29.17	29.32	29.41	29.54

Arrowtooth flounder is harvested in both the BSAI and GOA. The implementation of Amendment 80 in 2008 expanded the fishing season, and enabled the fleet to find areas with arrowtooth in better condition. Arrowtooth is also the largest flatfish fishery in the GOA where it can show considerable year over year catch variability, in part because of regulatory changes. Typical landings range from

40 to 55 thousand tons per year. Until somewhat recently, low quality harvest left prices low until the discovery several food grade additives that are successfully used to inhibit enzymatic breakdown of the meat (ASMI, 2014b). The emergence of Chinese markets and advent of new technology have resulted in higher prices and have encouraged the arrowtooth directed fishery (AK Seafood Coop., 2010). Arrowtooth is export to China for its meat and is eaten as a less expensive flounder-type fish or where certain parts are used raw as sashimi or sushi in place of other, more expensive raw fish (SeaFood Business, 2011).

The arrowtooth flounder H&G price decreased slightly to \$0.69/lb in 2015. This was within last year's estimated 90% confidence bounds of \$0.66/lb and \$1.02/lb, and a median \$0.82/lb. This year's price projections for the arrowtooth H&G price have 90% confidence bounds of \$0.60/lb and \$0.83/lb with median of \$0.70/lb indicating that prices are expected to remain flat. 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.

Other Flatfish

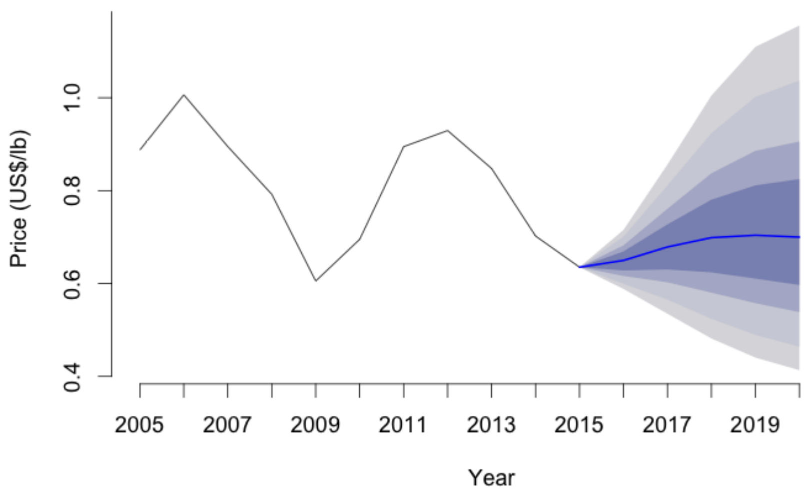

Figure 6.13: Flathead-sole Head-and-gut Price Projections and Confidence Bounds

Table 6.14: Projected Mean, Probability Bounds of First-wholesale Flathead-sole Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	0.59	0.60	0.62	0.63	0.65	0.65	0.67	0.68	0.70	0.72
2017	0.53	0.57	0.60	0.63	0.68	0.68	0.73	0.76	0.81	0.86
2018	0.48	0.52	0.58	0.62	0.70	0.70	0.78	0.84	0.92	1.00
2019	0.44	0.49	0.56	0.61	0.70	0.70	0.81	0.89	1.00	1.11
2020	0.41	0.46	0.54	0.60	0.70	0.70	0.82	0.91	1.04	1.16

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

Flathead-sole Head-and-gut Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
13.88	13.88	13.88	13.88	13.88	13.88

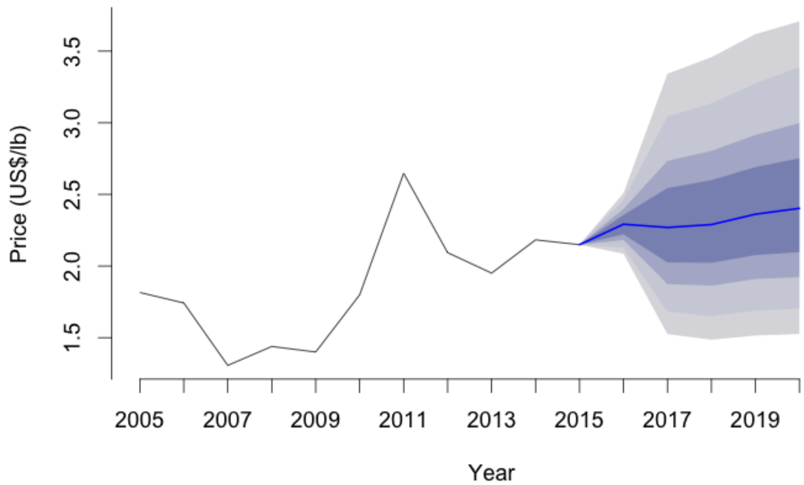

Figure 6.14: Greenland-turbot (BSAI) Head-and-gut Price Projections and Confidence Bounds

Table 6.15: Projected Mean, Probability Bounds of First-wholesale Greenland-turbot (BSAI) Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	2.09	2.13	2.18	2.22	2.29	2.29	2.36	2.40	2.46	2.51
2017	1.53	1.68	1.87	2.03	2.27	2.28	2.54	2.73	3.04	3.34
2018	1.49	1.65	1.86	2.02	2.29	2.30	2.60	2.80	3.13	3.46
2019	1.52	1.69	1.91	2.08	2.36	2.37	2.69	2.91	3.27	3.62
2020	1.53	1.71	1.92	2.10	2.40	2.41	2.75	3.00	3.39	3.71

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.

Greenland-turbot (BSAI) Head-and-gut Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
24.13	24.13	24.13	24.13	24.13	24.13

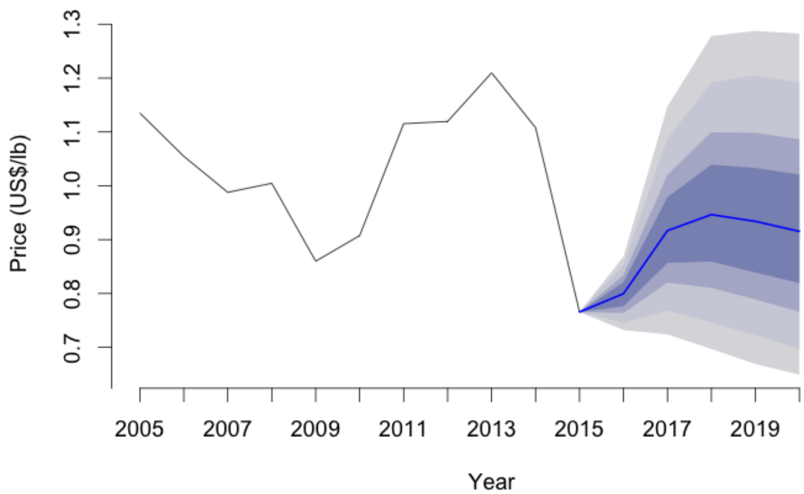

Figure 6.15: Rex-sole (GOA) Whole-fish Price Projections and Confidence Bounds

Table 6.16: Projected Mean, Probability Bounds of First-wholesale Rex-sole (GOA) Whole-fish Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	0.73	0.75	0.76	0.78	0.80	0.80	0.82	0.83	0.85	0.87
2017	0.72	0.77	0.82	0.86	0.92	0.92	0.98	1.02	1.09	1.15
2018	0.70	0.75	0.81	0.86	0.95	0.95	1.04	1.10	1.19	1.28
2019	0.67	0.72	0.79	0.84	0.93	0.93	1.03	1.10	1.20	1.29
2020	0.65	0.70	0.77	0.82	0.92	0.92	1.02	1.09	1.19	1.28

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.

Rex-sole (GOA) Whole-fish Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
13.71	13.47	13.56	13.57	13.57	13.53

The market shares for other flatfish fisheries are comparatively smaller. These include flathead sole, greenland turbot and rex sole. Export definitions are not specific to these species (with the exception of greenland turbot) hence nowcasts are primarily made using a non-specific aggregate flatfish export price. Among the various flatfish species, year-over-year prices move in different directions complicating the use of a coarse of non-specific flatfish export price for estimating first-wholesale prices as consistently and robustly as projections for species where there is a large active market (like yellowfin sole or rock sole). Information on recent exchange rates and predicted production bases on TACs was incorporated when it increased predictability. Finally, current media reports on the activity in these fisheries are scarce or non-existant, making it difficult to evaluate the price projections. Price projections are included here to provide the best available estimates of prices given the information available.

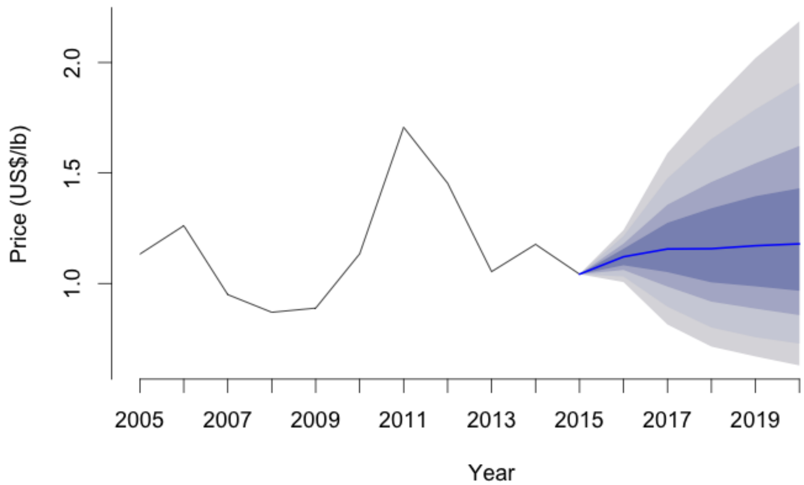

Figure 6.16: Rockfish Head-and-gut Price Projections and Confidence Bounds

Table 6.17: Projected Mean, Probability Bounds of First-wholesale Rockfish Head-and-gut Prices (US$/lb)

	Lower						Upper			
	5%	10%	20%	30%	Mean	Median	70%	80%	90%	95%
2016	1.01	1.03	1.06	1.08	1.12	1.12	1.16	1.18	1.21	1.24
2017	0.81	0.90	0.99	1.05	1.16	1.16	1.27	1.36	1.48	1.59
2018	0.71	0.80	0.92	1.01	1.16	1.17	1.34	1.46	1.65	1.82
2019	0.67	0.76	0.89	0.99	1.17	1.18	1.39	1.54	1.79	2.02
2020	0.63	0.73	0.86	0.97	1.18	1.18	1.43	1.62	1.91	2.19

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 Return Volatility Projections

Hist. Avg.	2017	2018	2019	2020	Long-run
19.82	19.89	19.90	19.92	19.94	18.83

6.4.6 Rockfish

Rockfish fisheries have historically been aggregated into a species complex in this report (e.g. Table 25). Consistent with the current presentation of economics data in this report, price projections are made for aggregate first-wholesale prices of the aggregate rockfish complex. Species within the complex include northern rockfish, Pacific Ocean perch, rougheye rockfish, shortraker rockfish, dusky rockfish and thornyhead rockfish. Like the other flatfish (Section 6.4.5), the mismatch between the first-wholesale product definition and the export definition potentially complicates the estimation of first-wholesale prices for these species as consistently and robustly as projections for species where there is a large active market (like pollock or cod). The only rockfish species defined in the export data is Pacific Ocean perch (POP) which is used to project current first-wholesale prices for the aggregate rockfish complex. POP constitues the largest share of catch and value in the Alaska rockfish fisheries. While the POP export price is a significant predictor, because of the definition mismatch, it's possible that movement in the POP export price differs from the movement in prices for the aggregate rockfish complex. However, estimated confidence bounds for 2016 are moderate ranging from ±10% of the projected first-wholesale rockfish price. Current media reports on the activity in these fisheries is scarce making it difficult to evaluate the price projections. Price projections are included here to provide the best available estimates of prices given the information available.

First-wholesale rockfish H&G prices were $1.04/lb in 2015. This was outside the last year's 95% confidence bounds of $1.09/lb and $1.31/lb. Projections for the 2016 price have 90% confidence bounds of $1.01/lb and $1.24/lb with a median of $1.12/lb indicating that 2016 prices will likely show an increase.

6.5. Acknowledgments

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7. WHOLESALE MARKET PROFILES FOR ALASKA GROUNDFISH

The Alaska Groundfish Wholesale Market Profiles (forthcoming) 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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7.1. Executive Summary

This section of the *Economic Status Report of the Groundfish Fisheries off Alaska, 2014* 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, and rock sole. The full Profiles report contains more extensive analysis and covers additional species and products not contained here, including Pacific halibut, Atka mackerel Pacific Ocean perch, 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.

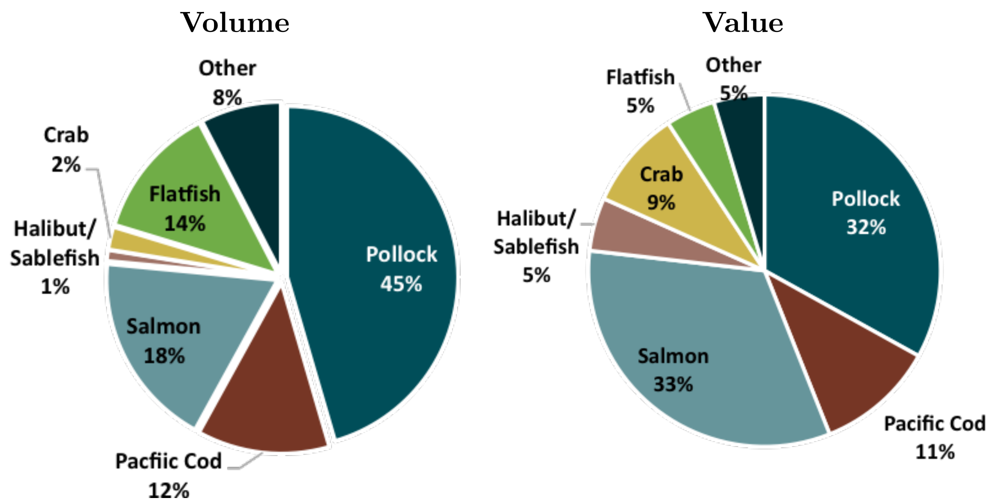


Figure 7.1: Composition of Total First Wholesale Volume and Value for Alaska Seafood, by Species, 2014.
Source: AKFIN.

The fisheries off the coast of Alaska are by far the most productive in the nation, accounting for 60 percent of total U.S. commercial fishery harvest volume. In 2014, total first wholesale production of 1.28 million metric tons of all Alaska species combined was valued at $4.27 billion.[1] The majority of Alaska seafood is exported, with overall exports estimated at 1.12 million metric tons valued at $3.28 billion. Alaska groundfish and crab species accounted for 78 percent of Alaska's total wholesale production volume in 2014, and 66 percent of the wholesale value.

In 2014, the BSAI region produced 86 percent of statewide total wholesale groundfish production volume and 83 percent of the value. The GOA region (including Southeast Alaska) produced 13 percent of total wholesale groundfish production volume and 16 percent of the value.

[1]See glossary defining first wholesale volume and value and other terms commonly used in this report.

Seafood processors use Alaska groundfish and crab species to produce a mix of product types. The majority of these products are considered intermediate products, which undergo secondary processing outside Alaska to create finished products for retail and food service buyers around the world. Figure 2 summarizes first wholesale production volume and value of key groundfish and crab products by general product.

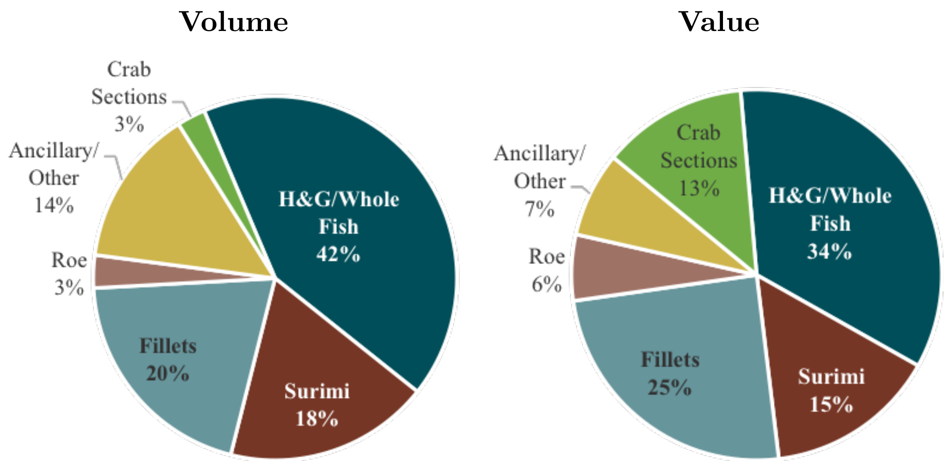


Figure 7.2: Composition of Total First Wholesale Volume and Value of Alaska Groundfish and Crab, by Product Type, 2014.
Source: AKFIN.

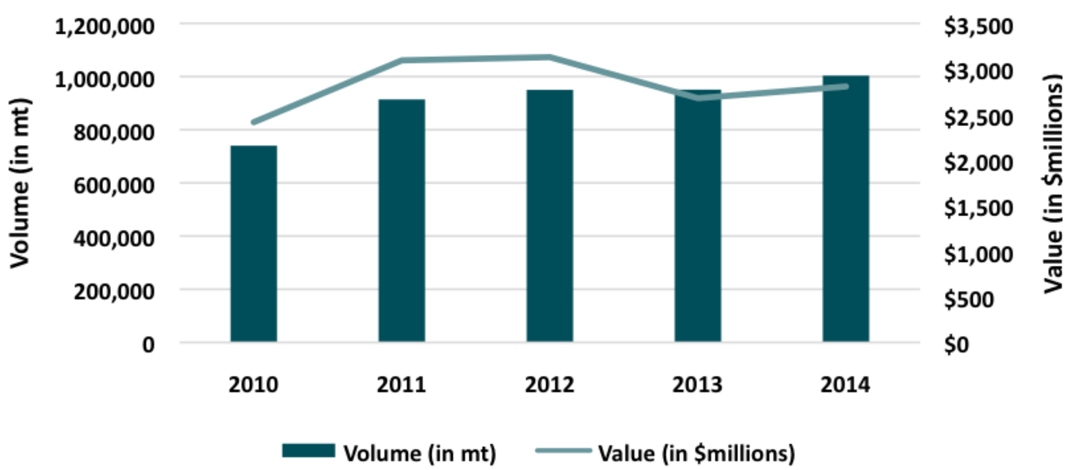


Figure 7.3: First Wholesale Volume and Value of Alaska Groundfish and Crab Species, 2010-2014.
Source: AKFIN.

The total value of Alaska groundfish and crab has remained steady over the last five years based on available data (2010-2014, see Figure 2). Unit values for each species category are shown in Table 7.1. Changes in value per metric ton are the result of numerous factors, summarized below and examined in greater detail in the rest of this section.

Table 7.1: Average First Wholesale Value per Metric Ton, 2010-2014.

	2010	2011	2012	2013	2014	2014 Pct. Change from Average
Alaska Pollock	$2,906	$2,772	$2,874	$2,443	$2,384	-13%
Pacific Cod	$3,042	$3,484	$3,154	$2,735	$3,033	-2%
Yellowfin Sole	$1,154	$1,400	$1,387	$1,287	$1,043	-20%
Rock Sole	$1,368	$1,705	$1,990	$1,333	$1,290	-19%
Pacific Halibut	$14,659	$17,693	$15,508	$14,419	$17,194	10%
Sablefish	$15,247	$19,220	$14,316	$12,250	$14,577	-4%
Pacific Ocean Perch	$2,459	$3,560	$3,137	$2,259	$2,578	-10%
Atka Mackerel	$1,861	$2,292	$2,480	$2,705	$3,561	53%
Snow Crab	$7,277	$12,054	$10,559	$11,052	$11,650	14%
King Crab	$25,273	$32,573	$27,144	$24,370	$23,968	-12%

Source: AKFIN.

Key Markets for Alaska Groundfish and Crab

The U.S., Europe, and Japan are the largest markets for finished products derived from Alaska groundfish and crab, typically accounting for more than 80 percent of first wholesale value. Approximately one-third of the production volume is reprocessed in China and re-exported to markets in Europe, the U.S., and Japan. A significant percentage of product exported to South Korea is held in cold storage facilities or secondarily processed and re-exported to Japan and Europe (Table 7.2).

Table 7.2: Primary Sales of First Wholesale Alaska Groundfish and Crab Products by Market, Estimated Annual Average Volume and Value, 2010-2014.

Market	First Wholesale Value ($Millions)	Pct. of Market Share (Value)	Sales Volume (mt)	Pct. of Market Share (Volume)
China*	$615	22%	281,533	33%
Japan	$454	16%	144,936	17%
Europe	$495	17%	168,026	19%
South Korea*	$313	11%	108,432	13%
Other Countries	$220	8%	60,030	7%
Export Markets Total	**$2,097**	**74%**	**762,957**	**88%**
Est. Domestic Market	**$736**	**26%**	**99,779**	**12%**

Notes: *Primarily re-export markets.

Source: AKFIN, ADF&G (COAR), ASMI Alaska Seafood Export Database, and McDowell Group estimates.

The Alaska species profiled in this report represent a significant percentage of the global seafood trade between developed nations; however, most species face market competition from fisheries in other countries. Table 7.3 summarizes first wholesale production volume and value of Alaska groundfish and crab products, the percent of global production volume, and key initial markets for each species.

Table 7.3: Alaska Groundfish and Crab Production and Market Summary, 2014.

Species/Product	First Wholesale Value ($Millions)	Alaska Production Volume (mt)	Pct. of Global Harvest (2013)	Key Markets
Alaska Pollock	$1,384	580,449	43%	Japan
Pacific Cod	$469	154,584	18%	China*
Flatfish	$216	175,919	32%	China*
Pacific Halibut	$109	6,159	57%	U.S.
Sablefish	$98	6,696	78%	Japan
Atka Mackerel	$74	20,892	19%	Japan
Rockfish	$85	32,383	28%	China*
King Crab	$117	4,870	15%	U.S.
Snow Crab	$233	20,023	15%	U.S.

Notes: *Denotes re-export market.

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

Current Market Issues

The value of Alaska groundfish and crab is affected by a range of market forces. The market profiles contain more detailed analysis about how these forces impact the value of Alaska production; noteworthy market factors are summarized by species below.

Alaska Pollock

- MSC certification of Russia's largest pollock fishery has depressed prices for pollock fillets in Europe, where certification is required by many large retailers.
- Increasing production volume and changing consumer preferences in Japan have negatively affected prices for pollock roe - an important high margin product for Alaska pollock producers.
- Prices for Alaska pollock surimi blocks are trending up, due to lower production of competing products.

Pacific Cod

- Traditionally, markets in Europe substituted Pacific cod for declining Atlantic cod stocks. In recent years, Atlantic cod production has rebounded. Larger supplies of competing product and protective tariffs in the EU have made it more difficult for Pacific cod to compete.

Halibut and Sablefish

- Halibut and sablefish processors have noted that moving inventory is not a problem due to high demand. Prices have reflected lower TACs for both species.
- Prices for halibut and sablefish peaked in 2011, but remain high. Sablefish, traditionally sold almost exclusively to Japanese buyers, has seen increased demand from other markets.

Flatfish

- Wholesale prices for primary Alaska products have been negatively affected by a weaker euro and rising secondary processing costs in China.
- Alaska flatfish compete with many different whitefish species. Globally, flatfish and other competing whitefish production is up in recent years, putting downward pressure on prices for Alaska sole.

Pacific Ocean Perch and Atka Mackerel

- Declining harvests of Atka mackerel in Japan have pushed up prices for product coming out of Alaska.
- Pacific Ocean Perch and other rockfish species are commonly reprocessed in China and exchange rates have decreased demand for the raw material from Alaska.

Crab

- The largest impact on market demand for crab from Alaska has been linked to changes in IUU fishing from Russia, which has historically produced a large volume of illegal crab. King crab prices are most responsive to total Russian production volume, but snow crab prices are also affected.

Implication of Currency Exchange Rates

In addition to the market issues described above, prices for Alaska products have been negatively impacted by a stronger U.S. dollar in recent years. A stronger dollar, relative to the currencies of key export markets and competing suppliers, generally makes Alaska seafood more expensive and competing product less expensive from foreign consumers' point of view. Over the past five years, 88 percent (by value) of the state's groundfish and crab production was sold to export markets - primarily in Europe and Japan.

Table 7.4 summarizes changes in foreign currency rates for key buyers and major competitors, versus the U.S. dollar, between 2013 and 2015. Exchange rates vary from year to year, but movements of this magnitude are unusual. Unfortunately, the situation has swiftly altered the bargaining position of Alaska producers.

7.2. Global Groundfish Production & Key Markets

Alaska Groundfish Production and Market Summary

Table 7.5 summarizes production volume, value, key markets, and the percentage of global production for Alaska groundfish species and products. Overall, the largest markets for Alaska groundfish are Europe, Japan, and the United States. Although Alaska accounts for a significant share of production for many groundfish species, the state produced only 2.9 percent of global whitefish and other marine fish harvests in 2013.

Table 7.4: Changes in Relevant Currency Exchange Rates, October 2013 vs. October 2015.

Country/Market	Currency	Primary Role	Pct. Change vs. U.S. Dollar
European Union	Euro	Buyer	-17.6%
Japan	Yen	Buyer	-18.6%
Canada	Canadian Dollar	Buyer	-20.8%
Russia	Ruble	Competitor	-49.2%
Norway	Kroner	Competitor	-28.1%
U.S. Dollar Index (value relative to a basket of foreign currencies)			**+20.9%**

Source: OANDA Average Foreign Exchange Rates and Investing.com DXY historical data.

Table 7.5: Alaska Groundfish Production and Market Summary, 2014.

Species-Product	First Whole-sale Value ($Mill.)	Alaska Production (mt)	Pct. of 2013 Global Production	Key Markets		
Pollock-Fillets	$551	183,970	30%	Europe	U.S.	Brazil
Pollock-Surimi	$421	183,641	23%	Japan	Europe	Korea
Pollock-Roe	$151	24,117	*N/A*	Japan	Korea	–
Pacific Cod	$469	154,584	18%	China*	Europe	U.S.
Flatfish	$216	175,919	32%	China*	U.S.	Europe
Pacific Halibut	$109	6,159	57%	U.S.	Canada	–
Sablefish	$98	6,696	78%	Japan	China	U.S.
Atka Mackerel	$74	20,892	19%	Japan	China*	Korea
Rockfish	$85	32,383	28%	China*	Japan	U.S.

Notes: *Denotes re-export market. Alaska harvest/production volume from 2013 was compared to 2013 global harvest/production estimates. Global harvest/production data for 2014 is not yet available.

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

Global Whitefish and Other Marine Fish Production

Whitefish generally refers to cod, pollock, haddock, hake, whiting, and benthic flatfish species, such as sole, plaice, flounder, and halibut. These species -primarily caught in wild fisheries- also compete in global seafood markets with notable aquaculture species such as tilapia and pangasius. Depending on the market, the scope of these whitefish species may be narrowed or supplemented with other local varieties. Although global fisheries produce significant volumes of whitefish, there are many other marine species with significant harvest volumes (referred to here as "other marine fish species.") .

Capture fisheries and aquaculture production yielded 74 million metric tons of whitefish and other marine fish species in 2013 (round weight terms) (Table 7.6). The majority of production is used for meat, but fish meal, fish oil, and surimi production also utilize significant volumes of wild marine fish species. Fish meal and fish oil production required 16.3 million metric tons of wild capture fish species in 2012; however, about 35 percent of fish meal production was created using fish residues (ancillary products and waste rather than whole fish).[2]

[2] (Green, 2014)

Table 7.6: Global Whitefish and Other Marine Fish Species Production, in Metric Tons, 2013.

Species	Harvest Volume (mt)	Primary Uses
Alaska Pollock	3,239,719	Meat, Surimi, Meal/Oil
Hakes, Hoki, and Whiting	2,209,131	Meat, Surimi, Meal/Oil
Cod and Haddock	2,169,226	Meat
Other Flatfish (Sole/Flounder/etc.)	882,063	Meat
Saithe	318,371	Meat
Other Whitefish	221,986	-
Halibuts and Turbots	157,824	Meat
Total Wild Whitefish (Capture Fisheries)	**9,198,320**	**-**
Anchovies, Shads, and Menhaden	9,411,729	Meal/Oil
Herring and Sardines	8,056,155	Meal/Oil, Meat, Roe, and Bait
Mackerel and Saury	5,716,215	Meat and Meal/Oil
Jacks, Scads, and Carangids	2,582,584	Meat and Meal/Oil
Other Coastal Species	2,556,069	-
Eels, Congers, and Hairtails	2,439,811	Meat and Surimi
Croakers and Drums	1,761,530	Meat and Bait
Breams, Lizardfish, and Pomfrets	1,539,437	Surimi and Meat
Mullets and Goatfish	778,322	Meat
Capelin	758,735	Roe and Meal/Oil
Other Demersal Species	590,858	-
Other Pelagic Species	529,231	-
Groupers and Seabass	317,542	Meat
Snappers	264,286	Meat
Rockfish	213,337	Meat
Atka Mackerels	130,448	Meat
Mahi-mahi (Dolphin)	102,986	Meat
Monkfish	92,768	Meat
Sablefish and Patagonia Toothfish	46,508	Meat
Other Misc. Species - Capture Fisheries	20,422,968	-
Total Other Marine Species	**58,311,519**	**-**
Tilapias (Farmed)	4,823,312	Meat
Pangasius (Farmed)	1,671,825	Meat
Total - Tilapias and Pangasius	**6,495,137**	**-**
Total Whitefish and Other Marine Species	**74,004,976**	**-**
Total Alaska Groundfish Harvest (2013)*	**2,169,200**	**Pct of Total: 2.9%**

Notes: *Includes herring harvests, to make the figure more comparable to the broader range of groundfish included in the table.
Red-fleshed fish species (e.g. tuna) and diadromous fish (e.g. salmon) are not included in these figures.

Source: FAO, compiled by McDowell Group.

The vast majority of fish shown in Table 7.6 produce white fillets, and could represent a substitute for key Alaska species on a general level. However, culinary traditions and local tastes tend to limit the number of species palatable to individual markets. For example, cod is a staple fish in Europe but virtually non-existent in Southeast Asia, where it would be more common to find carp or milkfish filling the whitefish role. Cost is always a primary concern as well. Consumers generally will not substitute imported whitefish species for less expensive and traditionally palatable domestic species. There are also significant differences in the way different cultures prepare whitefish. Countries in emerging markets are generally more likely to cook fish whole while developed countries tend to use fillets or steaks. Differences in availability, price, taste, and fish size limit actual consumer substitution, despite the fact that most species listed in Table 7.6 could generally be categorized as white-fleshed fish.

Alaska's Position in the Global Whitefish Market

Alaska accounted for 2.9 percent of global whitefish and other marine fish production volume in 2013. However, wild whitefish species, representing the majority of Alaska's groundfish harvest, only accounted for 12.4 percent of total production in 2013. Alaska plays a bigger role in global production if the whitefish scope is narrowed to wild and farmed whitefish species (i.e. tilapias and pangasius). In 2013, Alaska production accounted for 13.5 percent of global wild and farmed whitefish production, a substantial figure in a global context.[3] This is a notable comparison because wild whitefish species, such as cod, pollock, and sole, as well as farmed tilapias and pangasius, are more likely to be exported than other wild fish species, which are mainly sold into domestic markets or transformed into fish meal, fish oil, or surimi.

Alaska's commercial fisheries produce larger harvests than every other U.S. state combined and 80 percent of Alaska's harvest volume came from high-volume whitefish fisheries (pollock, cod, and flatfish) in 2013. Despite the impressive scale of its high-volume whitefish fisheries, Alaska is only a fractional part of global whitefish production. As a result, Alaska's groundfish industry is a usually a price taker, where the value of its cod, pollock, and flatfish are impacted by competing suppliers and competing whitefish species. Russia (cod/pollock/flatfish), China (tilapia), Norway (cod), Japan (pollock/cod), New Zealand (hoki), and Vietnam (pangasius) are the biggest competitors for Alaska's groundfish industry, in terms of high-volume whitefish species.

Low volume Alaska whitefish species like halibut, sablefish, rockfish, and Atka mackerel have much more defined markets where Alaska is the primary export supplier and generally account for a larger percent of global supply in these niche markets. As a result, species substitution is less common in markets for these species and price is mostly a function of Alaska or local harvest volume.

Tradition, taste preferences, and familiarity are hurdles in developing new markets for Alaska groundfish species. However, culinary influences are blending and crossing borders faster than perhaps any other time in human history. Modern urban centers, from Singapore, Sao Paulo, San Francisco, Sydney, to Seoul, provide a growing supply of unique seafood options. Expanding culinary options presents new marketing opportunities for Alaska's seafood industry, particularly since Alaska has a reputation for quality and a strong distribution network, having been in the business of exporting fish for decades. However, it may also present challenges in existing markets in years to come as consumers gain more exposure to seafood from other cultures.

[3]Whitefish in this comparison includes tilapia, pangasius, cod, haddock, pollock, hakes, hoki, whiting, flatfish, and other wild cod-like groundfish species.

Summary of Key Alaska Groundfish Markets

Export markets buy about 90 percent of Alaska groundfish meat products, and an even larger percentage of surimi, roe, and ancillary groundfish products are exported. China is the largest wholesale market for meat products, accounting for 44 percent of estimated sales volume in 2014 (see Table 7.7). However, with the exception of sablefish, the vast majority of Alaska groundfish exported to China is re-exported to Europe, the U.S., and Japan. Europe is the largest overall market for Alaska groundfish, due to the high volume of pollock and cod which eventually enters European markets. Japan is likely the second largest market followed by the United States, in terms of final sales volume.

Table 7.7: Wholesale Sales of Alaska Groundfish Meat Products, in Metric Tons, 2014.

Species	Wholesale Production	U.S. (Est.)	Europe	China	Japan	Other	Total Exports
Alaska Pollock	252,809	39,961	137,209	53,390	4,512	17,737	212,848
Pacific Cod	134,206	30,394	20,975	57,195	16,571	9,071	103,812
Flatfish	167,185	40,045	717	107,486	5,356	13,581	127,140
Rockfish	32,192	8,390	58	15,566	6,861	1,317	23,802
Atka Mackerel	20,888	1,361	15	3,741	12,627	3,144	19,527
Sablefish	6,696	593	173	559	4,648	723	6,103
Pacific Halibut	6,159	4,093	0	16	0	2,050	2,066
Unknown Species	-	-58,740*	310	36,950	7,401	14,079	58,740
Total	**620,134**	**66,096**	**159,457**	**274,903**	**57,976**	**61,702**	**554,038**
Pct. of Total	**-**	**11%**	**26%**	**44%**	**9%**	**10%**	**89%**

Notes: Wholesale production of high-volume whitefish species only includes whole fish, H&G, and fillet production. Virtually all halibut and sablefish consists of edible products.

*Unknown species likely represent exports of Alaska flatfish and other high-volume whitefish species, this non-specific volume is debited from estimates of U.S. sales.

Source: AKFIN, ADF&G (COAR), and ASMI Alaska Seafood Export Database.

7.3. Alaska Pollock Product Market Profiles

Alaska pollock or walleye pollock[4] (gadus chalcogrammus) is currently the largest single species fishery in the world, with stocks concentrated in the North Pacific Ocean. Pollock are commercially harvested by several countries, but Alaska and Russia are the largest producers by a wide margin. Alaska pollock harvests are large on a national scale, accounting for 33 percent of total U.S. commercial fishery landings and 14 percent of wholesale production value in 2014.

Pollock is the single most valuable and plentiful species in Alaska's seafood industry, accounting for 45 percent of production volume and 32 percent of first wholesale value in 2014. Alaska 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 markets. Table 7.8 summarizes some of the key statistics in the Alaska pollock fishery from 2014.

Table 7.8: Summary Profile of Alaska Pollock Wholesale Production and Markets, 2014.

Value and Volume		Key Products	Fillets	Surimi	Roe	H&G	Other
First Wholesale Production (mt)	580,400	% of Value	40%	30%	11%	7%	12%
Pct. of Global Pollock Harvest (2013)	43%	Key Markets	Japan	Europe	US	Korea	Other
First Wholesale Value ($millions)	$1,384	% of Final Sales	36%	40%	11%	6%	6%
Pct. Change from Prior 4-yr Avg.	3.7%	YoY Change	24%	11%	*N/A*	12%	*N/A*
Pct. of Alaska Groundfish/Crab Value	49%	Competing Species: Russian Pollock, hake, hoki, tropical surimi, & cod.					

Alaska Pollock Wholesale Production and Value

Pollock is one of the most valuable fisheries in Alaska, due to its tremendous volume, production versatility, and white, mild-flavored flesh. In total, Alaska pollock accounted for 58 percent of Alaska's groundfish/crab production volume and 49 percent of first wholesale value in 2014. Virtually all edible pollock products are frozen before being sold into wholesale markets. Alaska pollock harvests yielded 580,400 mt of processed product in 2014, with a first wholesale value of $1.38 billion.

Alaska pollock yield five primary product types: surimi, fillets, head/gut, roe, and fish meal/oil. In 2014, of the 580,400 mt of pollock products produced, 184,000 mt were used in fillets, 183,600 mt in surimi, 67,200 mt in H&G, 24,100 mt in roe, and other products (including fish meal, minced meat, and fish oil) adding up to 121,600 mt (Table 7.9). Fish meal, oil, and other ancillary are discussed in greater detail in the forthcoming Alaska Groundfish Wholesale Market Profiles report. Fillets are usually the most valuable product, with surimi a close second. Together fillets and surimi accounted for 70 percent of Alaska pollock's first wholesale value in 2014. Although roe is only 4 percent of the production volume, it accounts for 11 percent of the fish's value and used to be a more valuable piece of the pie. Fish meal/oil, minced meat, and other ancillary products account for 12 percent of the value, while head/gut production is 7 percent.

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

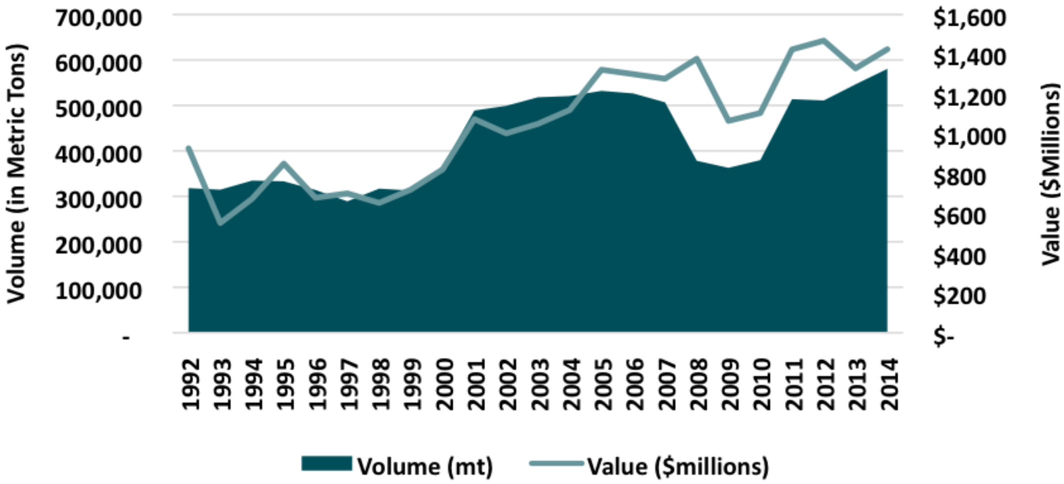


Figure 7.4: First Wholesale Volume and Value for Alaska Pollock, 1992-2014.
Source: AKFIN.

Table 7.9: Production Volumes and Recovery Rates for Common Alaska Pollock Products, 2014.

	2014 Production Volume (in mt)	2014 Production Value (in $000s)	Recovery Rate Range Pct. from Round Weight	Average Price per Kilo
Fillets	184,000	$551,100	20-35%	$3.31
Surimi	183,600	$419,200	20-30%	$2.28
Head and Gut	67,200	$84,100	52-72%	$1.25
Roe	24,100	$148,700	*1.2-1.9%	$6.17
Other Products	121,600	$165,300	-	$1.36
Total Production	**580,400**	**$1,383,700**	**41%**	**-**
Total Retained Harvest	**1,426,800**	**-**	**-**	**-**

Notes: Production volume is shown in product-weight terms.
*Actual range of roe recovery rate from 2010 to 2014 compared to total harvest volume; however, recovery rates can vary significantly depending on when fish are harvested - from virtually zero percent to eight percent.

Source: AKFIN, industry interviews, and Crapo, 2013.

Roe typically has the highest profit margin per unit of production. Its current price levels are at historic lows at $6.24 per kilo. In comparison, fillets and surimi have first wholesale prices of $3.00 and $2.29 per kilo, respectively.

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 is turned into fish meal/oil or retained for other niche markets. Pollock meat is generally used to make either surimi or fillets. The fillet supply chain is summarized in Figure 7.5.

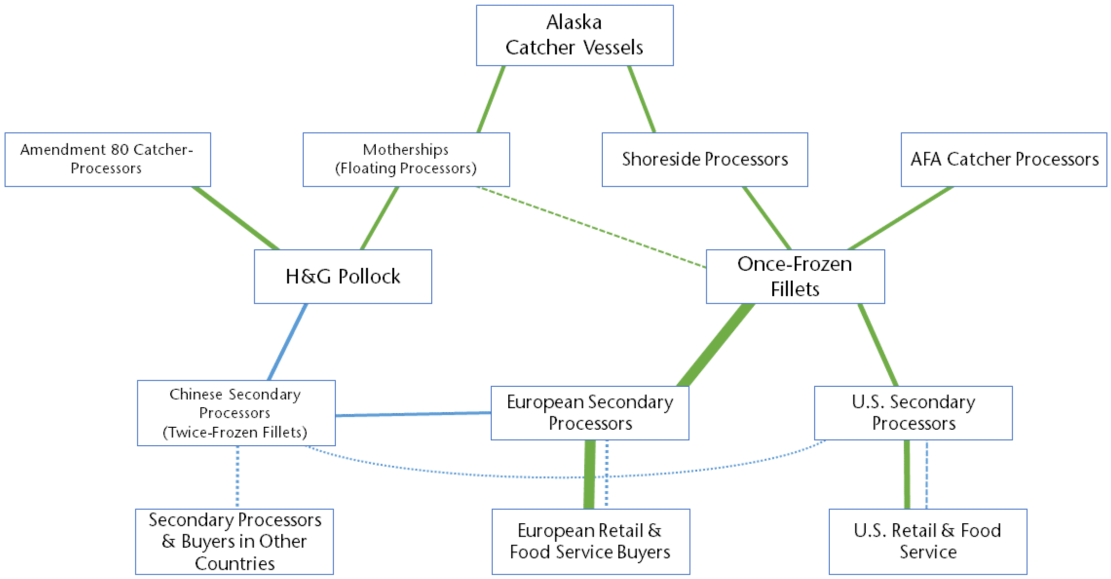


Figure 7.5: Alaska Pollock Fillet Supply Chain.
Notes: The diagram above depicts the movement of major product volumes, and does not reflect supply channels for smaller volumes of product.

7.3.1 Alaska Pollock Fillets Wholesale Market Profile

Fillets accounted for 40 percent of the total Alaska pollock production value in 2014. Pollock fillets function as a whitefish commodity for fish sticks/fingers, patties, and other value-added frozen whitefish fillet products. The two primary markets for fillets are Europe and the U.S. Prices have trended downward in recent years due to increased supply and a stronger U.S. dollar (Figure 1.1).

Alaska Pollock Fillet Product Description

Alaska pollock fillets are produced primarily by catcher-processors and shoreside production facilities. These Alaska producers manufacture once-frozen products. 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 often re-frozen after processed, 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. Whether the fish is processed in Alaska or abroad, the primary processing forms are skinless fillets and deep-skinned fillets. Deep-skinned fillets are skinless/boneless fillets with a deeper cut below the skin to remove the fat line resulting in a whiter fillet.

The average commercially harvested Alaska pollock weighs two pounds and yields fillets ranging from two to four ounces. The majority of Alaska pollock fillets are processed into frozen blocks of skinless or deep-skinned fillets, due to the long slender fillet shape of pollock. Fillets are also packaged as individually quick frozen (IQF) portions or shatterpacks (blocks of frozen fillets with each fillet separated by plastic).

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.

Alaska Pollock Fillet Production Analysis

Fillets accounted for 32 percent of all Alaska pollock production volume in 2014. Skinless/boneless fillets account for the majority of production. Deep-skinned fillets are the next most common product. In 2014, 74 percent of pollock fillets produced in Alaska were skinless fillets without ribs, while deep-skinned fillets accounted for 24 percent of production volume. Fillet production has grown in recent years, generally tracking increases in harvest volume.

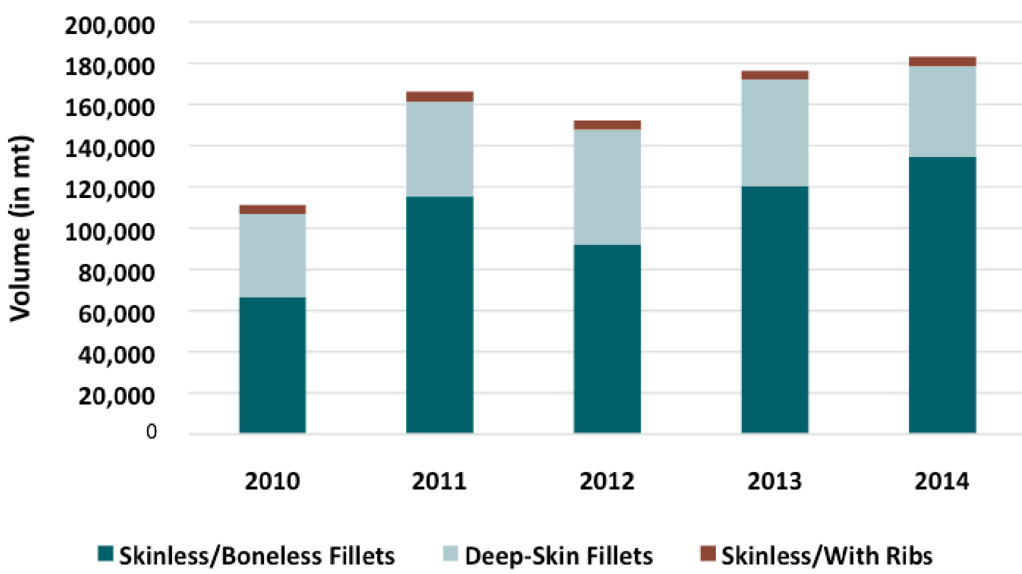


Figure 7.6: Alaska Pollock Fillet Production Volume, in Metric Tons, 2010-2014. **Source:** AKFIN.

Alaska Pollock Fillet Key Market Analysis

Export markets are critically important to Alaska's pollock industry. It is estimated that export markets buy approximately two-thirds of all Alaska pollock fillet production. More than half of all Alaska pollock fillets go directly to European markets (Table 7.10). In addition, the majority of Alaska pollock fillets exported to China are eventually re-exported to Europe. Germany is the largest single market for Alaska pollock fillets while the U.S. is the second-largest market.

The percentage of Alaska pollock fillet production exported directly to Europe increased to 65 percent in 2014, from 58 percent in the previous year. Due to a lack of data, sales to the domestic market must be estimated by subtracting production from exports. These estimates suggest domestic

Table 7.10: Sales of Alaska Pollock Fillets to Key Markets, in Metric Tons, 2010-2014.

Market	2010	2011	2012	2013	2014	Pct. of Total (5yr. Avg.)
Europe[1]	59,576	96,133	85,114	102,330	119,809	59%
China*	12,479	11,238	8,802	4,632	4,526	5%
South Korea*	6,907	3,374	1,602	848	839	2%
Other Countries	2,644	3,226	4,404	7,078	7,078	3%
Total Exports	**81,605**	**113,971**	**99,921**	**114,888**	**132,252**	**69%**
U.S. (Estimated)[2]	29,886	52,956	52,629	61,829	51,718	31%
Total Production	**111,491**	**166,927**	**152,550**	**176,717**	**183,970**	**-**
Est. Production to Export Markets	**73%**	**68%**	**66%**	**65%**	**72%**	**-**

Notes: *Denotes countries which primarily re-process and/or re-export product to other markets.
[1] Does not include Russia, Ukraine, or some minor European markets.
[2] Estimated based on annual production less calendar year exports.
Data pertains to primary exports only, does not portray product which may be re-exported to other markets.
Source: NMFS Trade Data, ASMI Alaska Seafood Export Database, and McDowell Group estimates.

market purchases increased significantly in 2011; however, given the sharp increase in production it is likely that some of that year's volume went into inventory and was sold the following year.

Europe

Europe is the world's largest market for pollock fillets and is also the largest market for any Alaska groundfish or crab product, in terms of first wholesale value. European countries account for 80 to 90 percent of all U.S. pollock fillet export value. European markets imported 119,809 mt of Alaska pollock fillets in 2014, worth $348 million. Pollock fillets are generally exported to Europe as frozen fillet blocks and are utilized as a whitefish commodity, primarily functioning as raw material for secondary processors. Although it is not possible to quantify precisely, industry interviews suggest pollock fillets are more often sold to European consumers via retailers, with less production entering the foodservice sector. Europe has a long history of whitefish consumption, so the presence of pollock as an affordable substitute to cod is common in most countries.

Alaska pollock fillets are primarily exported to Europe via Germany and the Netherlands. Germany's Hamburg and the Netherlands' Rotterdam are major ports. Overall, these two countries accounted for nearly 90 percent of total Alaska pollock fillet exports to European markets in 2014. The total volume and value of Alaska pollock fillets exported to Europe has increased substantially in recent years; however, the export value/mt was down 16 percent in 2014 compared to 2010.

Alaska single-frozen pollock fillets accounted for about a third of all pollock fillets imported into Europe, over the past five years (2010-2014, See Table 7.10). However, Alaska's market share increased to 39 percent in 2014. The balance comes from China, mostly re-processed, twice-frozen fillet block made from Russian pollock, or directly from Russia as a single-frozen fillet blocks.

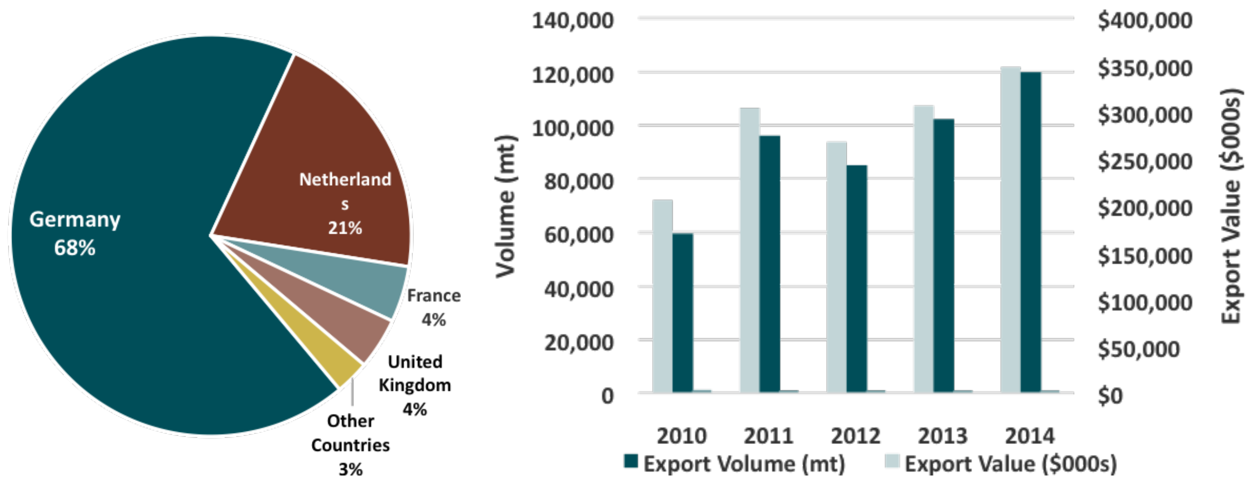


Figure 7.7: Exports of Alaska Pollock Fillets to European Markets, 2010-2014.

	2010	2011	2012	2013	2014
Export Volume (mt)	59,576	96,133	85,115	102,330	119,809
Export Value ($000s)	$205,860	$304,019	$267,796	$306,382	$347,635
Average Export Value per Metric Ton	$3,455	$3,162	$3,146	$2,994	$2,902

Source: ASMI Alaska Seafood Export database, compiled by McDowell Group.

Market Impact of Third-Party Certification

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 September 2013, Alaska's pollock fisheries were the only source for certified pollock fillets. This effectively gave Alaska producers sole access to a sizeable, premium market. Once-frozen Alaska pollock fillets used to sell at a significant premium to twice-frozen Russian pollock, typically on the order of $300 to $400 per ton due to Alaska's certification status but also based on the intrinsic difference in quality. Russian certification, along with larger harvests in both countries, has roughly doubled the supply of pollock fillets available to "MSC-only" buyers in Europe. The result has been a steady decline in wholesale prices for both Alaska and Russian pollock fillets, as well as a declining premium for once-frozen Alaska product.

United States

The 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 than retail outlets. Pollock is the primary whitefish species used in most generic fried fish sandwiches whole fillets or fillet portions, and frozen fish sticks. It is becoming more common to see the species name identified in product messaging.

It is possible to estimate the U.S. supply of pollock fillets by subtracting Alaska pollock fillet exports from domestic production, and adding this figure to imports of pollock fillets. Although the process provides some visibility about the nature and size of the U.S. market, it cannot account for the impact of Alaska pollock fillet inventories, which are added or subtracted to the U.S. supply estimate. Large supply estimates in 2011 and 2012 are outliers and likely the result of increasing inventory due to growing Alaska fillet production. However, when averaged over several years, it is a reasonable method for estimating market share and supply, given the lack of data.

The U.S. market consumes approximately 110,000 mt of pollock fillets per year (Table 7.11). Although the species name implies the product comes from Alaska, a large percentage of pollock fillets consumed by Americans actually come from Russian fisheries. Import volume and total supply estimates declined sharply from 2010 to 2014, suggesting a weakening market for fillet products.

Table 7.11: Estimated U.S. Pollock Fillet Market Supply, in Metric Tons, 2010-2014.

Year	Alaska Pollock Fillet Production	Imports	Exports	U.S. Supply (Est.)	Once-Frozen Product from Alaska (Est.)	Pct. from Alaska
2010	111,491	70,278	81,605	100,164	29,886	30%
2011	166,927	72,938	113,971	125,894	52,956	42%
2012	152,550	51,845	99,921	104,474	52,629	50%
2013	176,717	55,104	114,888	116,933	61,829	53%
2014	183,970	49,817	132,252	101,535	51,718	51%
Average	**158,331**	**59,996**	**108,527**	**109,800**	**49,804**	**45%**

Source: NMFS Foreign Trade Data, AKFIN, ASMI Alaska Seafood 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, sells finished product to retailers (in addition to wholesale customers). Unisea, Alaska's third-largest pollock producer, is owned by NISSUI and supplies raw material to Gorton's - a popular brand for frozen whitefish products. Foodservice operators utilizing Alaska pollock typically own or contract with processing facilities.

7.3.2 Alaska Pollock Surimi Wholesale Market Profile

Surimi accounted for 30 percent of Alaska pollock's first wholesale value and 32 percent of production volume in 2014. Nearly 184,000 mt of pollock surimi was processed in Alaska, with a first wholesale value of $421 million in 2014. Japan, Europe, South Korea, and the U.S. are key surimi markets.

Alaska Pollock Surimi Product Description

Surimi is an odorless, protein-rich, white paste that is an intermediate product used in a variety of surimi seafood products (such as imitation crab sticks). Pollock are first filleted and then minced. Blood and other odorous substances are removed through rinsing with water. Surimi blocks are produced when pulverized minced meat is mixed with additives such as salt, starch, egg white, and sugar, and then frozen and packaged. The commercial grade of surimi depends on the length of the process and the purity of the product. Surimi technology has improved over the years, with the yield increasing from 12 percent to over 30 percent.[5]

[5] (Park, 2014)

Surimi can be made from a variety of fish, but Alaska pollock surimi is sought after for its white color, binding ability, and meat quality. There are hundreds of surimi seafood product varieties. The broad categories include: kamakobo (steamed), chikuma (broiled), satsuma-age (fried), and seafood analogs (e.g. imitation crab sticks). The quality of surimi is determined by a few main characteristics including its gel-forming properties, color (the whiter, the better), and purity.

Alaska Pollock Surimi Production Analysis

Production volume has been relatively consistent outside of 2008 to 2010, typically ranging from 150,000 to 200,000 mt. First wholesale value is more variable, as the price of Alaska pollock surimi can vary widely from year to year depending on global surimi market conditions. Average surimi material prices were $2.28 per kilo in 2014, up 3.0 percent from 2013.

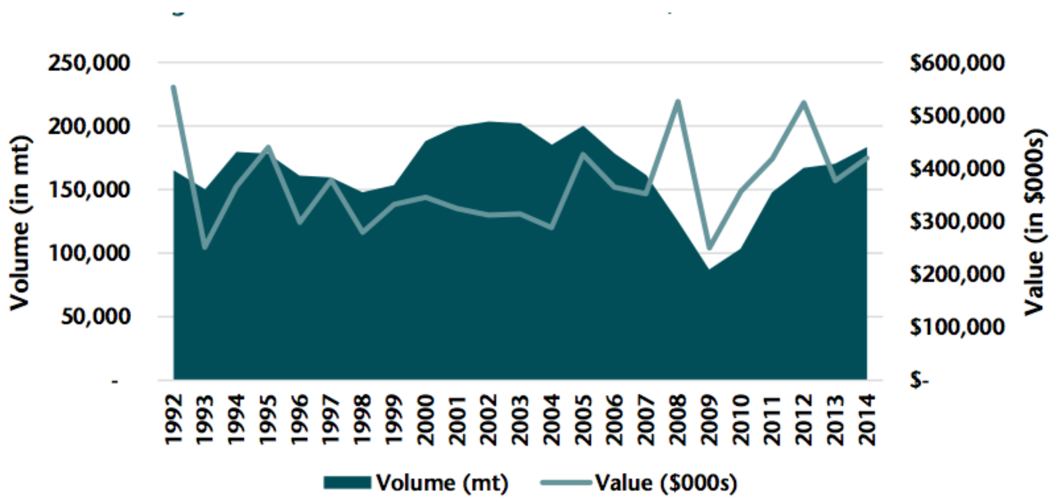


Figure 7.8: Pollock Surimi Production in Alaska, 1992-2014.

Source: AKFIN.

Alaska Pollock Surimi Key Market Analysis

Approximately 90 percent of Alaska pollock surimi is sold to export markets (Table 7.12). In 2014, Japan and South Korea imported 70 percent of all Alaska pollock surimi production. The remaining markets included Europe, U.S., China, Russia, and former Soviet-bloc countries. Europe is a larger market than the export data below suggests, importing significant volumes of surimi from South Korea (containing Alaska pollock as well as surimi made from other species). U.S. surimi exports in 2014 were 20 percent above the previous four year average.

The global market for surimi is approximately 820,000 metric tons, which is converted into approximately 3 million metric tons of surimi seafood products. Alaska's pollock fishery accounts for between 20 and 25 percent of global surimi production. Japan is the largest market; however, other Asian countries such as China and Korea are also important surimi consumers.

Japan

Japan is the world's largest end market for surimi seafood products, consuming 40 percent of global surimi production. Large companies and artisanal shops in Japan process over 1,000 different surimi

Table 7.12: U.S. Exports of Alaska Pollock Surimi by Country, in Metric Tons, 2010-2014.

Country	2010	2011	2012	2013	2014	Pct. Change from 2010-2013 Avg.	Pct. of Total (5yr. Avg.)
Japan	45,377	53,810	67,609	56,292	71,870	29%	38%
South Korea	33,671	41,332	44,788	61,516	56,804	25%	31%
Europe	10,992	28,391	32,568	35,359	25,920	-3%	17%
Russia	1,689	3,851	3,457	3,592	2,235	-29%	2%
China	515	1,144	370	1,466	1,281	47%	1%
Other Countries	1,629	4,978	2,407	4,127	4,534	38%	2%
Total Surimi Exports	**93,358**	**132,363**	**150,829**	**160,886**	**161,363**	**20%**	-
U.S. (Estimated)	10,237	15,709	16,214	9,373	22,278	73%	10%
Total Production	**103,595**	**148,072**	**167,043**	**170,259**	**183,641**	**25%**	-
Pct. Exported	**90%**	**89%**	**90%**	**94%**	**88%**	-	-

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

Source: ASMI Alaska Seafood Export database and AKFIN.

products. Surimi, known as neri in Japan, is a popular, convenient protein that is consumed in numerous ways, including fried, boiled, steamed, baked, and broiled. Consumption has declined since the mid-1970s, but has stabilized since 2010 at roughly 570,000 mt of surimi seafood products per year.[6]

Japan directly imported 38 percent of Alaska pollock surimi produced from 2010 to 2014, averaging 59,000 mt of direct imports worth $132.1 million per year. Including product routed through Korea and other countries, 55 to 60 percent of Alaska's total pollock surimi production goes to the Japanese market.

Alaska accounted for 36 percent of Japan's imported surimi volume between 2010 and 2014, and including domestic surimi production Alaska product comprises 25 to 30 percent of the total market share in Japan (Table 7.13). 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.

Imported surimi prices have trended up in recent years, partly due to lower supply and a weaker Japanese yen (Table 7.14). Alaska pollock surimi prices were lower than tropical surimi, on average, in recent years. This is due primarily to changes in supply patterns rather than the intrinsic quality of the product. Alaska pollock surimi production has increased significantly since 2010 while tropical surimi production declined in 2013 after years of steady growth. In addition, prices for common types of fish used in tropical surimi have increased.

Other Key Markets

Europe and former Soviet states are the second largest market for Alaska pollock surimi. Alaska producers exported 28,200 mt of surimi worth $61.2 million to Europe and Russia in 2014. Alaska

[6] (Park, 2014)

Table 7.13: Japan Surimi Imports from Major Producers, in Metric Tons, 2010-2014.

Exporter	2010	2011	2012	2013	2014	Pct. of Total (5yr. Avg.)
U.S. (Alaska)	62,194	79,817	93,990	94,070	109,957	36%
Thailand	55,055	57,723	50,782	36,661	34,159	19%
India	25,334	28,895	29,174	28,083	33,969	12%
China	29,163	26,817	14,535	13,459	19,078	8%
Vietnam	23,691	18,756	18,576	12,122	16,753	7%
All Others	38,233	35,870	37,771	34,875	37,599	15%
Total	**240,171**	**252,093**	**249,403**	**224,725**	**259,386**	**-**
Pct. from Alaska	**26%**	**32%**	**38%**	**42%**	**42%**	**-**

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

Table 7.14: Total and Unit Value of Japan Surimi Imports, 2010-2014 Europe and Russia.

	2010	2011	2012	2013	2014	Pct. Change from 2010-2013 Avg.
Total Import Value						
Millions yen	¥72,321	¥69,913	¥77,436	¥71,924	¥88,979	22%
Yen/kg	¥301	¥277	¥310	¥320	¥343	14%
Alaska Surimi Import Value						
Millions yen	¥20,723	¥19,580	¥26,441	¥23,452	¥30,693	36%
Millions US dollar	$236	$246	$331	$240	$290	10%
Yen/kg	¥333	¥245	¥281	¥249	¥279	1%
US dollar/kg	$3.80	$3.08	$3.53	$2.55	$2.64	-19%
Exchange Rate (yen/USD)	¥87.8	¥79.7	¥79.8	¥97.6	¥105.9	23%

Notes: Value figures are CIF Japan. U.S. dollar conversions were made using average annual exchange rates from OANDA.com.

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

surimi accounts for approximately half (33,000 mt) of Europe and Russia's total surimi consumption; this includes Alaska product routed through other countries.

The U.S. exported 56,804 mt of Alaska pollock surimi to South Korea in 2014, which accounted for 44 percent of Alaska pollock surimi exports. However, Korean import statistics suggest only 18,715 mt actually entered the country. The balance is 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 pollock surimi.[7] South Korea imported 128,200 mt of all surimi varieties in 2014 worth $226.4 million, with Alaska accounting for 15 percent of total surimi imports.

[7] (Yoo, 2013)

Alaska Pollock Surimi Competing Supply

There are two tiers in which Alaska pollock surimi has competition. One is the raw material, which is minced fish. The second is surimi production, which requires advanced food science technology to produce a variety of surimi products. Pollock surimi accounted for 26 percent of total surimi production over 2010-2014 (Table 7.15). Virtually all pollock surimi is produced in Alaska or comes from Alaska fisheries. 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.

Table 7.15: Global Surimi Production, in Metric Tons, 2010-2014.

Surimi Type	2010	2011	2012	2013	2014	5yr. Avg. Pct. of Supply	Major Producers
Alaska Pollock	160,900	208,800	227,100	216,000	213,000	26%	Alaska
Cold Water Fish	34,000	30,700	34,100	37,000	37,500	5%	WA/OR, Argentina, Chile
Tropical Fish	485,000	537,000	576,600	528,000	550,000	68%	China, Vietnam, Thailand, India
Other	33,000	19,000	20,500	8,500	4,500	1%	-
Total	**712,900**	**795,500**	**858,300**	**789,500**	**805,000**	-	-

Source: Future Seafood Group (via Undercurrent News).

Surimi is made from a variety of fish species. Alaska pollock is the most widely used species, but other types of surimi utilize a range of other fish. 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. Most U.S. surimi production comes from Alaska (pollock) and the Pacific hake fishery off the coast of Washington and Oregon. As shown in Table 7.15, pollock accounts for 26 percent of surimi supply, a small share compared to tropical fish species which account for 68 percent of surimi production. Russia occasionally produces a relatively insignificant volume of surimi, relative to other producers. China, India, and Southeast Asia (including Thailand and Vietnam), are key tropical surimi producers, with China typically claiming the title of world's largest surimi producer. Argentina, Chile, and the Faroe Islands are important cold water surimi producers. 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.

7.3.3 Alaska Pollock Roe Wholesale Market Profile

Pollock roe commands the highest price of all major pollock products at $6.24 per kilo and was worth $151 million in total first wholesale value in 2014. It accounted for 11 percent of Alaska pollock's total first wholesale value but only 4 percent of production volume (24,100 mt). Pollock roe is widely consumed as a condiment and during holidays in Japan. South Korea is the world's only other sizeable market.

Alaska Pollock Roe Product Description and Supply Chain

Pollock roe production occurs when the fish are spawning. Due to the variety of spawning timing within pollock stocks, the spawning season extends from November to May but most production occurs during the late winter and early spring. After the fish is headed, 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 be discounted due to roe maturity (eggs are too young or too old). Product caught and processed at sea tends to command the highest prices with average prices of $7.50 per kilo compared to $4.90 shoreside.[8] Pollock roe is traditionally sold to wholesale buyers in frozen block form, packed into 49.5 lb. cases each containing three blocks of roe.

Pollock roe is an export product. Frozen Alaska 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 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. In fact, 80 percent of Alaska's pollock quota is shared by four large vertically-integrated companies: Trident Seafoods, Maruha Nichiro, Nissui, and American Seafoods.[9] Each of these companies own stakes in Alaska fishing vessels, Alaska shoreside plants, and distributors in Japan and South Korea.

After frozen pollock roe is exported to Asia, it eventually undergoes secondary processing. Japan, Korea, China, and in Thailand are common destinations, where it is processed by defrosting and brining the roe in spices or salt.[10] In Japan, pollock roe is often sold in the skein and consumed as salted roe (tarako) or spicy/marinated roe (karashi mentaiko). The product is commonly utilized as a condiment and as an ingredient in soups, rice balls (onigiri), rice dishes, and pastas. High quality pollock roe is a popular gift during holidays and consumed individually with sake.

Alaska Pollock Roe 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 2014, only 24,100 metric tons was produced, but the wholesale value $151 million (11 percent of the species' wholesale value).

Historically (prior to 2007), roe often accounted for one-third to one-fifth of Alaska pollock's total first wholesale value. It was a consistently valuable market. However, the percentage of roe value compared to all Alaska pollock products has declined significantly in recent years. Since 2010, roe has only generated 9 to 12 percent of total first wholesale value. This market development has an even deeper impact considering there is virtually no trade-off with roe, unlike surimi and fillets which both utilize pollock flesh. Roe creates a substantial additional income stream (in addition to the meat), and is relatively inexpensive to process.

[8] AKFIN
[9] (Globefish, 2015)
[10] Industry Interview

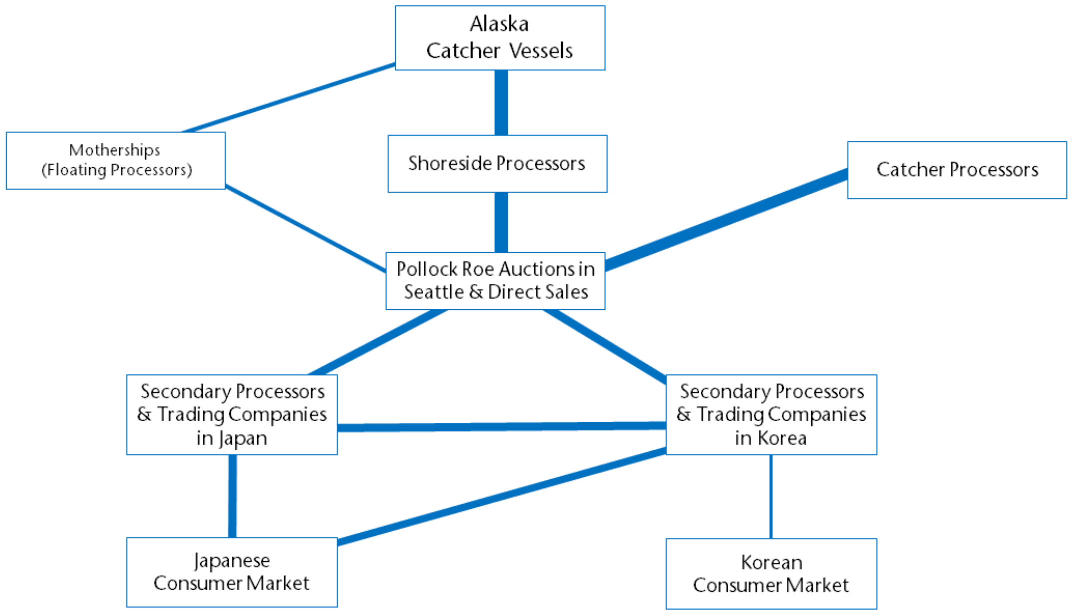


Figure 7.9: Alaska Pollock Supply Chain for Roe.

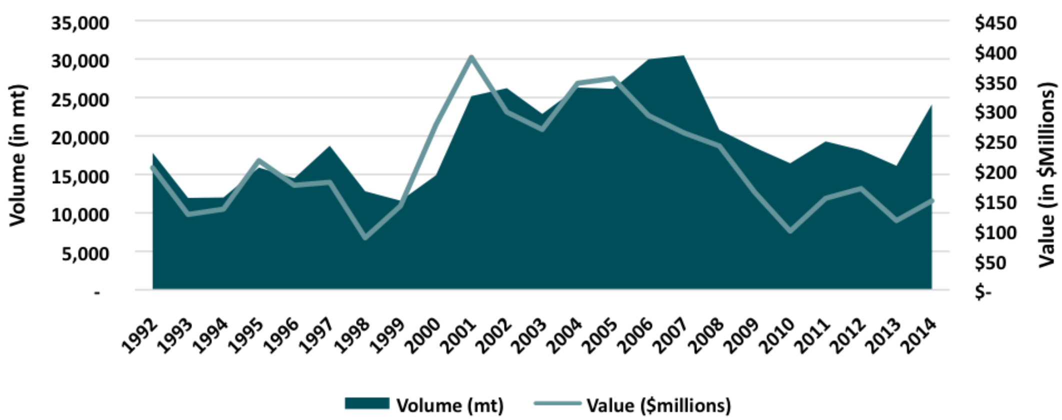


Figure 7.10: Total Pollock Roe Production and Value in Alaska, in Metric Tons, 1992-2014. **Source:** ADF&G (COAR).

Alaska Pollock Roe Key Market Analysis

Virtually all Alaska pollock roe is exported to Japan or South Korea. In 2014, exports totaled 21,778 mt and $153 million Table 7.16. Japan is the dominant market, absorbing more than 90 percent of finished Alaska pollock roe exports. South Korea is the only other sizeable market, but the majority of frozen pollock roe produced in Russia and Alaska generally passes through Korean auction houses (Russian product) or cold storage facilities before entering the Japanese market. A few Japanese companies operate secondary processing facilities in China, but industry contacts report very little product actually enters the vast Chinese consumer market.

Efforts to develop other pollock roe markets outside of Japan have been largely unsuccessful, but given declining Japanese consumption patterns and the weaker yen, finding additional roe markets is extremely important to the long term health of Alaska's pollock industry. The industry is exploring opportunities to utilize more mentaiko and tarako in sushi preparations, as well as marketing it as an ingredient in pasta sauces and investigating new products which might find appeal in other caviar markets.

Pollock roe supply has increased faster than demand in recent years. Larger production volumes, as well as a weaker yen and shifting Japanese consumer preferences, have resulted in lower prices and lower overall value for Alaska pollock roe. Large inventories and a sharp increase in supply led to declining prices in 2014, and trade press reports suggest prices fell further during the spring 2015 roe auction in Seattle.

Table 7.16: U.S. Exports of Alaska Pollock Roe by Country, in Metric Tons, 2010-2014.

	2010	2011	2012	2013	2014	Pct. Change from 2010-2013 Avg.
Japan	5,535	8,027	7,621	6,544	11,212	62%
South Korea	5,601	9,196	7,560	7,414	9,792	32%
China	138	312	554	901	764	61%
Other	3	4	172	108	10	-86%
Total Export Volume	**11,276**	**17,539**	**15,907**	**14,967**	**21,778**	**46%**
Total Export Value ($Mill.)	**$107.1**	**$158.4**	**$117.9**	**$114.2**	**$152.8**	**23%**
Avg. Export Price per Kilo	**$9.16**	**$9.48**	**$6.34**	**$8.96**	**$7.07**	**-17%**

Source: ASMI Alaska Seafood Export database, compiled by McDowell Group.

During the spring and fall, large pollock roe buyers come from Japan and South Korea to buy roe from Alaska producers in auction markets held in Seattle. Spring auctions produce significantly higher sales volumes. The same buyers also purchase Russian pollock roe at large auctions in Busan and Tokyo.[11]

Japan

Japan is the world's primary pollock roe market with imports of 44,800 mt in 2014, worth $330 million (Table 7.17). Pollock roe is consumed in a variety of ways in Japan, including in sushi rolls, rice balls, soups, noodle dishes, or by itself. High-grade roe traditionally is used in gift boxes for holidays and special occasions. In the retail market, mid-grade is sold as salted roe. Food service purchases tend to purchase lower quality roe for rice and noodle dishes.[12] Pollock roe is a traditional product in Japanese food culture, with consumption dating back to the mid-1900s.

Alaska product accounted for 39 percent of the import volume between 2010 and 2014. Russia is the country's largest pollock roe supplier. Imports of Alaska product increased 40 percent in 2014 versus the prior four-year average due to better roe yields and slightly higher TACs in Alaska pollock fisheries. Total imports increased 18 percent versus the prior four-year average.

[11] (Nissui, n.d.)
[12] Industry Interview

Table 7.17: Japan Pollock Roe Imports, in Metric Tons, 2010-2014.

Exporter	2010	2011	2012	2013	2014	Pct. of Total (5yr. Avg.)
Russia	25,379	23,736	25,179	21,008	24,916	61%
U.S. (Alaska)	13,368	14,520	15,260	13,158	19,720	39%
Others	59	151	180	237	164	<1%
Total	**38,806**	**38,407**	**40,619**	**34,403**	**44,800**	-
Pct. from Alaska	**34%**	**38%**	**38%**	**38%**	**44%**	-

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

In yen terms, total Japanese pollock roe imports tend to range from 30 to 35 billion yen but the value of the market in dollar terms fluctuates with exchange rates. Despite a 17 percent increase in import volume and a 7 percent increase in value (in yen terms) during 2014, Japan's import value of all pollock roe in U.S. dollar terms decreased 10 percent compared to the prior four-year average. Import volume and prices spiked in 2012. The March 2011 tsunami, which devastated many coastal Japanese communities, affected inventories, and led to a significantly weaker yen - a trend that continued until early 2013. Prices in both yen and dollars terms have declined substantially since 2012.

The Japanese pollock roe market - and by extension, the value of the pollock roe resource - is well defined with relatively steady demand. 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 (even slightly declining) demand, the product's unique niche, and a lack of alternative markets and uses, the upside potential of the Japanese market appears limited unless the consumer base can be expanded.

South Korea

South Korea is the second largest consumer of pollock roe, but it also is an intermediary buyer. An average of 14,222 mt of pollock roe imports were registered by the Korean Customs and Trade Development Institution between 2012 and 2014 (Table 7.18). However, Russia and Alaska sent 48,494 mt of pollock roe to South Korea per year during this period (see Table 11). Trade statistic discrepancies are likely due to product which is sent to Korea for auction, storage, or secondary processing. Korean import statistics suggest the Korean market consumes approximately a quarter of total pollock roe volume. Alaska supplies an estimated 21 percent of the Korean domestic market.

Korea is known for having less traditional tastes than Japan and has recently been in the spotlight for an emerging market for new roe products. Currently, lower grade pollock roe is marketed in Korea as a condiment mixed with other ingredients and spices.[13] Though is also consumed in spicy and salted roe products, like its Japanese neighbor. The Korean word for pollock roe is myeongtae.

7.3.4 Global Pollock Production and Competing Supply Analysis

Alaska pollock is fished almost entirely by Alaska and Russia, due to its distribution in the North Pacific Ocean. Japan, South Korea, and North Korea also harvest pollock, though in smaller volumes than Alaska or Russia. Pollock production has increased in recent years, from 2.83 million mt in 2010 to an estimated 3.38 million mt in 2014. Alaska harvested 1.44 million mt in 2014 and

[13] (Hui, 2006)

Table 7.18: South Korean Pollock Roe Trade, in Metric Tons, 2012-2014.

	2012	2013	2014	3-yr. Average
Exports Reported by Major Producers				
Russia	41,256	39,972	39,488	40,239
Alaska	7,560	7,414	9,792	8,255
Total	**48,816**	**47,386**	**49,280**	**48,494**
Actual Imports by Major Producer				
Russia	9,918	11,838	12,008	11,255
Alaska	2,415	3,425	3,061	2,967
Total	**12,333**	**15,263**	**15,069**	**14,222**
Export/Import Difference	**36,483**	**32,123**	**34,211**	**34,272**

Source: Global Trade Atlas, compiled by McDowell Group.

accounted for 43 percent of global supply. Despite increasing harvest volumes in recent years and providing the fish's namesake, Alaska is currently the world's second-largest pollock producer behind Russia (see Table 7.19).

Table 7.19: Global Pollock Harvest by Major Producer, in Metric Tons, 2010-2014.

Producer	2010	2011	2012	2013	2014	Pct. Change from 2010-2013 Avg.
Russia	1,584,527	1,579,792	1,632,631	1,558,721	1,625,000	2%
U.S. (Alaska)	883,416	1,274,965	1,302,815	1,362,213	1,440,471	19%
Japan	251,166	238,920	229,823	228,200	228,200	-4%
South Korea	46,795	48,793	39,026	24,342	24,300	-39%
Others	62,167	64,593	67,132	66,243	66,200	2%
Total	**2,828,070**	**3,207,063**	**3,271,426**	**3,239,719**	**3,384,171**	**8%**
Pct. from Alaska	**31%**	**40%**	**40%**	**42%**	**43%**	**-**

Source: FAO (1977-2013, non-Alaska), NMFS (1977-2014), and industry estimates (2014, non-Alaska).

Pollock has been harvested for many decades, but the U.S. did not play a significant role in the fishery until the passage of the Magnuson-Stevens Fishery and Conservation Act in 1976. The legislation laid the groundwork for consolidating control over territorial waters, and along with later amendments and other international agreements, provided unfettered access for U.S. fishing companies to Alaska pollock fisheries within 200 nautical miles of U.S. soil.

U.S. harvests began ramping up in the mid-1980s, displacing Japanese vessels in newly designated Alaska waters. U.S. pollock harvests have been relatively consistent since 1989, producing an average of 1.30 million mt per year. Overall, pollock harvests have declined since the 1970s and 1980s due to tighter control over fishery access and the application of responsible fishery management practices.

Several other species impact the market for pollock fillets and surimi. Pollock fillets compete with potential substitutes from other white fish fillets such as Atlantic and Pacific cod, haddock, saithe,

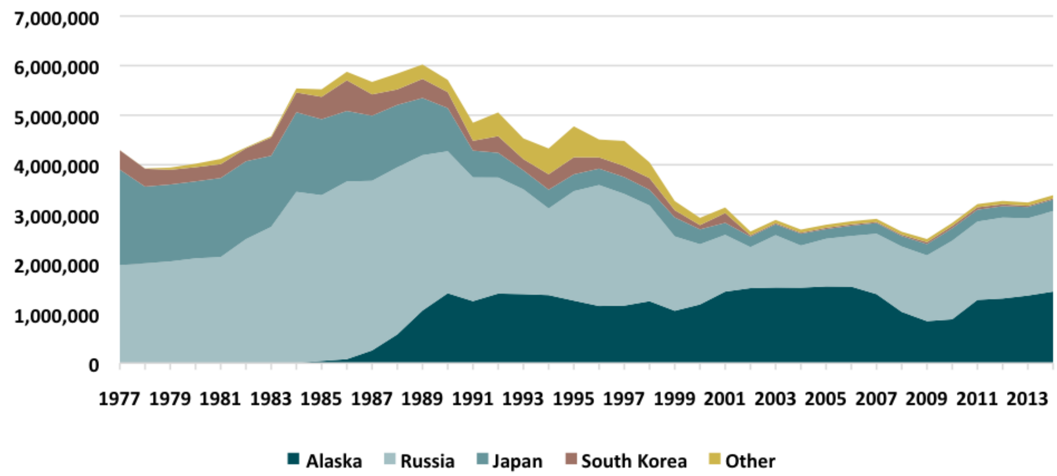


Figure 7.11: Global Harvest Volume of Alaska Pollock, in Metric Tons, 1977-2014.
Source: FAO (1977-2013, non-Alaska), NMFS (1977-2014), and McDowell Group estimates (2014, non-Alaska).

hake, tilapia, pangasius (in order of importance). Surimi from tropical species (including threadfin bream, lizardfish, and big eye) and hake compete with pollock surimi.

Pollock supply likely increased in 2015, but supplies of most other competing whitefish species was expected to decline (Table 7.20). Cod and haddock production in Europe likely declined in 2015, which would have been supportive for the pollock fillet market but the weak euro and larger pollock TACs more than offset the effects of less competing whitefish species.

Table 7.20: Competing Whitefish Supply Trends.

Species	2013 Harvest (thousands mt)	Expected Trend for 2014-2015
Cod	1,821	Down 5%
Haddock	309	Down 3%
Hakes[1]	1,019	Down 6%
Saithe	309	Flat
Russian Pollock	1,559	Up 5%
Alaska Pollock	1,362	Up 5%

Notes: [1]Includes major hake fisheries only.

Source: FAO (2013, non-Alaska), NMFS (2013), and Groundfish Forum 2014 (Expected Trends).

7.4. Pacific Cod Market Profile

Pacific cod (*Gadus macrocephalus*) is a whitefish found in the coastal Pacific Ocean from Alaska to California with the largest concentration found in the Gulf of Alaska and the Bering Sea. The largest of the Alaska groundfish species, Pacific cod can reach a length of six feet. In 2014, Pacific cod accounted for 18 percent of total global cod harvest, with 154,584 metric tons in 2014 (Table 7.21). The first wholesale production was worth $469 million, or 19 percent of total Alaska groundfish value in 2014. Highly valued for their mild, white flesh, Pacific cod are primarily processed as fillets and head and gut (H&G).

Table 7.21: Summary Profile of Pacific Cod Wholesale Production and Markets, 2014.

Value and Volume		Key Products	H&G	Fillet	Other	
Wholesale Production (mt)	154,584	% of Value	70%	21%	9%	
Pct. of Global Cod Harvest (2013)	18%	Key Markets	China	Europe	U.S.	Other
First Wholesale Value ($millions)	$469	% of Final Sales	37%	14%	31%	18%
Pct. of Alaska Groundfish Value	19%	YoY Change	14%	-6%	31%	-11%
Production Sold to Export Markets	69%	Competing Species: Russian Pacific cod and Atlantic cod.				

Pacific Cod Production Analysis

In 2014, Pacific cod wholesale production was the second largest in terms of volume, following pollock, with production volume of 154,584 mt valued at $468.7 million. Cod production has steadily increased in the last ten years, with a 34 percent increase in volume in the last five years.

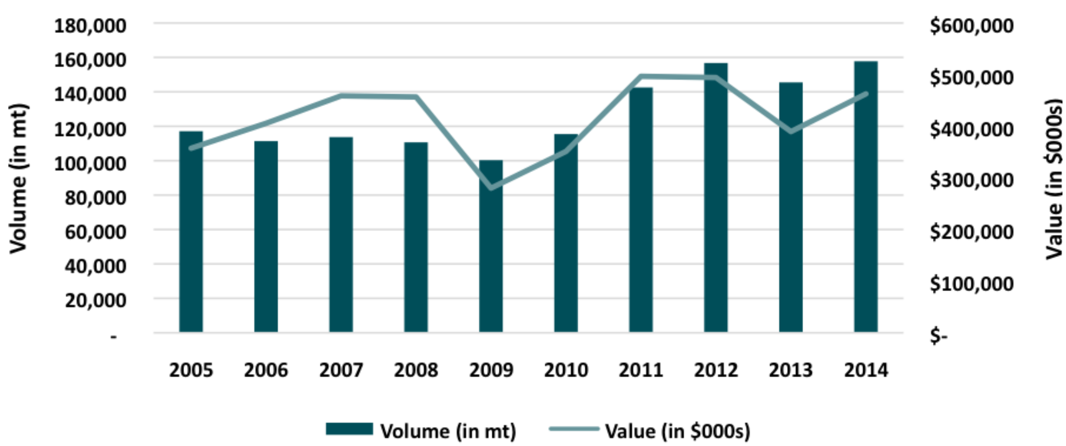


Figure 7.12: First Wholesale Volume and Value for Pacific Cod in Alaska, 2005-2014.

	2010	2011	2012	2013	2014
Wholesale Value (in $000s)	$351,461	$497,082	$497,082	$397,893	$468,776
Price per Ton	$3,042	$3,484	$3,154	$2,735	$3,033

Source: ADF&G (COAR).

In 2014, Alaska harvest of Pacific cod was almost entirely processed as H&G and fillets. H&G product accounted for 74 percent of production volume (114,510 mt) in 2014, and 67 percent of first wholesale value ($314 million). Fillets accounted for 12 percent by wholesale volume (18,268 mt) and 25 percent of first wholesale value ($117 million). Other products, including roe and fish meal, made up 14 percent of wholesale volume with 20,014 mt valued at $37 million (Table 7.22).

The H&G sector averaged $294.7 million in first wholesale value over the last five years (2010-2014).[14] Figure 2 shows overall Alaska production of H&G, which has been increasing. Most H&G cod is

[14] ADF&G (COAR).

Table 7.22: Common Pacific Cod Products, Alaska Production, and Recovery Rates, 2014.

	Production Volume (in mt)	Production Value (in $000s)	Recovery Rate Range	Average Price per Kilo
H&G Eastern	87,815	$245,878	56-75%	$2.80
H&G Western	25,562	$57,705	56-75%	$2.26
Fillets, skinless/boneless	17,406	$112,363	18-39%	$6.46
Roe	5,251	$11,682	1-7%	$2.22
Other	18,551	$41,148	-	$2.22
Total Wholesale Production	**154,584**	**$468,776**		
Total Retained Fed. Harvest	**299,128**			

Notes: Volume in product-weight terms.

Source: NMFS Catch and Product Reports and Alaska Sea Grant (Crapo, Paust, & Babbit, 1993).

frozen and exported to China for secondary processing, mainly into fillets. Fillets are produced almost entirely at shoreside facilities and are frozen in shatterpack form, blocks, IQF, and fresh. The remainder of cod is mostly salted, minced, or dried.

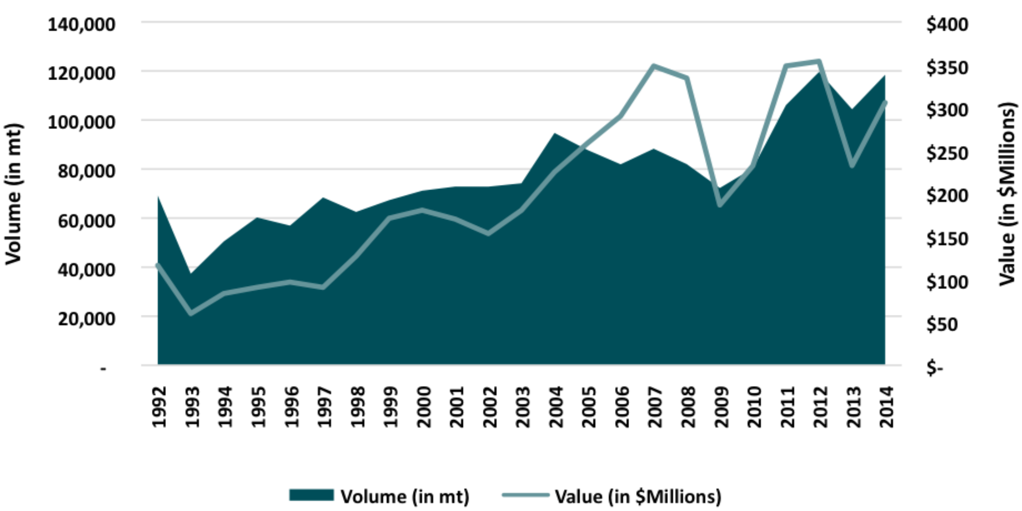


Figure 7.13: Pacific Cod H&G Production in Alaska, by Volume and Value, 1992-2014.
Source: ADF&G (COAR).

Pacific Cod H&G and Fillets Product Descriptions

Frozen H&G product provides a raw material to secondary processors that is not contaminated by viscera and blood. Cod are headed and gutted, either onshore or at-sea, and immediately frozen. Frozen H&G product must be thawed, cut, and then re-frozen, which causes fillets to lose some of their quality.

Most Alaska cod fillets are packaged as shatterpacks, consisting of frozen fillet blocks, while individual fillets are separated by plastic sheets, making them easier to separate without need to be thawed. IQF (individual quick frozen) fillets and loins are portions that are quickly frozen to preserve freshness.

Shatterpack fillets are traditionally packed into 45 pound containers and sold to the grocery refresh market. Block fillet products are reprocessed into value-added breaded frozen portions.

Pacific Cod Supply Chain

H&G cod has the most complex supply chain. Most of the Pacific cod caught in Alaska is processed into frozen H&G and exported for secondary processing. While most frozen H&G product is exported, a portion is distributed to domestic secondary processing facilities. The largest reprocessing market is China, followed by Japan, U.S., and Europe. This secondary processing results in primarily frozen fillets and loins, but also includes breaded fish sticks, fillets, and other value added products. Foreign buyers also purchase H&G cod as a raw material for salt cod products, which are popular in Europe and Latin America.

A direct channel for H&G products in the U.S. are refresh markets, where it is thawed and filleted into portioned products. Refresh markets have increased in popularity in the U.S. within the last ten years. Other U.S. processors use H&G Alaska cod to produce breaded or coated sticks and portions for sale in grocery stores and food service outlets.

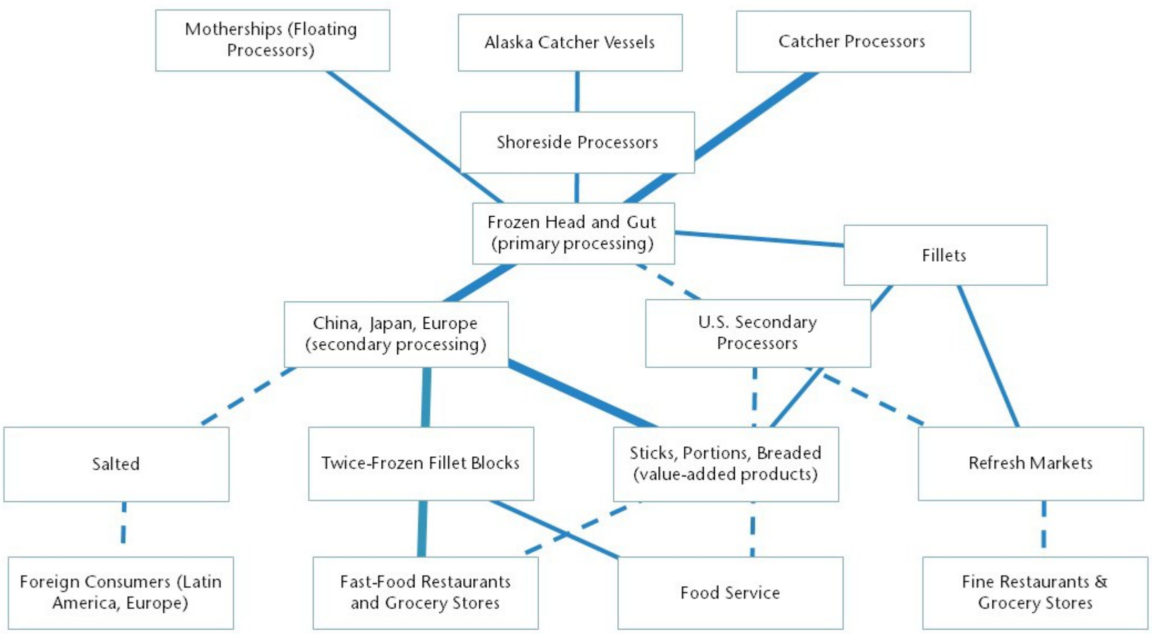


Figure 7.14: Pacific Cod Supply Chain.

In Alaska, cod fillets are reprocessed for both food service and retail as a whitefish product which is easy to thaw and cook from a retail outlet or as a mild seafood dish served at a variety of restaurants including fine dining to quick service. Chinese re-processors produce twice-frozen fillet blocks and breaded frozen portions which compete directly with once frozen cod products produced in Alaska, even though the quality is reported to be lower. The competition for cod fillets has reduced the value for cod exports from Alaska, which is shown in Figure 6. Many fillets are intended for the domestic market.

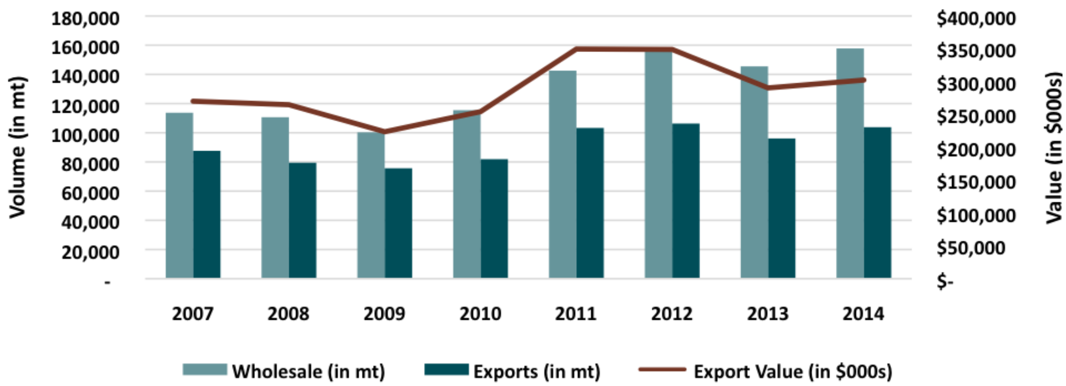


Figure 7.15: Pacific Cod H&G Wholesale Production and Exports, 2007-2014.
Source: ASMI Export Database.

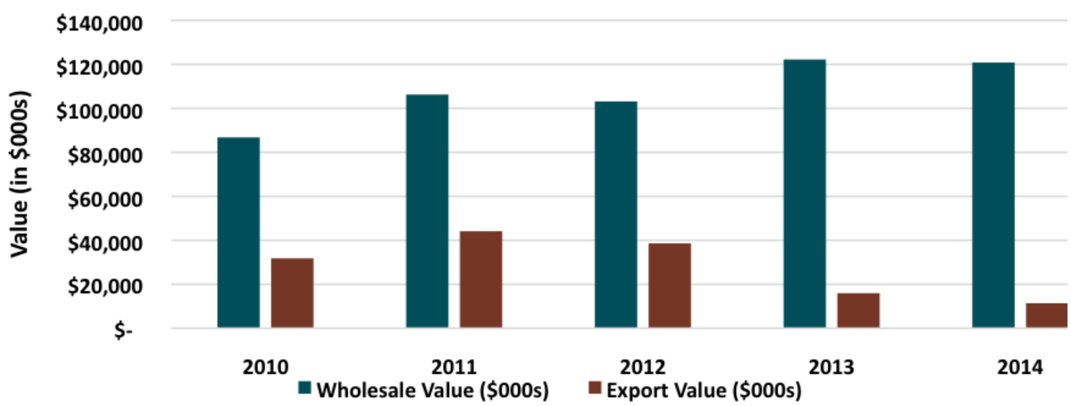


Figure 7.16: First Wholesale and Export Values for Pacific Cod Fillets, in $000s, 2010-2014.
Source: ADF&G (COAR) Reports, ASMI Export Database.

Pacific Cod Key Markets

In 2014, Alaska Pacific cod H&G exports totaled 100,542 mt, representing 97 percent of total cod exports (Figure 7.18).[15] Frozen H&G exports have been increasing. China is the largest importer of H&G Pacific cod, but most product is reprocessed for export. In 2014, China imported 55,600 mt of cod from the U.S. The next largest markets are Europe and Canada (Table 7.23).

Pacific cod fillets are primarily consumed in the U.S., Canada, and European markets. The domestic market, according to McDowell Group estimates, consumed 57 percent of fillets produced in Alaska- or an average of 9,613 mt from 2010-2014. In 2014, Alaska Pacific cod fillets had a first wholesale value of $120.8 million and an export value of $11.4 million, suggesting most product is sold into the domestic market. In the last five years, Canada and Europe are the largest foreign markets for once frozen Alaska cod fillets, importing 41 percent of exported Alaska cod fillets over the last five years (2010-2014).

U.S. Market

[15] ASMI Export Database.

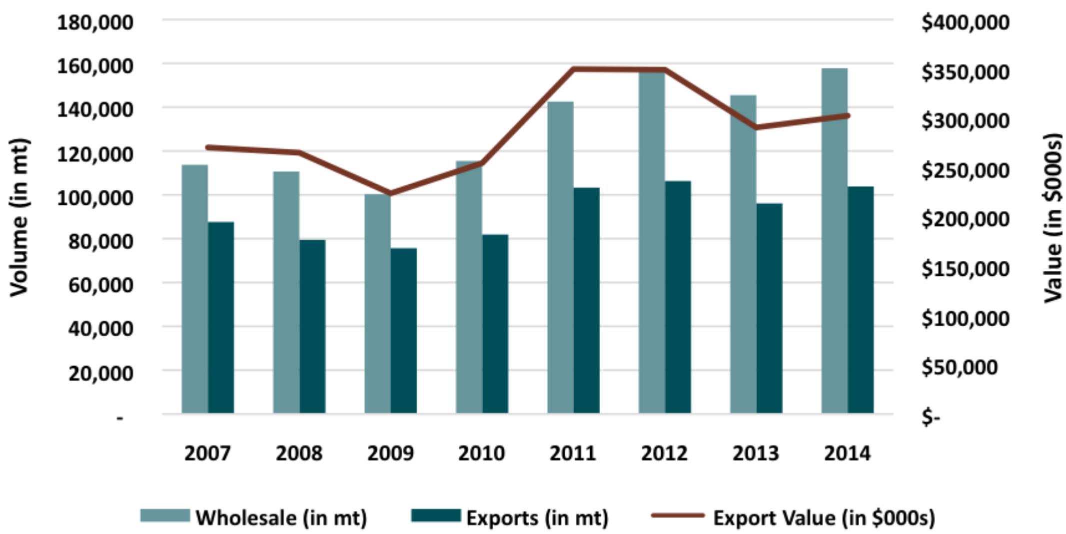


Figure 7.17: Total Alaska Cod Exports, by Volume and Value, 2007-2014.

Notes:

Source: ASMI Export Database.

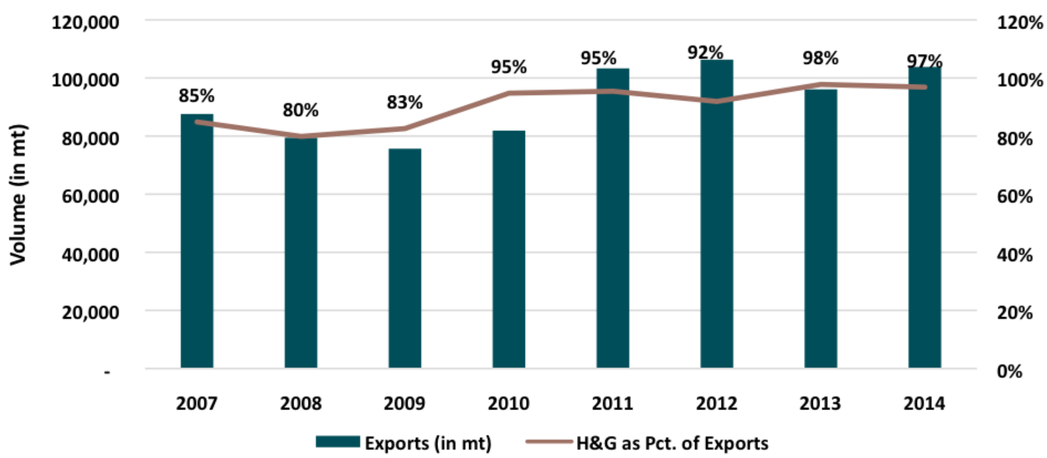


Figure 7.18: Pacific Cod H&G as Percent of Exports, 2007-2014.

Source: ASMI Export Database.

Not differentiating between Pacific and Atlantic cod, the U.S. imported 66,421 mt of cod in 2014, valued at $392.5 million (Table 7.24). In 2014, fillets accounted for 90 percent of cod imports into the U.S., with the remainder divided between H&G and salted. The U.S. imported $304.1 million of cod fillets, a 19 percent increase over 2013 (Table 7.25). According to McDowell Group estimates, the U.S. market bought an estimated 57 percent of Alaska's cod fillet production from 2010-2014. Seventy-four percent of U.S. cod fillet import volume came from China in 2014. Approximately 15 percent of H&G production went to the domestic market to be reprocessed.

Cod is a popular menu item in the U.S. market. IQF fillets and shatterpack fillets of Pacific cod are used by fine restaurants, food service, fast food restaurants, and retail fish markets. Fillet blocks are utilized when the customer needs uniformity, such as in fish sandwiches or in "fish and chips" restaurants. Some grocery retailers utilize fillet block forms in the frozen aisle as value-added

Table 7.23: Sales of H&G Pacific Cod to Key Markets, in Metric Tons, 2010-2014.

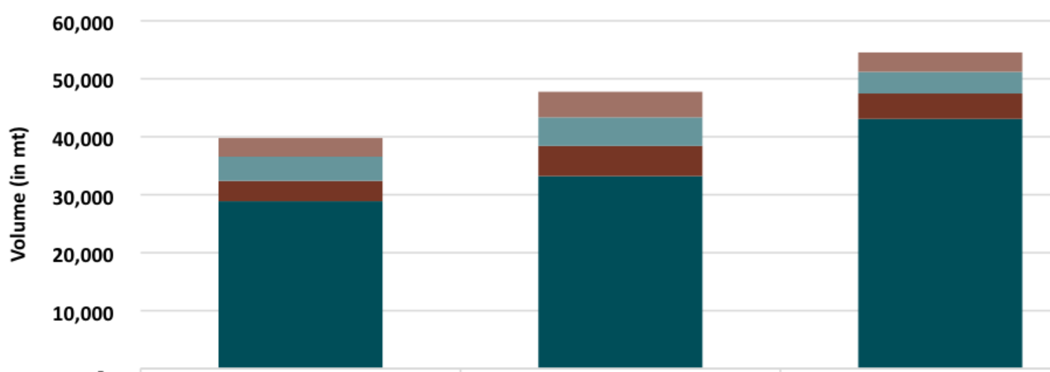
Market	2010	2011	2012	2013	2014	% of Total (5yr. Avg.)
China*	23,547	40,854	45,311	47,116	55,600	40%
Japan*	14,532	18,224	17,087	12,896	17,338	15%
Europe[1]	17,580	14,884	14,422	8,670	5,968	12%
South Korea*	6,203	5,784	5,472	7,684	5,372	6%
Canada	2,705	2,328	2,482	2,500	2,011	2%
Other	13,038	16,525	12,944	15,108	14,253	14%
Total Exports	**77,605**	**98,599**	**97,718**	**93,974**	**100,542**	**89%**
U.S. (Estimated)[2]	2,711	7,471	21,888	10,409	17,895	11%
Alaska Production	**80,316**	**106,070**	**119,606**	**104,383**	**118,437**	

Notes: *Denotes countries which primarily re-process and/or re-export product to other markets.
[1] Does not include Russia, Ukraine, or other minor European markets.
[2] Estimated based on annual production less calendar year exports.
Data pertains to primary exports only, does not portray product which may be re-exported to other markets.
Source: NMFS Trade Data, ASMI Alaska Seafood Export Database, and McDowell Group estimates.

Table 7.24: Total Cod Imports into U.S. Market, Volume and Value, 2010-2014.

	2010	2011	2012	2013	2014	Pct. Change Yr-0ver-Yr
Volume (in mt)	48,566	52,269	49,755	59,850	66,421	10%
Value (in $Millions)	$263.3	$327.1	$327.6	$341.5	$392.5	13%

Source: NMFS Foreign Trade.



	2012	2013	2014
Other	3,217	4,401	3,348
Iceland	4,166	4,937	3,735
Russia	3,522	5,202	4,383
China	28,876	33,217	43,080

Figure 7.19: U.S. Imports of Cod Fillets from Major Producers, in Metric Tons, 2012-2014.
Source: Global Trade Atlas.

products, as well as at the retail fish counter, where fillets are thawed and displayed in a refreshed format.

Table 7.25: Total Imports and Price per Kilo for Cod Fillets into the U.S. Market, 2012-2014.

	2012		2013		2014	
	Value (in 000s)	Price per Kilo	Value (in 000s)	Price per Kilo	Value (in 000s)	Price per Kilo
China	$174,951	$6.06	$165,845	$4.99	$226,315	$5.25
Russia	$25,333	$7.19	$35,239	$6.77	$29,780	$6.79
Iceland	$31,230	$7.50	$29,135	$5.90	$26,715	$7.15
Thailand	$7,485	$7.11	$9,632	$6.30	$8,065	$6.56
Norway	$3,020	$6.82	$5,425	$5.97	$6,431	$5.77
Other	$11,690	$6.79	$10,815	$5.51	$6,865	$6.84
Total	**$253,710**	**$6.38**	**$256,092**	**$5.36**	**$304,171**	**$5.58**

Source: Global Trade Atlas.

China

China serves as a secondary processor for fillets by augmenting fillets with value-added product forms and re-exporting to markets such as Europe and the U.S (Table 7.26). Over the last five years, China has imported 40 percent of Alaska's cod, and trade with China increased 57 percent. Cod fillet blocks compete with Alaska produced cod fillet blocks in the U.S. and with European cod fillet blocks in the EU. There are other overseas markets that are also destinations for Chinese reprocessed cod products such as Brazil, which increased imports of cod fillets from China by 141 percent from 2013 to 2014.[16]

China imports H&G cod (both Pacific and Atlantic) as raw material for reprocessing. The two primary products from China are value-added products such as frozen sticks, portions such as loins or fillets, or breaded products. Cod fillet blocks compete with Alaska produced cod fillet blocks in the U.S. and with European cod fillet blocks in the EU.

Table 7.26: Primary Export Markets for Chinese Twice-Frozen Cod Fillets, in Metric Tons, 2012-2014.

	2012	2013	2014	Pct. Share of Total Exports
European Market	57,588	68,399	79,976	58%
U.S.	33,093	38,899	44,756	32%
Canada	3,237	4,568	4,918	4%
Brazil	1,386	1,649	3,987	3%
Other	3,904	4,777	4,982	4%
Total	**99,208**	**118,292**	**138,619**	**100%**

Notes: Figures may not sum due to rounding.

Source: Global Trade Atlas.

Japan & South Korea

[16] Global Trade Atlas.

South Korea and Japan are key re-exporters for Alaska H&G cod, with a market share average of 24 percent over the last five years (2010-2014). In 2014, 17,338 mt were exported to Japan and 5,372 mt were exported to South Korea (Table 7.27). Much of the H&G cod product imported by South Korea or Japan is re-exported for destinations such as the U.S. or Europe. Japanese consumers typically consume cod in the wintertime, often used in soups, and traditionally prefer it in "kirimi" cut. South Korea buys H&G and also whole fish, consuming the entire fish. Cod is a mainstay on restaurant menus and a popular item cooked for home consumption.

Table 7.27: Major Asian Markets for Alaska Cod, in Metric Tons, 2010-2014.

Export Market	2010	2011	2012	2013	2014
Japan	**17,068**	**22,158**	**17,616**	**13,176**	**17,572**
Fillet	1,836	3,911	464	67	46
H&G	14,532	18,224	17,087	12,896	17,338
Other	700	23	65	213	187
South Korea	**7,244**	**7,168**	**6,533**	**7,988**	**5,535**
Fillet	956	1,204	84	29	126
H&G	6,203	5,784	5,472	7,684	5,372
Other	86	179	977	275	36
Grand Total	**24,313**	**29,326**	**24,149**	**21,164**	**23,106**
Pct. of Total Exports	**30%**	**28%**	**23%**	**22%**	**22%**

Source: ASMI Export Database.

Europe

Over the last five years (2010-2014), approximately 12 percent of Alaska cod exports have been to the European market. Europe's share of H&G imports has been decreasing, with 2014's export volume down 66 percent from 2010. Europe is traditionally a large end-market for cod, but Alaska Pacific cod is rerouted through China first. The increase of Chinese imports of H&G cod has been linked to high import duties into the European Union. The EU protects its domestic cod producers by maintaining high duties on imported cod fillets. Chinese H&G product does not have the same high level of tariffs in the EU. This modification in the supply chain can be linked to the H&G production increase in Alaska.[17]

Table 7.28: European Imports of Pacific Cod Fillets from Major Producers, in Metric Tons, 2012-2014.

Exporter	2012	2013	2014	% of Total (3yr. Avg.)
China*	45,414	55,565	68,533	69%
U.S. (Alaska)	3,445	690	369	2%
Russia	10,871	25,884	36,572	30%
Total	**59,730**	**82,139**	**105,474**	

Notes: *Denotes re-exported Atlantic and Pacific cod.

Source: Global Trade Atlas, ASMI Alaska Seafood Export Database.

[17]Pers. comm. with Industry, 2015.

When Atlantic cod stocks began to decline, Pacific cod was used as a substitute. In the last few years, the Atlantic cod supply has increased, leading to more global cod supply, which has reduced cod prices in Europe. In the last five years (2010-2014), 27 percent of Alaska cod fillets were exported to Europe (Table 7.28). Frozen seafood in Europe tends to be a more popular protein than in the U.S.[18] In food service, the common packaging are ten- kilo bags of frozen 500 gram (about 1.1 pounds) portions.

Northern Europe and Southern Europe are two distinct end markets for cod products. In the north, the primary end markets are Germany, the UK, and Norway. In Southern Europe, Spain and Portugal consume traditional dishes that incorporate salted cod.

Pacific Cod Competing Supply

In addition to Alaska, Russia and Japan are the next largest Pacific cod producers. Japan was the first nation to commercially fish for Pacific cod in Alaska waters. The Asian nation still harvests Pacific cod, albeit in much smaller quantities than it did decades ago. The two largest suppliers of Pacific cod are the U.S. and Russia. There has been downward pressure on market prices for cod due to increased quotas in both the U.S. and Russia. More U.S. Pacific cod is processed in China as prices decrease, due to lower processing costs abroad.

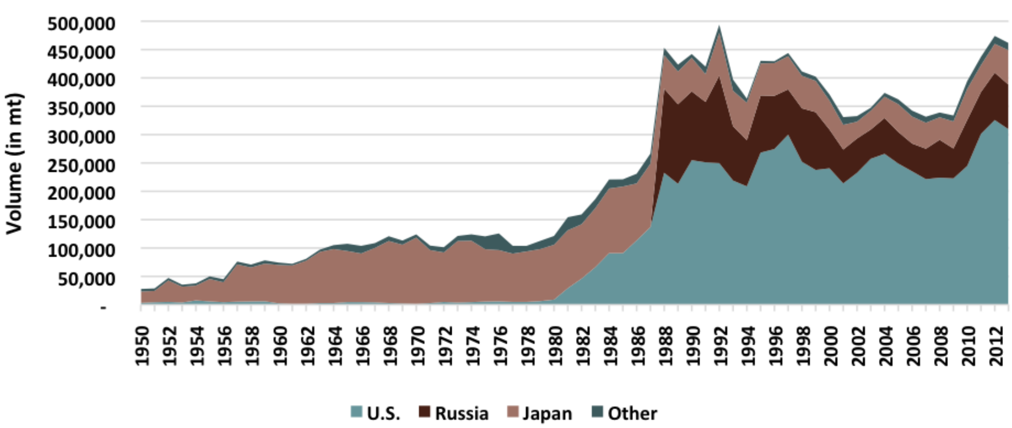


Figure 7.20: Global Supply of Pacific Cod, in Metric Tons, 1950-2013.
Source: FAO.

Competing Cod Species

There are two main species of cod, Pacific cod (*gadus macrocephalus*) and Atlantic cod (gadus morhua). Both are found in the northern hemispheres of the Atlantic and Pacific Oceans. Most end markets, cod do not differentiated between Pacific cod or Atlantic cod and they are generally considered almost identical substitutes for each other and. In 2014, it is estimated that 482,000 mt of Pacific cod and 1.2 million mt of Atlantic cod were harvested globally.

Fishing for Atlantic cod peaked in the mid-1970s, with global harvests near 3 million mt, nearly double the 2014 level. Stocks were overfished along the Atlantic coasts and served as case studies for collapsed fisheries. In recent years, the supply of Atlantic cod has dwindled with a reduction in harvests due to stocks being rebuilt to sustainable levels, while the demand in the EU for cod has

[18] Pers. comm. with Industry, 2015.

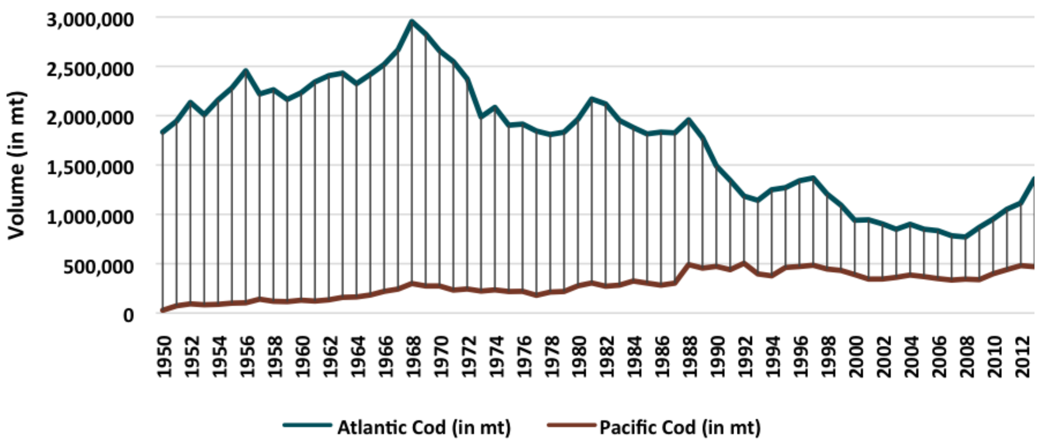


Figure 7.21: Global Supply of Atlantic and Pacific Cod, in Metric Tons, 1950-2013.
Source: FAO.

increased. An easy substitute, Pacific cod began to be exported to fulfill demand for Atlantic cod. Pollock, the largest single species fishery in the world, has also been a substitute for Atlantic cod.

The U.S. fishery for Atlantic cod is very small and Pacific cod from the North Pacific (primarily Alaska waters) accounts for almost all U.S. cod harvest. Alaska accounted for 68 percent of global Pacific cod harvests over the last three years (2012-2014), with an average of 327,000 metric tons annually (Table 7.28). It contributed 19 percent to the global cod harvest over the same three year period. As shown in Figure 11, shatterpack cod from Alaska follows a similar price trend of Atlantic cod.

Table 7.29: Major Cod Producing Nations, in Metric Tons, 2012-2014.

	2012	2013	2014
Atlantic Cod Supply	**1,107**	**1,343**	**1,334**
Norway	358	472	465
Russia	334	435	432
Iceland	205	236	240
EU	149	132	130
Other	61	68	67
Pacific Cod Supply	**470**	**470**	**482**
U.S.	331	320	330
Russia	77	78	80
Japan	50	60	60
Korea	12	12	12
Total Cod Supply	**1,577**	**1,813**	**1,816**

Source: Groundfish Forum.

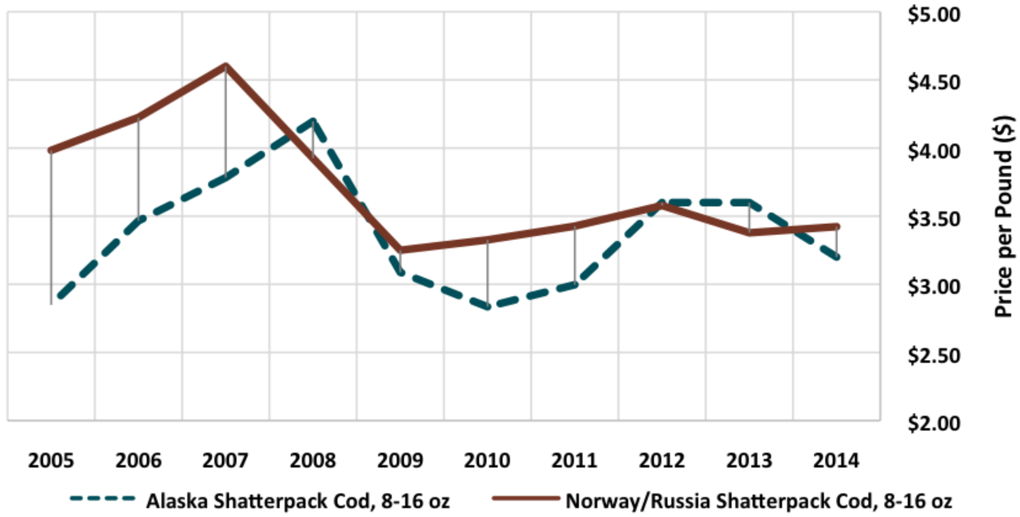


Figure 7.22: Comparison of Shatterpack Cod between U.S. and Competitors, 2005-2014.
Source: UBComtell.

7.5. Sablefish Market Profile

Sablefish (*anoplopoma fimbria*), known commonly as black cod, is a prized fish species found in waters from the Aleutian Island chain to Northern Mexico, with a larger distribution concentrated in the North Pacific Ocean, primarily in the Gulf of Alaska. Sablefish are a highly migratory fish that live along the continental slope and shelf gullies at depths of 200 meters and greater. The fish commands one of the highest ex-vessel prices of any species harvested in Alaska and is primarily exported into Asian markets. Sablefish accounted for $97.6 million of Alaska's total wholesale value in 2014 and 15 million pounds of the production volume.

Sablefish Product Description

Shoreside processors in Alaska receive sablefish deliveries either in the round or eastern cut, on ice. While there are various sablefish products, the primary product form for most Alaska processors is eastern cut H&G (headed and gutted, head removed just behind collar bone) (Table 7.30).

Table 7.30: Common Sablefish Products, 2014 Alaska Production Volume, and Recovery Rates (%).

	2014 Alaska Production (mt)	Average Recovery Rate Pct. from Round Weight	Recovery Rate Range
H&G, Eastern Cut	6,404	62%	60-67%
H&G, Western Cut	68	68%	67-71%
Pectoral Girdles (Collars)	207	6%	*N/A*
Fillets	49	50-64%	45-52%

Notes: Volume in product-weight terms.

Source: ADF&G (COAR) and Alaska Sea Grant (Crapo, Paust, & Babbit, 1993).

Sablefish is a premium-quality whitefish that can be smoked, grilled, and sautèed. It is sold in retail markets in frozen fillet form, often in a marinade. The species' high oil content and delicate texture make it a sought after product. It is primarily exported to wholesale buyers in Japan and other niche Asian markets, where most volume is eventually sold into high-end restaurants.

Sablefish Production and Supply Chain

The supply chain diagram illustrates the sablefish supply chain, from harvesters to consumers. Alaska sablefish is primarily harvested by relatively small boats (most less than 60') and delivered to shoreside plants either in the round or already headed/gutted. From there, the majority of product is sold in a frozen, H&G format to high-volume distributors in Japan and other Asian countries. These foreign importers sell product to secondary distributors in smaller volumes as well as directly to retail and restaurant. Product sold into the domestic market is typically filleted by primary processors in Alaska or 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.

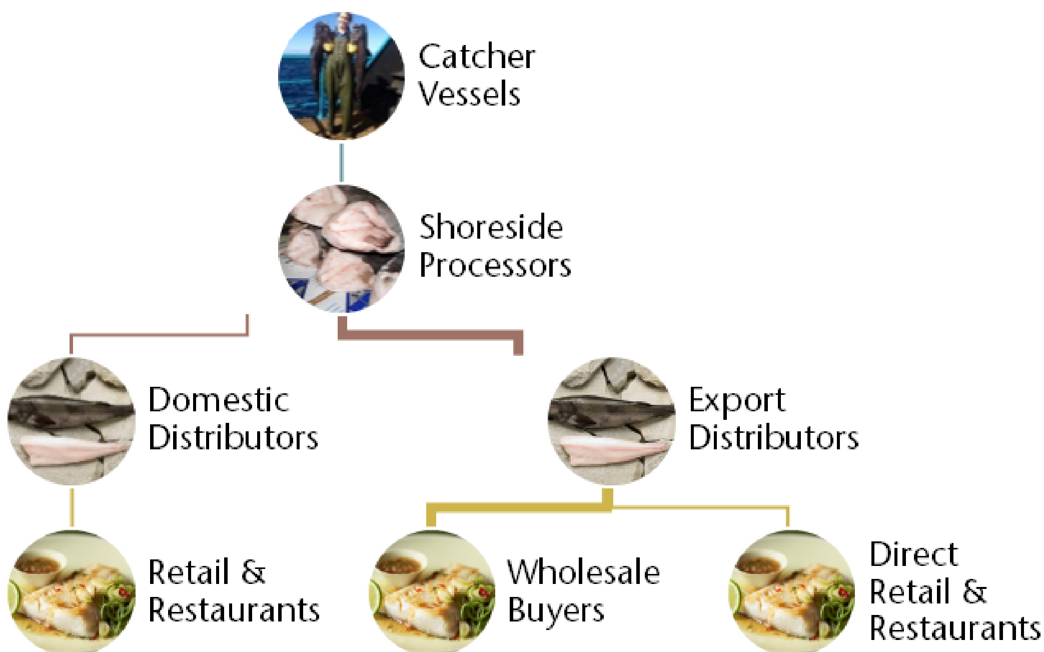


Figure 7.23: Global Distribution of Alaska Sablefish.

Sablefish Volume and Value

In the last ten years, Alaska fisheries have produced 71 percent of U.S. sablefish harvests. Volume peaked in the late 1980s at 28,000 mt in Alaska, doubling current landing levels of 12,200 mt. The state's sablefish production has been relatively stable since the late 1990s, but has declined each of the past two years (2013- 2014). The 2014 production volume was 59 percent lower than peak production levels, which averaged 21,200 mt between 1987 and 1990. The TAC declined in 2014, dipping 17 percent from the last three year average. The TAC for 2015 stabilized to 13,500 mt, following abundance trends. Lower recruitment rates are a cause of the decline in TAC from 2013-2016, but are projected to increase after 2016.[19]

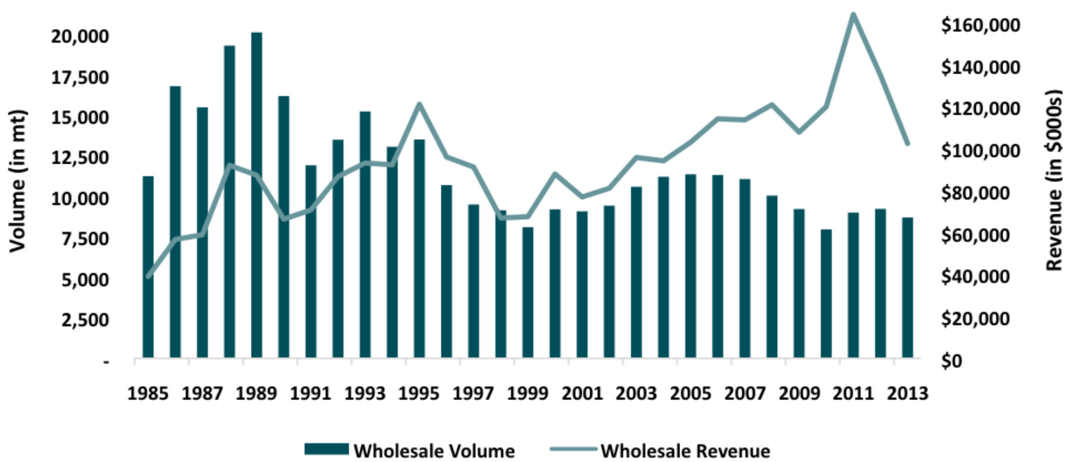


Figure 7.24: Alaska First Wholesale Volume and Value of Sablefish, 1985-2013.

Notes: Volume in product-weight terms.

Source: ADF&G (COAR).

Sablefish wholesale volume was roughly equivalent to halibut in 2014, with wholesale volumes near 6,500 mt for both species and wholesale values near $100 million dollars. Although they differ greatly in appearance and have different key markets, halibut and sablefish are similar in other regards. Both are high-value fish, are managed under the same IFQ program, and most are harvested using similar gear (primarily longline). The bulk of each species is harvested before and after the summer salmon fishing season, even though the season typically runs from March into November. Sablefish is delivered either eastern cut (dressed and iced) or in the round. Unlike halibut, which is sold either fresh or frozen, sablefish is almost entirely sold frozen.

The total wholesale value of sablefish was $98 million in 2014, a 26 percent decrease from the previous three year average. This percentage decrease is smaller than the decrease in volume from 2013, which measured to 21 percent.

Sablefish Price

Sablefish wholesale prices reached a record high of $8.27 per pound in 2011.[20] Since then, mean prices declined to $6.64 in 2012 and $5.34 in 2013. Smaller harvests led to higher prices in 2014, averaging $6.61 per pound. Volume is forecasted to be below historical averages in the next few years and prices are anticipated to remain high.

Fish size largely determines pricing in wholesale markets, but prices are also affected by quality, origin, supply, substitute fish prices, and the dollar-yen exchange rate. Sablefish are categorized by

[19](Hanselman, Lunsford, & Rodgveller, 2014)
[20]NMFS Sablefish Multi-Year Prices

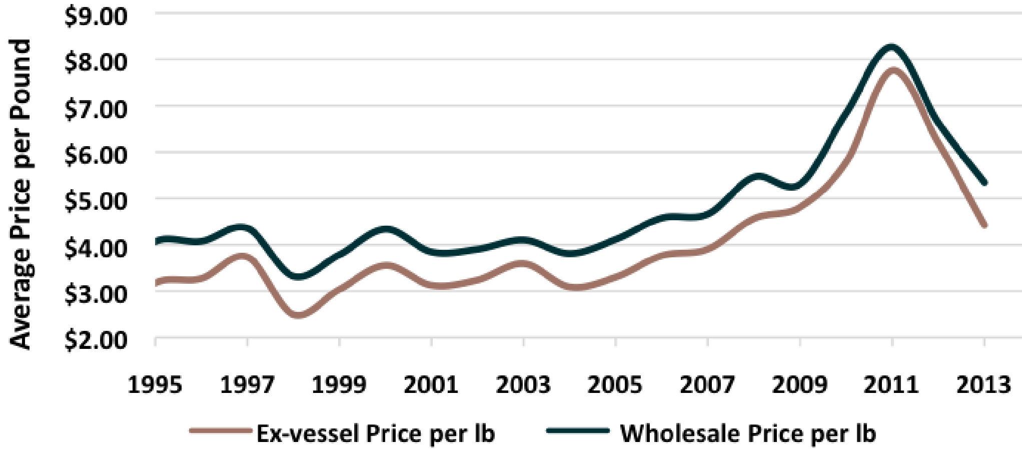


Figure 7.25: Alaska Wholesale and Ex-vessel Prices per Pound, 1995-2013.
Source: ADF&G (COAR).

weight: the larger the fish, the higher the price per pound.[21] Differences in wholesale prices often range from $0.75 to $1.50 for each additional pound.

Sablefish Key Market Analysis

Sablefish is primarily sold by the container load as a frozen, dressed (eastern-cut) product. Importers purchase containers of sablefish and then sell it to wholesale buyers, who in turn act as distributors or secondary processors for restaurants and retail markets.[22] Japan has been the primary market for Alaska sablefish extending back to the 1960s when Japanese fishing vessels began harvesting the species in waters off the coast of Alaska. China (including Hong Kong) and the U.S. are the next largest markets, and strong demand from those countries has pushed prices higher in recent years.[23]

U.S. sablefish exports are a reasonable proxy for global market share, as the U.S. accounted for just under 90 percent of global supply. In 2014, Japan account for 77 percent of U.S. exports by weight; HS (Harmonized System) codes typically do not allow for a more comprehensive market share analysis outside of U.S. exports or Japanese imports. Export volume has decreased since 2013, with overall revenues decreasing by 15 percent (Table 7.31).

Canada is the only other major sablefish exporter, producing roughly 11 percent of the global share. Canada's top two export markets are Japan and the U.S.; however, it is likely that a portion of frozen sablefish imported by U.S. buyers from Canada is re-exported to Asia.

Patagonian toothfish (*Dissostichus eleginoides*), also known as Chilean seabass, is the primary competitor with sablefish in high-end whitefish markets. It also features a high oil content and rich white meat.

Japan

[21] (Reynolds, 2015)
[22] (Reynolds, 2015)
[23] (Sackton, Near Record Prices for Sablefish May Mean Much Lower Consumption in Japan, 2015)

Table 7.31: 2014 U.S. Sablefish Exports to Global Markets.

	Volume (mt)	Revenue ($millions)	Pct. Change in Volume from 2013	Pct. Change in Revenue from 2013
Japan	5,131	$59.5	-24%	-16%
China/Hong Kong	595	8.5	-26%	-16%
Singapore	141	2.3	3%	25%
Europe	316	4.6	13%	48%
All other	482	6.7	-	-
Total	**6,665**	**$81.6**	**-23%**	-15%

Notes: Volume is in product-weight terms.

Source: NMFS Foreign Trade Data.

Japan imports more sablefish than all other countries combined, but its import share of large sablefish decreased in the last few years due to a strong dollar and increasing international demand.[24] Despite the recent downward trend in market share, Japan's sablefish market remains a key segment for the Alaska seafood industry. The country imported approximately 7,200 mt of frozen H&G sablefish in 2014, valued at $96.6 million (Table 7.32). Total imports in 2014 were one-third below the 2009 level of 10,600 mt, including a 14 percent decline between 2013 and 2014. Total imports in 2014 were 18 percent below the three year average of 7,900 mt, including a 15 percent decline between 2013 and 2014.

Sablefish supply, exchange rates, and availability of substitutes, such as mero (Patagonian toothfish), drive sablefish prices historically. A weaker yen and increasing demand in the U.S. and other export markets have pushed sablefish prices up in Japan (in both USD and yen).

Table 7.32: Japan Frozen H&G Sablefish Imports, by Major Trade Partner, 2009-2014.

Country of Origin	2009	2010	2011	2012	2013	2014
Import Volume (MT)						
U.S.	9,409	8,402	7,878	8,324	7,655	6,514
Canada	1,196	941	762	789	725	668
Total	**10,607**	**9,349**	**8,640**	**9,113**	**8,380**	**7,182**
Import Value ($Millions)						
U.S.	$117.0	$123.5	$151.2	$106.8	$90.3	$87.6
Canada	15.6	13.9	14.9	11.4	9.0	8.9
Total	**$132.6**	**$137.4**	**$166.0**	**$118.2**	**$99.3**	**$96.6**
Import Value/MT						
Avg. Total USD/MT	$9,409	$8,402	$7,878	$12,972	$11,850	$13,444
Avg. Yen/USD Exchange Rate	¥93.6	¥87.8	¥79.7	¥79.8	¥97.6	¥105.8
Est. Total Yen/MT (in ¥000s)	¥880	¥737	¥627	¥1,035	¥1,156	¥1,423

Notes: Volume is in product-weight terms.

Source: Global Trade Atlas and OANDA.

[24] Pers. comm. with Industry, 2015.

United States

Estimates for the five-year average of annual U.S. consumption of sablefish are around 2,895 mt, though the domestic market for sablefish has been increasing for several reasons (Table 7.33). First of all, high prices for Patagonian toothfish have pushed consumers toward substitutes, in particular sablefish. Another reason for the growing popularity of sablefish is its increased usage in Japanese restaurants and chefs in other premium outlets. Lastly, a significant weakening of the yen versus the dollar has reduced demand in Japan and increased the supply of sablefish available for the U.S. market.[25]

Table 7.33: Estimated U.S. Sablefish Market Supply, in Metric Tons, 2010-2014.

	Est. U.S. Wholesale Production	U.S. Imports	U.S. Exports	Est. U.S. Supply
2010	12,182	409	9,148	3,443
2011	12,960	833	13,088	705
2012	12,467	691	10,144	3,014
2013	11,259	268	8,646	2,881
2014	10,400	695	6,665	4,430
5yr. Average	**11,854**	**580**	**9,538**	**2,895**

Notes: Production and supply figures are quoted in product-weight terms, based on frozen H&G, eastern cut product.

Source: McDowell Group estimates, based on NMFS harvest and trade data.

China and Other Asian Markets

Sablefish has recently seen increased demand in China and other large Asian markets. China is the largest seafood producer in the world as well as a re-processor for Alaska seafoods.[26] Demand for high-quality fish has increased due to an expanding middle class, and in recent years, lavish government parties in China and Hong Kong drove an increase in exports until 2013 when the Chinese government curbed expenditures.[27] In 2013, U.S. export value was highest in Hong Kong and China, with values over $7.2 million and $2.4 million, respectively.

Sablefish Global Production and Competing Supply Analysis

In 2014, the U.S. harvested 16,500 mt of sablefish while Canada harvested 1,773 mt. Over the last five years, Alaska has harvested 65 percent of the global sablefish production. Current harvest levels are lower than historical averages, which has led to higher prices. For wholesale markets, this means volume will remain low and prices fairly high, however there are limitations.

A common substitute on the market, Patagonian toothfish, has a similar high oil content and rich flavor, and equivalent high prices. Patagonian toothfish production peaked at 41,000 mt in 2001 and harvest levels have been declining since. Many different countries fish for Patagonian toothfish with varying degrees of sustainable management. In the early 2000s, it was estimated that up to half of

[25] (Sackton, As Alaska sablefish season closes, prices reach record levels in Japan, 2014)
[26] (Alaska Seafood Marketing Institute, 2011)
[27] (China seafood sales feel pinch of corruption crackdown, 2013)

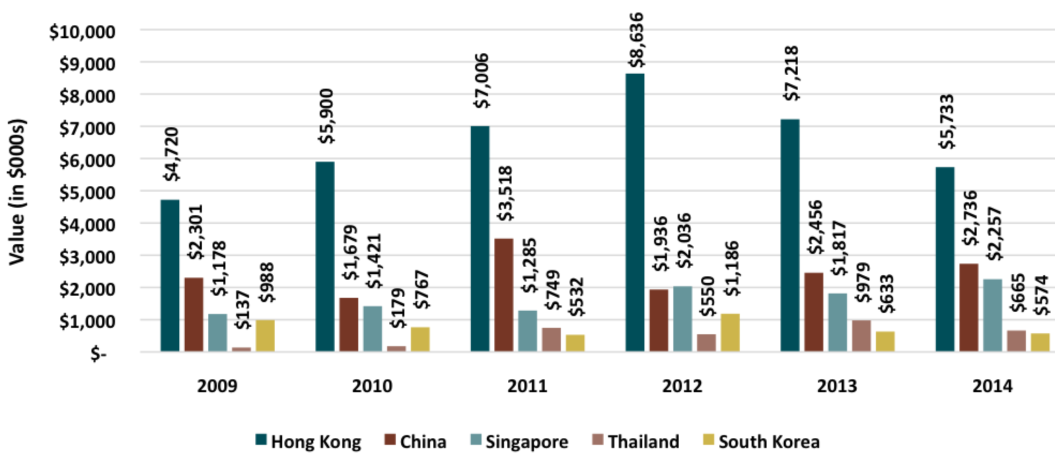


Figure 7.26: U.S. Exports of Sablefish by Top 5 Asia Countries (excluding Japan, in $000s), 2009-2014.
Source: Sonu 2014.

all harvests consisted of illegal, unreported fishing actual toothfish landings. This led to informed consumers moving to more sustainably harvested species, such as sablefish.[28]

Sablefish farming has not developed as anticipated. There are some sablefish farming ventures in British Columbia, with no evident impact on wild Alaska sablefish harvest or revenues. Canada's wild sablefish harvest is equivalent to that of California or Oregon, with 1,773 mt harvested in 2014.[29]

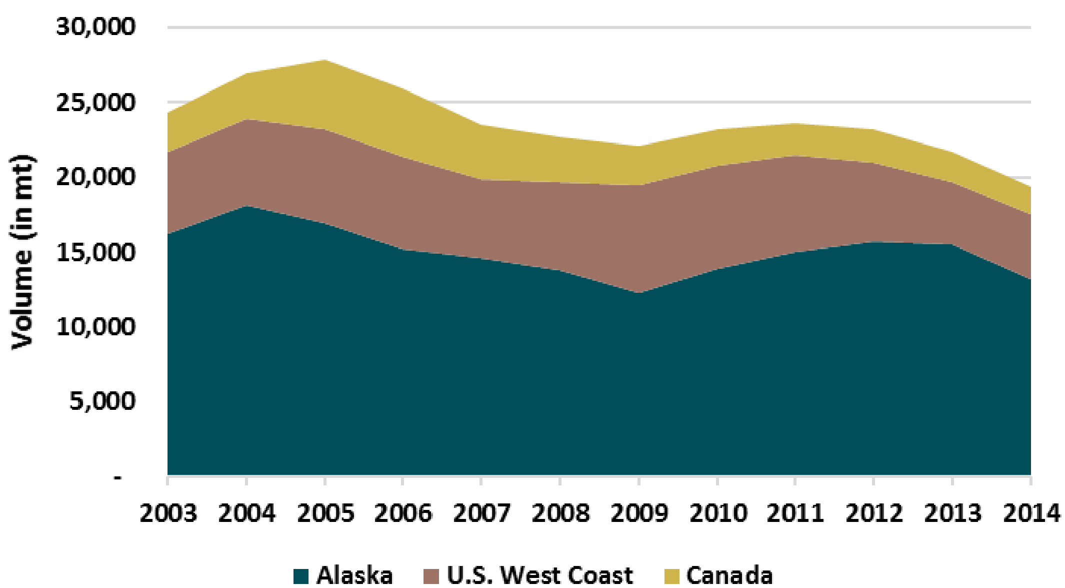


Figure 7.27: Global Supply of Sablefish, in Metric Tons, 2003-2014.
Notes: In 2014 Alaska comprised 65% share of the volume, U.S. West Coast 24% and Canada 10%.
Source: AKFIN.

[28](Catarci, 2004)
[29](Pacific Fisheries Catch Statistics, 2015)

7.6. Yellowfin Sole & Rock Sole Market Profiles

7.6.1 Yellowfin Sole

Yellowfin sole (*Limanda aspera*) is one of the most abundant flatfish in the eastern Bering Sea. Alaska is responsible for the majority of the global catch. Overall, the species represented 45 percent of the first wholesale value in 2014 of all Alaska flatfish, which also includes rock sole, arrowtooth flounder, flathead sole, turbot, and rex sole. Table 7.34 summarizes some of the key market statistics for yellowfin sole products from Alaska. Most of Alaska's yellowfin sole production is exported to China.

Table 7.34: Summary Profile of Yellowfin Sole Wholesale Production and Markets, 2014.

Value and Volume		Key Products	H&G	Whole	Other
Wholesale Production (mt)	93,794	% of Value	69%	12%	19%
Pct. of Global Flatfish Harvest (2013)	14%	Key Markets	China	S. Korea	Other
First Wholesale Value ($millions)	$97.8	% of 1st Sales	86%	13%	1%
Pct. of Alaska Groundfish Value	4%	YoY Change	-1%	6%	14%
Pct. of Alaska Flatfish Volume	53%	Competing Species:Other flatfish, Tilapia, Whitefish.			

Yellowfin Sole Product Description and Supply Chain

Yellowfin sole average 42 cm long (approximately 16.5 inches) and weigh 750 grams (1.6 pounds). The primary products produced in Alaska are frozen H&G (83 percent of production volume) and frozen whole fish (16 percent). Yellowfin sole is a white fish with delicate, sweet, and mild-tasting flesh. The most common H&G size is approximately 130-450 grams and most whole round fish are 200-700 grams.[30] Almost all yellowfin sole are exported to China where they are processed into fillets. These twice-frozen fillets are primarily sold as frozen skinless, boneless 2-4 ounce fillets. Sole are commonly served poached, sautèed, or steamed.

The supply chain for yellowfin sole begins with catcher processors in Alaska that export frozen H&G product to secondary processors in China. Secondary processors transform the fish into its frozen skinless, boneless fillets, primarily for re-export. Twice-frozen fillets are then sold to distributors who sell fish to retail and foodservice operators in Europe, Japan, and the United States.

Yellowfin Sole Production Volume and Value

Alaska produced 93,794 mt of yellowfin sole products in 2014 worth $97.8 million. The species accounted for 9.6 percent of total groundfish production volume and 4.2 percent of the total first wholesale value for groundfish species in 2014. Yellowfin sole are primarily harvested by the Amendment 80 fleet of catcher processors, which consists of 19 vessels. This fleet also targets other flatfish and rockfish species. From 2010 to 2014, flatfish accounted for the majority (60 percent) of Amendment 80 fleet harvests. The first wholesale value of yellowfin sole has been pushed lower due to an increase in whitefish competition.

[30] (Alaska Seafood Marketing Institute, 2012)

Yellowfin sole prices are highly dependent on when the fish are harvested. Fish caught in the winter, prior to spawning, command higher prices. Flesh quality declines significantly during and after spawning, resulting in lower prices.

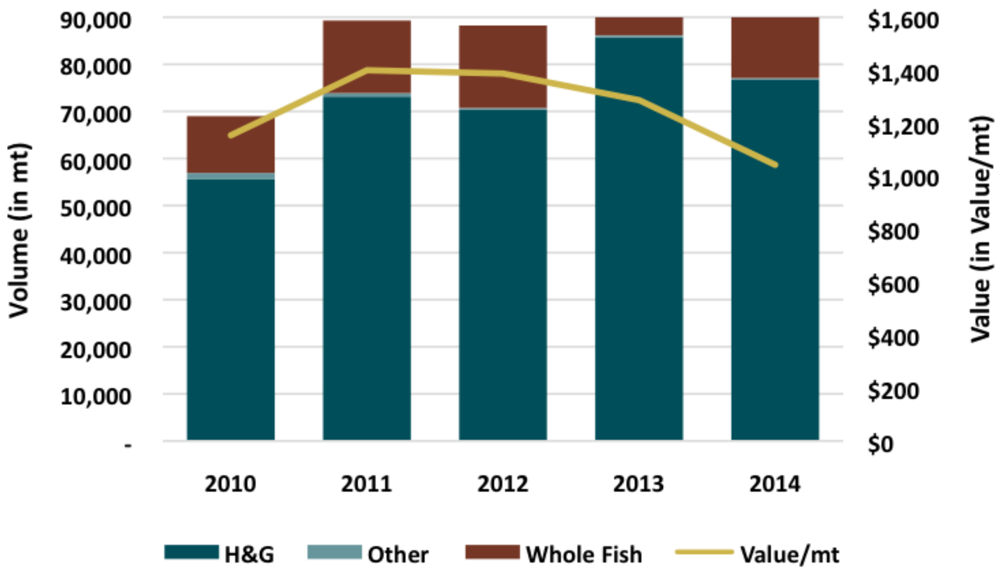


Figure 7.28: First Wholesale Volume and Value for Yellowfin Sole, 2010-2014.

	2010	2011	2012	2013	2014
Wholesale Value (in $Millions)	$69.0	$89.3	$88.2	$94.6	$93.8

Source: AKFIN.

7.6.2 Rock Sole

Rock sole (*Lepidopsetta polyxystra* and *bilineata*) is the second most abundant flatfish by wholesale volume (after yellowfin sole) from the Gulf of Alaska and the Bering Sea. Alaska is responsible for the majority of the global rock sole harvest. In 2014, rock sole accounted for 16 percent of the total first wholesale volume and 17 percent of wholesale value for Alaska flatfish (Table 7.35). Most of Alaska's rock sole production is exported to China, Japan, or South Korea as H&G or whole fish products. Rock sole generate higher unit value than yellowfin sole due to markets for their roe. This market profile summarizes production and markets for rock sole fisheries in Alaska.

Table 7.35: Summary Profile of Rock Sole Wholesale Production and Markets, 2014.

Value and Volume		Key Products	H&G	H&G w/ Roe	Whole
Wholesale Production (mt)	30,808	% of Value	51%	34%	11%
Pct. of Global Flatfish Harvest (2013)	6%	Key Markets	China	S. Korea	Other
First Wholesale Value ($millions)	$39.7	% of 1st Sales	85%	16%	1%
Pct. of Alaska GF/Crab Value	1.7%	YoY Change	-13%	36%	-70%
Pct. Flatfish Volume	17%	Competing Species:Other flatfish, Tilapia, Whitefish.			

Rock Sole Product Description and Supply Chain

Rock sole average about 61 cm in length (approximately 24 inches) and weigh between two to four pounds (900-1,800 grams).[31] The primary products produced in Alaska are frozen H&G (51 percent of production volume), frozen H&G with roe (34 percent), and whole fish (11 percent). The general H&G size is approximately 500-2,500 grams and whole round is 750-3,500 grams.[32]

Rock sole are primarily caught by catcher processors in Alaska targeting roe-bearing females. Most male rock sole are sold to China and the females with eggs are exported to Japan. Almost all H&G and whole round rock sole is processed in China into fillets that are re-exported into the U.S. It is primarily sold as frozen skinless, boneless 2-5 ounce fillets. It is also sold as H&G, roe-in to Japan, where it is a specialty item that is grilled whole. Rock sole is a delicate and mild- tasting whitefish. It is commonly served poached, sautéed, or steamed.

The short duration, high value roe fishery is unique to the flatfish species. During the spawning months, fish with roe intact are hand processed with roe-in, a more expensive processing technique than standard H&G.

Rock Sole Production Volume and Value

Alaska produced 30,808 mt of rock sole products in 2014 worth $39.7 million (Table 7.36). The species accounted for 3.2 percent of total groundfish production volume and 1.7 percent of groundfish value in 2014. Rock sole are primarily harvested by the Amendment 80 fleet of catcher processors. This fleet also targets flatfish and rockfish species. From 2010 to 2014, flatfish accounted for the majority (67 percent) while rockfish species accounted for 23 percent.

Table 7.36: Alaska Rock Sole Production Volume and Value, 2014.

	Volume (in mt)	Value (in $000s)	Recovery Range	Price per Kilo	Pct. of Total Volume	Pct. of Total Value
H&G	19,799	$20,463	60-79%	$1.03	64%	51%
H&G, roe-in	6,736	$13,434	60-79%	$1.99	22%	34%
Whole fish	3,729	$4,530	80-94%	$1.21	12%	11%
Other*	544	$1,309	22-92%	$2.41	2%	3%
Total	**30,808**	**$39,736**		**$1.29**	**100%**	**100%**

Notes: *Other includes fillets, which are hand processed. While only two percent of total value, they command the highest price per pound.

Source: ADF&G (COAR).

Rock sole is similar to other flatfish, except for the roe-in market. In 2014, a third of the total rock sole wholesale value came from H&G roe-in. H&G product with roe was worth nearly twice as much, on a per pound basis, as regular H&G product. H&G, H&G roe-in, and whole fish made up 98 percent of the total rock sole production volume in 2014.

[31](Washington Department of Fish and Wildlife, 2015)
[32](Alaska Seafood Marketing Institute, 2012)

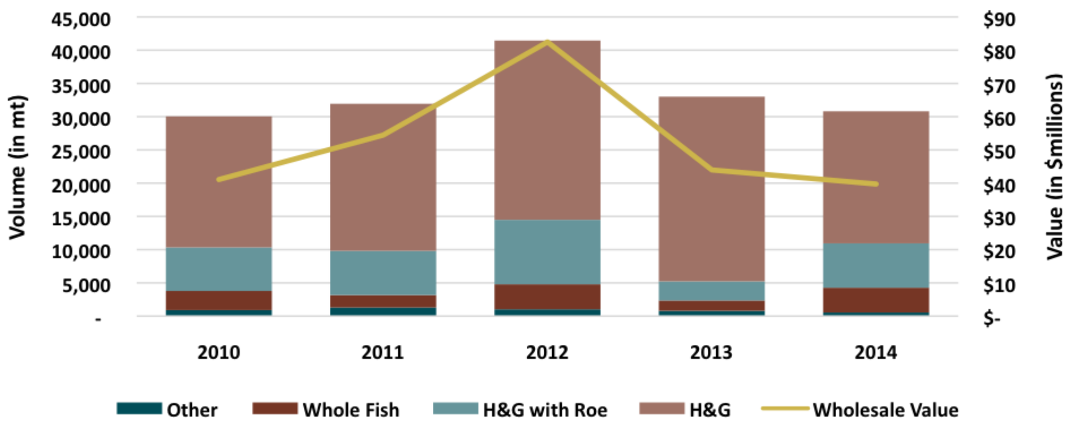


Figure 7.29: First Wholesale Volume and Value for Rock Sole, 2010-2014.
Source: AKFIN.

Key Market Analysis for Sole

Based on U.S. export statistics, roughly 82 percent of Alaska's yellowfin and rock sole is exported to China (Tables 7.37 and 7.38). The balance flows to South Korea, or remains in the U.S. market. Whole or H&G yellowfin sole is exported to re-processors in China where it is converted into individual frozen skinless, boneless fillets. The majority are re- exported back into North America and Europe for use in food service and for retail. A portion of yellowfin sole is sold as kirimi (slices of fish), which is popular in Japanese cafeterias.[33] Korea tends to purchase smaller fish, which tend to be cheaper per kilo.

Most rock sole is combined with other flatfish which is exported to China and reprocessed as frozen fillets and other products. The highest value product, H&G with roe intact, is consumed in Japan.

Table 7.37: U.S. Yellowfin Sole Exports by Major Country, in Metric Tons, 2013-2014.

	2013		2014		Yr.-Over-Yr. Pct. Change in Volume	Pct. Share of Exports
	Volume (in mt)	Value ($000s)	Volume (in mt)	Value ($000s)		
China	62,680	$89,057	62,095	$86,134	-1%	86%
South Korea	9,381	$12,775	10,017	$12,264	7%	14%
Other	28	$35	32	$161	11%	1%
Total	**72,089**	**$101,867**	**72,143**	**$98,559**	**0.08%**	**100%**

Source: NMFS Foreign Trade.

China

China is responsible for reprocessing most Alaska-caught yellowfin and rock sole, which is processed with other flatfish into frozen portioned fillets. Approximately 80 percent of all China's flatfish exports go to Europe, Japan, and the United States (Table 7.39). As China's economy grows, an increasing number of whole round sole remain in the domestic market. Both yellowfin and rock sole

[33]Pers. Comm. with Industry Representative (2015).

Table 7.38: U.S. Rock Sole Exports by Major Country, in Metric Tons, 2013-2014.

	2013		2014		Yr.-Over-Yr. Pct. Change in Volume	Pct. Share of Exports
	Volume (in mt)	Value ($000s)	Volume (in mt)	Value ($000s)		
China	18,989	$31,686	16,557	$26,336	-13%	85%
Japan	1,947	$3,495	2,649	$4,463	36%	14%
South Korea	503	$907	149	$254	-70%	1%
Other	256	$584	136	$295	-47%	1%
Total	**21,695**	**$36,671**	**19,491**	**$31,348**	**-10%**	**100%**

Source: NMFS Foreign Trade.

require hand processing, which is labor-intensive. Due to lower labor costs, much of the flatfish catch from Alaska is processed in China.

Table 7.39: China Flatfish Exports, by Value and Volume, 2012-2014.

	2012		2013		2014		Pct. Market Share (3yr Avg.)
	Value ($000s)	Volume (in mt)	Value ($000s)	Volume (in mt)	Value ($000s)	Volume (in mt)	
Europe	$97.9	20,140	$87.0	19,595	$99.1	24,939	29%
Japan	$99.0	18,416	$106.1	19,344	$106.2	20,577	26%
U.S.	$88.1	17,363	$95.5	18,852	$81.9	17,139	24%
Taiwan	$5.1	289	$19.9	984	$36.2	2,197	2%
Canada	$24.5	4,626	$26.0	4,844	$31.5	5,947	7%
Other	$27.5	7,289	$34.1	9,452	$39.3	11,896	13%
Total	**$342.2**	**68,123**	**$368.7**	**73,071**	**$394.2**	**82,695**	**100%**

Source: Global Trade Atlas.

Japan

Japan imports 4 percent of Alaska's frozen H&G rock sole, primarily females with roe intact. They also import reprocessed rock sole roe and kirimi from China. H&G fish are commonly grilled with the roe inside as a delicacy. According to industry experts, Japanese demand has decreased for this specialty product, resulting in lower prices. From 2013 to 2014, export volume increased by 19 percent, but the price per kilo decreased by 10 percent (Table 7.40).

Table 7.40: U.S. Rock Sole Exports to Japan, in Metric Tons, 2010-2014.

	2010	2011	2012	2013	2014	Yr.-Over-Yr. Pct. Change
Volume (in mt)	4,569	3,149	1,256	1,947	2,649	36%
Price per kilo	$1.38	$1.68	$1.63	$1.80	$1.69	-6%
Value (in $000s)	$6,325	$5,282	$2,048	$3,495	$4,463	28%

Source: NMFS Foreign Trade.

U.S. and Europe

The U.S. and Europe consume a large amount of flatfish, most of it processed in China. Flatfish include a variety of groundfish species such as sole, flounder, and plaice. Both end markets consume flounder in fast food restaurants as well as in grocery stores in the frozen aisle. In the U.S., about 75 percent of the sole and flounder imports enter through the East Coast, a region where flounder is a traditional meal.

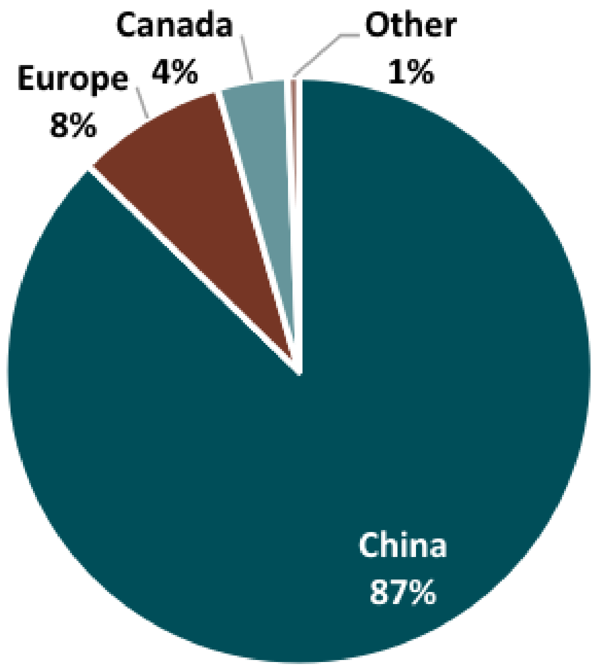


Figure 7.30: U.S. Imports of Sole, by Volume, 2014.
Source: NMFS Foreign Trade.

The unit value of imported frozen sole fillets (into the U.S.) from China is down 17 percent from the peak in 2012 (See Figure 4). Year-to-date import unit values through August 2015 for these frozen sole fillets are down 9 percent from calendar year 2014. The decline is likely to a number of factors, including more competing pollock supply, lower fuel costs, and a stronger U.S. dollar. In addition, Europe's harvests of plaice, a substitute for yellowfin sole, have increased leading to lower demand for yellowfin sole.

Prices of frozen sole fillets from China generally track the value per pound. of Alaska H&G flatfish product. However, the gap between primary and finished product has increased over the past decade supporting industry's claims of increasing secondary processing costs in China. Fuel is a major operating cost for flatfish catcher processors, accounting for approximately 20 percent of total expenses in 2013 for the Amendment 80 sector.[34] Converting the first wholesale value of H&G flatfish to a fillet basis suggests the value-added per pound - or cost of producing such products - increased from less than $0.20/lb. in 2006 to more than $0.70/lb. since 2013.

Other Markets

South Korea consumes some yellowfin sole domestically. The country is the end market for lower quality yellowfin that have already spawned. Koreans also highly value the whole fish appearance; marks and flaws in the gills and eyes detract from value in this market. A substantial portion of

[34](Fissel, et al., 2014)

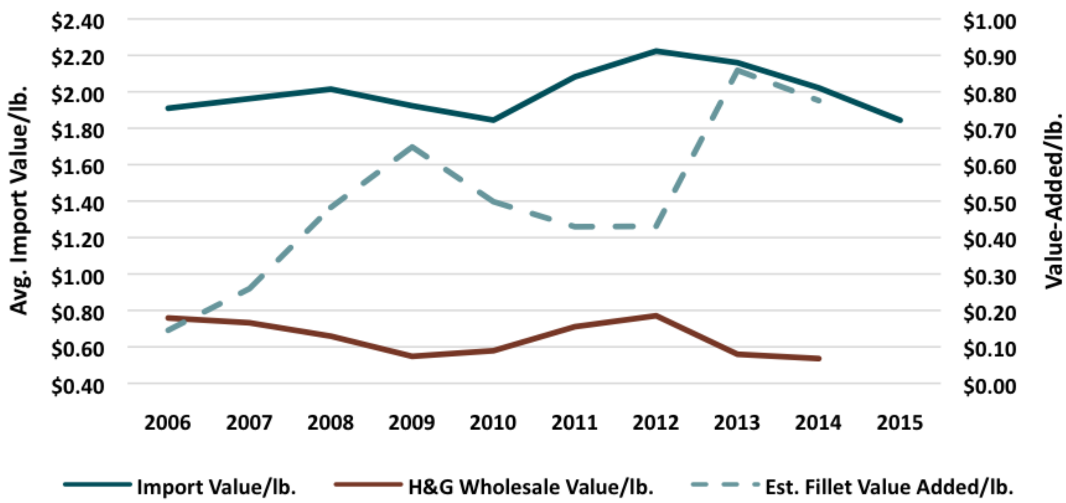


Figure 7.31: Average Unit Value of Sole Fillets from China vs. H&G First Wholesale Value, 2006-2015.

Notes: Figures reflect non-specific sole imports (fillets) and first wholesale value of Alaska flatfish (H&G only). Value added figures are estimated by applying a H&G-to-fillet recovery rate of 43 percent to H&G first wholesale average value/lb. Data for 2015 reflects year-to-date imports through August.

Source: NMFS Foreign Trade, AKFIN, and McDowell Group estimates.

the end market for whole fish is Korea. Brazil was a growing market until it recently banned fish imports with water-retention preservatives used to improve the quality of the flesh, which includes most twice-frozen yellowfin sole from China.[35]

Competing Flatfish Supply

Both yellowfin and rock sole are primarily processed at-sea in H&G format initially, destined for fillet processing in China. In the last five years, Alaska's first wholesale volume of flatfish includes 52 percent yellowfin sole, 20 percent rock sole, and 21 percent other species combined. Nearly all of the flatfish are caught by the Amendment 80 fleet, which targets schools of flatfish, depending on seasons. Yellowfin sole are targeted until they spawn, from winter until early spring. Rock sole are targeted during late winter-early spring, just before they spawn.

In terms of contributions to the global flatfish supply, Alaska yellowfin sole was about 14 percent of total flatfish supply volume and rock sole was 6 percent. Alaska's contribution to global production of flatfish has been increasing since the mid-1980s. Alaska flatfish continue to compete with species such as European plaice and dabs. Global flatfish supply has remained fairly constant over the past four decades, but the U.S. contribution increased from 10 percent in 1977 to 48 percent in 2013. Most Alaska sole and flounder ends up in either the U.S. or Europe. The U.S. end market allows for multiple species to be labeled as "flounder." However, Europe requires species to be labeled with the Latin name, which reduces the amount of sole sold as flounder.

[35]Pers. Comm. with Industry Representative, 2015.

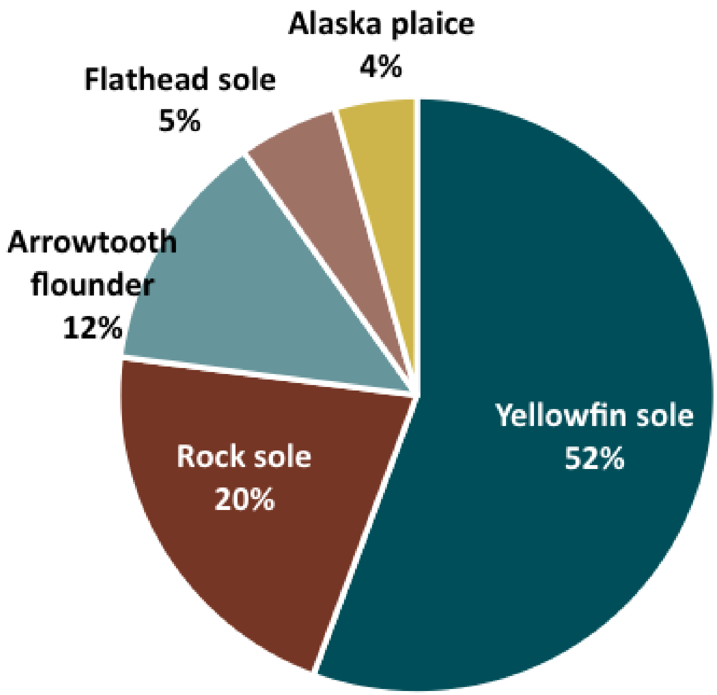


Figure 7.32: Alaska Flatfish Production, by First Wholesale Volume, 2010-2014.
Source: AKFIN.

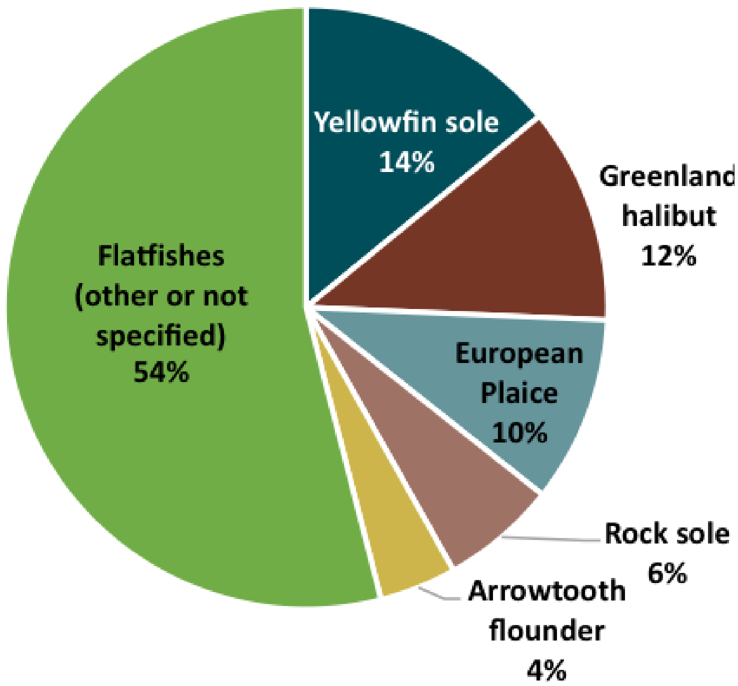


Figure 7.33: Average Global Production of Flatfish Species, by Volume, 2010-2013.
Source: FAO.

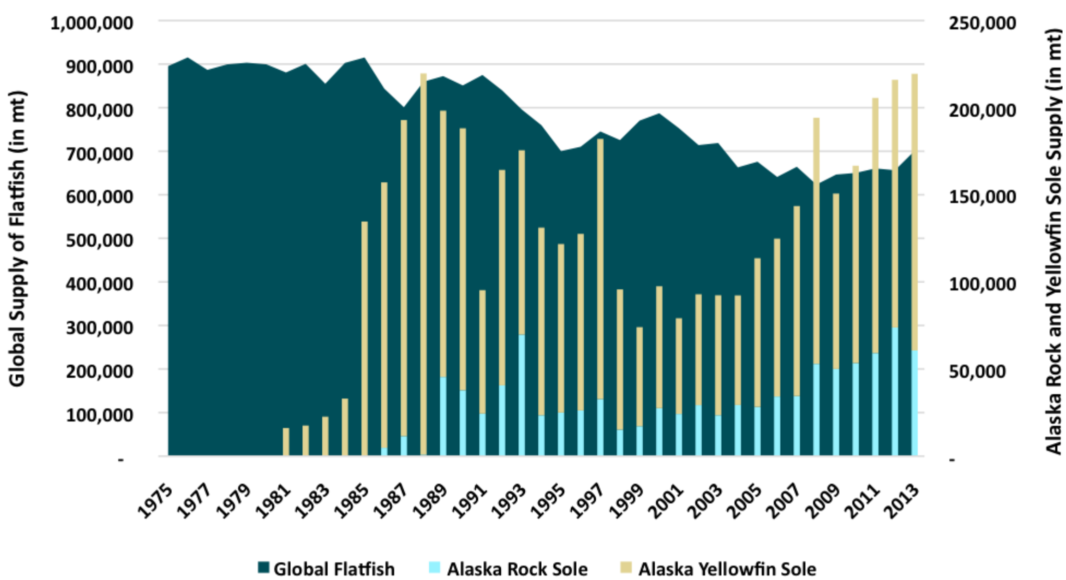


Figure 7.34: Global Flatfish Supply and Alaska Harvest of Yellowfin and Rock Sole, by Volume, 1975-2013.
Notes: Figures include all flatfish globally.
Source: FAO.

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8. AMENDMENT 91 CHINOOK BYCATCH ECONOMIC DATA REPORT (EDR) SUMMARY AND ANALYSIS

8.1. Introduction

Amendment 91 was passed by the North Pacific Fisheries Management Council (NPFMC) and implemented in 2011. A trailing amendment was passed which collected several data elements from industry, as discussed below.

The purpose of this section of the SAFE is to contribute information to enable the public, the Council, industry, and other stakeholders to better understand and analyze the impacts of Amendment 91. This information should be viewed in the context of other relevant resources, including Chinook catch information and the AFA Cooperative and Incentive Plan Agreement (IPA) reports.[1]

The section updates the public on the status of the Amendment 91 (A91) Chinook Salmon Economic Data Report (EDR) program for the 2012-2015 fishing seasons as well and related data-collection measures implemented in relation to A91 to the BSAI Groundfish FMP.

The report includes the following:

- A brief review of the Council's objectives and process for the development and implementation of this data collection;
- A summary of data collected over the first four years of the A91 vessel master ("skipper") survey and fuel usage data collection; and
- A report on collaborative efforts between industry members and NMFS and Council staff to implement the EDR program, minimize EDR submitter burden, ensure data quality standards, and that the Council's stated objectives for the data collection program are met.

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). The EDR is a mandatory reporting requirement under 50 CFR 679.65 for all entities participating in the American Fisheries Act (AFA) BSAI pollock trawl fishery, including vessel masters and businesses that own or lease[2] 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 prohibited species catch (PSC) from NMFS. The EDR program is comprised of three separate survey forms[3]:

- Chinook salmon PSC Allocation Compensated Transfer Report (CTR)

[1]Current and historical Chinook 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.

[2]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.

[3]More information on Amendment 91 EDR forms can be accessed online at http://www.psmfc.org/chinookedr/.

- Vessel Fuel Survey
- Vessel Master Survey.

Distinct conditions that require an entity to submit one or more of the respective forms are discussed in more detail below. 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 (implemented in the 2012 fishing year) to add a “checkbox” to the tow-level logbook record, requiring vessel operators to indicate instances when a vessel fishing pollock in the BSAI changed fishing locations, prior to each tow, for the primary purpose of avoiding Chinook salmon PSC. For AFA CPs, this information is recorded in the Trawl CP Electronic Logbook (ELB) and submitted to NMFS via the eLandings system. The DFL for trawl CVs is not submitted to NMFS in a form that permits electronic data capture, so vessel movement data for pollock CVs remains unavailable to analysts pending implementation of an Electronic Logbook for trawl CVs or the digitization of logbook data. Vessel movement data collected from CPs for the 2012-2015 fishing year is still being analyzed and is therefore not included in this report.

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 the yield of pollock. The Council’s December 2009 purpose and need statement recommended that these data be used to address four components of Amendment 91:

- Understand the effects and impacts of the Amendment 91 IPAs, the higher and lower PSC hard caps, and the performance standard;
- 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 Amendment 91 EDR, the Council recommended implementing new data collection measures as summarized below:

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).

Subsequent to the Council's final action on the EDR program in 2009, industry representatives worked with AFSC economists, AKRO, and Council staff members to refine EDR survey forms, clarify instructions, and develop and improve the administrative process for implementing the annual data collection. An initial workshop was held at AFSC on June 21, 2010 to review the original drafts of the three Amendment 91 EDR forms and solicit input on any needed modifications. With minor revisions resulting from the workshop, the draft forms were reviewed by the Council in October 2010 and approved with some additional modifications to the Vessel Fuel Survey and Vessel Master Survey forms recommended by the Advisory Panel. At the same time, the Council reviewed the draft Proposed Rule implementing the new data collection measures, including the EDR program, the addition of the salmon movement checkbox to the Daily Fishing Logbook (CV's) and Electronic Logbook (CP's), and additional requirements for IPA Annual Report regarding PSC sub-allocations and in-season transfers[4].

The final rule to implement the above measures went into effect March 3, 2012[5]. Although the Chinook PSC reduction measures under Amendment 91 itself were implemented for the 2011 pollock fishing season, the new data collection measures required the affected entities to initiate new in-season recordkeeping systems beginning in 2012. As a result, the earliest feasible administration of annual EDR reports was to collect data for the 2012 pollock season, with an initial EDR submission due date of June 1, 2013. Submission requirements for each of the three forms are contingent on the entity's role and activity in the AFA Pollock Fishery 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 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.

[4] Available at http://www.npfmc.org/wp-content/PDFdocuments/bycatch/ChinookBycatchEDR910.pdf.
[5] See **77 FR 5389** (February 3, 2012) for details; http://www.alaskafisheries.noaa.gov/frules/77fr5389.pdf.

- 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.

Two features of the EDR program posed unique challenges for NMFS' and PSMFC's administration of the annual data collection process compared to the BSAI Crab and Amendment 80 EDRs implemented previously. As specified in the final rule, all Amendment 91 EDR forms must be submitted electronically. In addition, the rule requires that: a) for any AFA-permitted vessel used to harvest BSAI pollock, the vessel master must complete and certify a Vessel Master Survey form; and b) the vessel owner must certify and submit all Vessel Master Surveys. These specifications required the development of new IT infrastructure and other survey administration protocols by AFSC and PSMFC in the course of implementing the program, as well as substantial coordination with EDR submitters and industry representatives prior to and during the initial data collection in April-June of 2013. After the initial implementation, the online data-collection platform has been improved to incorporate error checking and streamline data submission, particularly with regard to the vessel master survey, and has functioned more efficiently with recent data submissions.

Initial development of administrative protocols and software to support electronic data submission began in early 2012, and AFSC and PSMFC staff met with industry representatives in June of 2012 to present a prototype web portal and online versions of the three EDR forms, as well as associated procedures for distributing login credentials for secure online access to enable use and submission of the electronic forms. Several issues related to the Vessel Master form were identified at the meeting, most importantly issues concerning ambiguity in determining which individual captains employed by AFA vessel owners would be required to complete survey forms[6], and the procedures for vessel owners to assign, certify, and submit survey forms completed online by their captain(s). As it would be necessary for vessel owners to make determinations regarding which individual captains would complete the Vessel Master Surveys, it was requested that the prototype web portal be modified to enable vessel owners (or authorized administrative staff) to generate and assign vessel master user accounts to the appropriate captains. Additional questions addressed the definition of compensated transfers as described in the CTR form, and additional guidance from NMFS was requested to clarify standards for compliance in submission of Vessel Master Survey and CTR forms. To the extent possible, such guidance was provided in the form of additional instructions incorporated into the online EDR forms as well as supplementary guidance distributed to EDR submitters prior to the start of the data collection period in April 2013.

[6] There is no regulatory definition of "Vessel Master" as used in the Amendment 91 EDR regulations that is applicable to groundfish trawl vessels, and not all individuals identifiable in in-season catch accounting or other reporting systems are employed as vessel captains.

8.3. Overview of the Annual Amendment 91 EDR Implementation and Data Submission Process

Because of previous experience in implementing the BSAI Crab and Amendment 80 EDR programs, PSMFC was contracted by AFSC to support of the Amendment 91 EDR. All EDR data collection for the 2012-2015 fishing years have been completed. This section provides an overview of information compiled by PSMFC staff during the process of implementing the online EDR survey forms, identification and notification of specific entities of requirements for EDR submission, and communications and submitter support during the data collection.

The contact list for all AFA vessel owners (including both primary and secondary owners), CDQ groups, Inshore Cooperative representatives, and Sector Entity representatives determined to be subject to EDR reporting requirements is constructed by PSMFC annually in consultation with NMFS AKR staff prior to sending notifications to AFA entities and beginning administration of the EDR data collection process. During the last week of March each year, PSMFC distributes notices by certified mail to the identified contacts, describing the requirements for EDR submission and instructions for accessing the online survey forms using the included secure login credentials[7].

Tables in each section below report how many vessel master and fuel surveys were submitted each year by each fishing sector.

8.4. Vessel Master Survey Overview and Qualitative Data Analysis

8.4.1 Introduction

The vessel master survey was designed with extensive input from industry and Council direction and approval after being requested as a data element by a principle pollock trade group.

In this report, survey responses are summarized 2012-2015 fishing years. The sections combines a summary of responses to the yes/no survey questions as well as an analysis of the participants' text responses.

Survey data were analyzed with a grounded theory approach, meaning codes were created based on verbatim statements of respondents (Glaser and Strauss 1967).[8] Each survey question was analyzed separately and generated a unique code list. Statements that were unintelligible, irrelevant to the question, or were only stated once in the dataset were placed in an 'other' category. Every statement was coded. This analysis is based on the total dataset (all sectors for 2012- 2015[9]), but is also broken down by sector and year. Total N refers to the sum of code counts for a single code, which would include every time the code was mentioned for all years, in all sectors. N refers to the code count within a single sector and/or year which is specified in the text. As discussed in the section on data quality, below, there were times when it was not possible to determine which specific season or year a respondent was referencing. Any quotes that are provided should be interpreted as providing insight into larger theme that were common responses among many participants, as opposed to individual perspectives, unless noted otherwise.

[7]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.

[8]Glaser, B. G., & Strauss, A. L. (1967). The discovery of grounded theory: Strategies for qualitative research. Piscataway. NJ: Transaction.

[9]The Mothership Sector did not provide responses for 2015.

8.4.2 Highlights of Qualitative Analysis of Survey

Key findings from the vessel master survey for 2012-2015 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 declined over the 2012-2015 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. This was a consistent trend across all years, for all sectors.
- 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 areas. Operators avoid any area that might contain salmon rather than risk bycatch.
- 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 high-salmon areas.
- Other than Chinook, chum salmon is the most likely species that vessels report alters their fishing strategy.
- Squid closures, and to a lesser extent herring closures, emerged as a significant factor impacting fishing in the 2015 B season.
- Most vessel operators stated that they did not experience any exceptional factors that affected their fishing season for any given year (2012-2015), when prompted to explain any unusual circumstances. Exceptional factors that were identified had to do with fishing and/or stock conditions. 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.

8.4.3 Vessel Master Survey responses

Table 8.1 reports the number of vessel master survey responses by year and fishing sector.

Question 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.

See Table 8.2 for Question 1 Yes/No response frequencies and Table 8.3 for Question 1 discussion responses.

Table 8.1: The number of vessel master survey responses by year and fishing sector

Year	CP	CV/MS
2012	17	117
2013	18	115
2014	18	108
2015	17	102

Table 8.2: Question 1 responses by year and sector and percent responding 'yes'

Year	Sector	No	Yes	Yes %
2012	CP	6	11	65%
2013	CP		18	100%
2014	CP	1	17	94%
2015	CP		17	100%
2012	CV+MS	21	96	82%
2013	CV+MS	21	94	82%
2014	CV+MS	31	77	71%
2015	CV+MS	29	73	72%

Respondents interpreted this question in a number of ways depending on which part of the question they focused on, with the key words being incentive, strategy and impact. Respondents appeared to have a hard time distinguishing between: 1) whether the question asked about the actual incentives that motivated them or 2) strategies they adopted because of participation in an IPA. Approximately half of the respondents (across all years) commented on incentives (total N=236) while the other half commented on how the IPA impacted their fishing strategies or outcome (total N=219).

This question was atypical in that there was a notable difference between how respondents from the CP and CV/Mothership sectors responded to the question. Respondents from the CP sector mentioned fewer specific incentives; the top incentive mentioned was the need to avoid Chinook because of limited allocation (N=11). Many of the responses have to do with actions and strategies taken by respondents to avoid or not catch salmon, where not catching salmon was the implied incentive. Top responses include avoiding known salmon areas (N=14) and avoiding closures (N=9). The incentive of peer pressure was unique to the CP Sector (N=5).

The CV/Mothership sector identified the need to avoid catching Chinook, sometimes at all costs, as a top incentive across all four years (N=68). In addition to avoiding salmon because of limited allocation (N=31), the CV/Mothership sector identified new incentives not mentioned by the CP sector. The fear of getting prematurely shutdown (N=37), the ability to acquire salmon credits to use for future seasons (N=32), and owner policy (N=7) were also identified as incentives for the CV/Mothership sector. The reporting of the incentives of avoiding a shutdown, and accruing salmon credits decreased significantly from 2012 to 2015 in the CV/Mothership Sector. In addition, the CV/Mothership sector identified a new incentive for 2015: having information about bycatch was viewed as being valuable/extremely helpful. In previous survey years, informants stated that they would use information, but did not specifically identify it as an incentive as the following quote demonstrates: *"The best incentive is salmon savings credits and having information shared among the boats on bycatch rates in different areas." CV Sector 2015*

Table 8.3: Question 1 responses – IPA agreement impacts by year and sector

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
I: Don't catch/avoid salmon	1	1	0	4	18	14	17	19	74
I: Salmon quota limited/cap	4	2	1	4	7	6	13	5	42
I: Complete fishing season/avoid shutdown	0	0	0	2	14	9	7	7	39
I: Salmon credits/"insurance"	0	0	0	0	16	6	6	4	32
I: Avoiding salmon to harvest full allotment of pollock	1	2	0	0	7	3	0	1	14
I: Avoid triggering new closures	0	1	0	2	6	0	2	1	12
I: Having information is valuable	0	0	0	0	0	0	0	7	7
I: Owner policy	0	0	0	0	0	1	2	2	5
I: Peer pressure incentive	0	0	3	2	0	0	0	0	5
I: Fleet penalties	0	0	2	0	0	0	1	0	3
I: Roll over of uncaught salmon to B season	0	0	0	0	1	1	0	1	3
Impact: Increased costs (fuel, time)	0	0	0	2	4	13	4	9	32
Impact: Forced out of/move from good pollock fishing areas	0	1	3	2	6	7	2	8	29
Impact: Increased awareness of need to avoid salmon bycatch	2	3	2	0	5	3	3	0	18
S: Avoided known salmon AREAS/hotspots	3	4	4	3	11	14	10	10	59
S: Move to new area to avoid bycatch	0	1	2	1	6	10	8	6	34
S: Avoid closures	2	5	2	0	1	5	10	1	26
S: Traveled further	0	0	0	1	5	4	7	6	23
S: Utilize bycatch information/ fleet reporting	0	0	0	0	1	3	10	6	20
S: Catching smaller/less valuable fish - lower income	0	1	0	1	6	7	1	4	20
S: Change in tow	0	0	0	0	2	2	6	2	12
S: Season adjustments	0	1	0	0	3	0	2	1	7
S: Chinook avoidance more important than pollock quality	0	0	2	1	0	1	1	1	6
S: Salmon excluder	0	1	0	0	1	2	1	0	5
S: Fish in areas with no historical salmon catch	0	1	1	0	0	1	1	0	4
S: Had to search for new pollock fishing grounds	0	0	0	0	0	0	0	3	3
Not affected by IPA	0	1	1	0	0	1	2	4	9
Other	2	1	1	5	8	9	14	11	51
TOTALS:	15	26	24	30	128	122	130	119	594

I: Incentive; S: Strategy

Question 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.

See Table 8.4 for Question 2 Yes/No response frequencies and Table 8.5 for Question 2 discussion responses.

Table 8.4: Question 2 responses by year and sector and percent responding 'yes'

Year	Sector	No	Yes	Yes %
2012	CP	5	12	71%
2013	CP		18	100%
2014	CP		18	100%
2015	CP	1	16	94%
2012	CV + MS	20	97	83%
2013	CV + MS	26	89	77%
2014	CV + MS	27	81	75%
2015	CV + MS	26	76	75%

The vast majority of respondents answered yes, the amount and/or cost of Chinook PSC allocation available to the vessel led them to make changes in pollock fishing operations. Few respondents, however, actually described how the specific amount and/or cost of Chinook allocation affected them. The vast majority described changes in their fishing strategies that were adopted to avoid Chinook. Having a limited allocation for salmon is the implied incentive that causes them to avoid salmon. As one CP respondent put it in the 2014 survey: "Any time there is a cap, your strategies become more conservative."

Some respondents directly connected changes in fishing strategies to their Chinook allocation. These captains stated that they had a low allocation or limited amount of Chinook, and thus couldn't risk catching salmon (total N=38). Other respondents stated that they needed to avoid Chinook in order to ensure they had enough salmon to participate in both the A and B pollock seasons (total N=15); this was increasingly reported in the CV/Mothership Sector. An increasing amount of respondents reported that having a limited allocation meant that they were unable to take risks that they might ordinarily take (total N=11). A few respondents mentioned that they try to avoid Chinook regardless of their allocation (N=7). Only 3 respondents out of the total dataset mentioned the cost of Chinook allocation/being able to buy allocation.

In this question, most respondents did not actually comment on their allocation. The majority stated that they wanted to avoid Chinook and then provided examples of fishing strategies that allowed them to do this more effectively. Respondents reported being more cautious where and how they fish. The vast majority of respondents stated that they avoid or have moved away from known bycatch areas (total N=134). Respondents also stated that they traveled further to avoid salmon (total N=64), or have changed their fishing technique to avoid salmon (doing test tows, fishing in shallower locations, etc.). A total of 19 respondents stated that they no longer fish in their traditional grounds, and an additional 19 stated they increasing rely on information and increased communication with SeaState to avoid bycatch.

Respondents stated that their efforts to avoid salmon bycatch often come at an increased cost. A total of 46 respondents reported that they would have fished in a more productive area and felt that bycatch concerns forced them out of prime pollock fishing grounds. A total of 31 respondents stated that they feel that they are catching smaller fish or fish with less roe, resulting in lower revenue. Respondents also reported significant vessel costs (increased time and fuel costs) from having to travel further to cleaner fishing grounds (total N=41).

Table 8.5: Question 2 response - Chinook allocation impacts

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
A: Limited/low allocation -can't afford to catch salmon	2	2	0	3	7	6	9	9	38
A: Avoid salmon to ensure participation in B season/future seasons	0	0	0	0	1	2	5	7	15
A: Avoiding salmon to harvest full allotment of pollock	0	0	1	1	5	2	3	2	14
A: Had to be conservative/don't take risks	0	0	1	0	0	2	2	6	11
A: Avoid salmon even if we have Chinook allocation/regardless of allocation	0	0	0	0	1	4	2	0	7
A: Owner ensures vessel will not exceed allocation	0	0	0	0	0	0	0	4	4
A: Buying salmon	0	0	0	0	2	0	1	0	3
A: Closely monitor use of allocation	1	0	0	0	0	0	0	2	3
Avoid/Stay away/moved away from high bycatch AREAS	4	6	9	8	32	30	22	23	134
Traveled further to avoid salmon	0	0	2	0	14	15	19	14	64
Would have fished in a more profitable area/forced out of good pollock fishing	4	3	4	4	8	10	10	3	46
Don't catch/avoid salmon	0	1	2	2	13	10	6	8	42
Increased costs (fuel, time)	0	0	1	0	10	14	11	5	41
Catching smaller/less valuable fish/less roe	2	2	0	1	10	6	5	5	31
Changed fishing techniques	0	0	0	1	8	8	5	7	29
Excluders	0	1	1	0	11	6	3	3	25
Chinook avoidance/reducing bycatch top priority; max value pollock 2nd	0	3	2	0	7	3	2	2	19
Did not fish in traditional area/fishing different area	0	1	2	1	5	5	3	2	19
Increased communication/information gathering (SeaState)	0	0	1	0	9	5	1	3	19
Monitor bycatch closely	0	1	1	0	4	5	3	4	18
Lower income/lower value for fish	0	0	1	0	5	4	2	2	14
Quality pollock and roe are where salmon are	3	1	0	0	6	2	0	0	12
Fished in area with low bycatch	0	1	1	0	2	2	1	2	9
Fish shallower water/ changes in depth	0	0	0	1	2	2	1	1	7
Tried to fish more earlier in the season	1	0	0	0	0	1	1	0	3
Same answer as #1	0	0	0	1	0	1	5	3	10
No changes/ not affected	0	0	0	0	1	3	1	4	9
Other	1	2	0	2	11	7	5	9	37
TOTALS:	18	24	29	25	174	155	128	130	683

A: Allocation

Question 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.

See Table 8.6 for Question 3 discussion responses.

The majority of respondents stated that their seasons were normal/had not changed from year to year (total N=128). Yet even these respondents would follow this statement with some version of "overall things were normal, but this one event X also occurred that was noteworthy." It was apparent that answers to this question may not be comparable given that they were highly dependent on the conditions experienced when vessels chose to go fishing. For example one respondent stated:

"The Chinook salmon bycatch was higher for the A season but less for the B season, Reason for less bycatch during the B season is we caught our quota earlier and we able to discontinue fishing Sept 10 before the Chinook salmon historically start showing up in the Fall." CV Sector 2015

Most respondents did not explain the context for their evaluation of their season as clearly. Thus, there is not a consensus concerning the responses given to this question. Responses provided by some respondents to this question contradict the experiences reported by others, which is not completely surprising considering that conditions likely varied depending on where and when respondents fished. Some respondents also commented on conditions at the start of the season, some at the end, but most do not specify exactly what period they are referencing. There are some respondents who comment on how changes to policy/ and or their fishing strategy affected the outcome of their season and equate this with fishing conditions. There is a lot of ambiguity in skipper responses to this question.

In the 2012 survey, 38 respondents stated that there was less Chinook or that Chinook bycatch conditions were easier to avoid. A total of 5 of these 38 respondents stated that Chinook were easier to avoid in the A season, 13 in the B season, while the rest were unspecified. A total of 25 respondents stated that fishing conditions were the same (fishing conditions unspecified) and 33 respondents talked about their fishing strategies or provided a description of their fishing decisions.

In the 2013 survey, overall respondents were more evenly split between those who felt that there were more Chinook/they were harder to avoid (N 36) and those that felt that there were less Chinook/they were easier to avoid (N=20). This could be due to different conditions in the A and B seasons. Of the 20 that mentioned that there were less Chinook, 7 mentioned conditions were better in the B season, 4 mentioned conditions were better in the A season, and the rest did not specify to which season they were referring. Of the 36 that mentioned there were more Chinook/they were harder to avoid, 14 mentioned conditions were worse in the A season, and only 2 mentioned conditions were worse in the B season. A total 27 respondents stated that fishing conditions were the same (fishing conditions unspecified) and 16 respondents felt that pollock fishing conditions had improved.

In the 2014 survey, 47 respondents stated that there were more Chinook and/or Chinook were more difficult to avoid and 13 of these specifically identified the A season as being problematic. 32 respondents reported that conditions were similar. Only 14 respondents stated that Chinook were less prevalent.

In the 2015 survey, respondents were more likely to report that there were more Chinook/ that Chinook were harder to avoid (N=32), as opposed to 7 respondents who felt that there were less Chinook. Many respondents felt that Chinook did not follow their typical distribution, and could be found everywhere as opposed to historical locations and/or depths. Additionally, 10 respondents felt reported unusually small pollock (N 10).

Table 8.6: Question 3 responses - unique aspects of the last fishing year

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
More Chinook/harder to avoid	1	6	10	5	7	30	37	32	128
Conditions similar/same	1	2	3	4	25	25	29	29	118
A season	5	5	4	3	21	18	16	17	89
Less Chinook/ less Chinook bycatch/ easier to avoid	6	2	1	1	32	18	13	7	80
B season	3	6	3	2	18	14	9	16	71
More pollock/better fishing	3	3	1	1	4	13	9	7	41
Chinook did not follow typical behavior/distribution	0	1	3	1	3	2	5	16	31
Conditions similar/the same conditions Chinook bycatch	1	4	0	1	4	5	4	0	19
Ice bigger impact	4	2	2	0	4	3	0	0	15
Smaller pollock	2	0	0	1	1	0	0	10	14
Not alot of salmon caught/no salmon/salmon not an issue	0	2	1	0	0	3	0	5	11
Conditions similar/the same conditions pollock	0	0	0	0	5	1	3	0	9
Early in the season	1	0	0	0	0	1	0	7	9
Chinook smaller	0	1	1	0	0	1	2	3	8
Pollock did not follow typical behavior	0	0	0	0	2	0	4	2	8
Weather conditions/water temp	0	0	1	1	1	1	2	1	7
late in the season	0	0	0	0	0	3	0	2	5
Less bycatch (unspecified)	3	0	0	0	0	1	1	0	5
Less pollock/slower fishing	2	0	0	0	1	1	0	1	5
Pollock/salmon mixed together	0	0	1	1	0	0	2	1	5
Increased chum	0	0	0	0	0	0	2	2	4
More bycatch (unspecified)	0	0	0	0	1	0	0	2	3
Pollock roe less volume/less abundant	0	1	0	0	1	0	1	0	3
Better quality/more marketable pollock	0	0	0	0	0	1	1	0	2
Chinook average amount	0	0	0	1	1	0	0	0	2
Other -can't compare	0	1	1	0	8	11	10	7	38
Other -strategies/description of fishing decisions	1	2	3	3	32	15	8	19	83
Other	1	1	2	3	4	11	7	7	36
Wrong year comparison	0	1	1	4	4	1	3	0	14
N/A, don't know	0	1	0	0	0	2	0	1	4
No change	0	0	0	0	6	1	0	1	8
TOTALS:	34	41	38	32	185	182	168	195	875

Question 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.

See Table 8.7 for Question 4 Yes/No response frequencies and Table 8.8 for Question 4 discussion responses.

Table 8.7: Question 4 responses by year and sector and percent responding 'yes'

Year	Sector	No	Yes	Yes %
2012	CP	17		0%
2013	CP	13	5	28%
2014	CP	13	5	28%
2015	CP	10	7	41%
2012	CV + MS	71	46	39%
2013	CV + MS	79	36	31%
2014	CV + MS	72	36	33%
2015	CV + MS	67	35	34%

Respondents either addressed how bycatch conditions affected the timing of their overall seasons or how it affected the timing of specific trips. There was strong consensus about the effect Chinook had on the timing of pollock fishing seasons. A total of 48 respondents stated that it was important for them to begin the B Season on time or as early as possible, although this trend decreased in the CV/Mothership sector from 2012-2015. Of these respondents, 42 stated that there was increased pressure to start the B season as soon as possible to finish fishing before Chinook salmon started to show up in greater numbers in the Fall. A total of 31 respondents stated that they delayed the beginning of the A season. Respondents stated that the delay was due to the need to be cautious and evaluate salmon bycatch conditions (total N=10), as well boats increasingly waiting for trip reports from other vessels before fishing (total N=14). A few vessel masters reported that they would continue cod fishing at the beginning of the A season or would switch to cod fishing if salmon bycatch conditions were problematic (total N=6). The following quotes illustrate these themes well:

"Two ways our fleet altered its timing: we started a little late during A season so we could see where salmon bycatch was occurring in the inshore fleet. In B season, we started fishing right away to avoid being caught fishing late and to help reduce Chinook bycatch." CV/Mothership Sector 2013

"There is much more pressure to get our fish caught before the middle of September because traditionally Chinook bycatch increases the later in the fall you fish. In the past we did not find it so important to start B season on the opening day." CV/Mothership Sector 2012

Other respondents addressed how the timing of their trips were affected by bycatch conditions. A total of 41 respondents reported that they changed fishing locations or had to move at some point in a trip in order to avoid bycatch. 28 respondents indicated that they travel longer distances to avoid Chinook salmon, while others (N=23) avoided known locations of high Chinook bycatch. These respondents did not directly tie this information to the timing of their pollock fishing but may imply that any increase in vessel movement due to avoiding salmon would likely lead to increased time at sea and longer travel distances.

Specific examples of how salmon bycatch conditions affected timing were relatively rare in the dataset, those that provided specific examples are included below:

"High salmon bycatch mixed with pollock around the horseshoe area during A season. We started the season slower than normal, not utilizing our entire fleet." CV/Mothership Sector 2012

“We had to leave town sooner for all our trips and run farther distances to fish to avoid Chinook Bycatch close to Dutch Harbor to the Northeast. We were forced to run Northwest.” CV/Mothership Sector 2012

“Early in season there is fish around horse shoe area but also salmon. We would travel to Pribs to get fish to avoid salmon. Later in season we could work horse shoe and no salmon.” CV/Mothership Sector 2013

“During A season we slowed down our fishing effort at night in the horseshoe & to the NE.” CV/Mothership Sector 2013

“Chinook salmon bycatch is early in A season and late during B season. To avoid this bycatch I try to fish further north off the deep edge or further west on the flats. Usually fish (pollock) are harder to find and increases expenses such as fuel & time at sea.” CV/Mothership Sector 2014

Table 8.8: Question 4 responses - impact of Chinook season start delays

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
Started season earlier/started right away	1	1	0	0	16	12	10	8	48
Try to end B season ASAP before Chinook show up/avoid fall fishing	0	0	0	1	8	12	9	12	42
Changed areas/moved to avoid salmon	0	1	1	3	5	10	12	9	41
Started Season later	0	0	2	2	3	6	12	6	31
Travel longer distances (to avoid salmon)	0	2	3	2	7	3	9	2	28
Avoided known salmon areas	0	1	0	2	8	5	5	2	23
Closely monitor Chinook conditions/waited to get info	0	0	1	0	3	3	2	5	14
Generic statements about avoiding salmon	0	1	1	0	1	2	2	6	13
Examples of specific salmon bycatch conditions	0	0	0	1	4	2	2	3	12
Increased costs (fuel, time)	0	0	0	1	7	1	2	1	12
Started season slower/cautious startup to evaluate salmon conditions	0	0	0	0	3	3	0	4	10
Inferior pollock quality/less pollock	0	0	1	0	2	2	2	2	9
Changed tow/fishing tactics	0	0	0	0	3	2	0	3	8
TRIP: Delay trip	0	0	0	0	5	0	0	2	7
Cod fishing to avoid salmon	0	0	0	0	2	1	2	1	6
Chinook more plentiful earlier in season	0	0	0	0	0	1	2	2	5
Concerns about high bycatch conditions	0	0	0	0	0	3	1	1	5
TRIP: End trip prematurely	0	0	0	0	2	0	0	0	2
TRIP: start trip early	0	0	0	0	2	0	0	0	2
No alteration on timing	0	1	0	0	8	8	3	6	26
Other	0	1	0	1	9	6	11	3	31
TOTALS:	1	8	9	13	98	82	86	78	375

Q5. 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).

Table 8.9 reports responses to Question 5. Most respondents reported that zero trips were delayed.

Table 8.9: Question 5 responses - the number of respondents reporting trips delayed by season and sector

		A-Season Delays (trips)		B-Season Delays (trips)	
Year	Sector	1-3	4-10	1-3	4-10
2015	CP			1	
2012	CV + MS	2			
2013	CV + MS	1	2	3	2
2014	CV + MS				
2015	CV + MS	7		3	

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

See Table 8.10 for Question 6 discussion responses.

Respondents stated that closures often occurred in productive pollock grounds that were closer to town/delivery ports (total N=42). Closures forced vessels to relocate and look for pollock elsewhere (total N=114) and that this necessitated traveling further to avoid salmon/search for new pollock grounds (total N=177). Some respondents gave mileage estimates that ranged from 5 miles up to 500 miles to relocate. Increased fuel and time costs associated with moving were reported (total N=69). Specific time and fuel cost increases were also not specified; however increased costs were reported less for the CV/Mothership sector 2014-2015.

Respondents talked about lost time and income due to relocating. They stated that they often had to move to new areas where pollock fishing was not as good because of smaller pollock or were fishing in areas of lower pollock concentration (total N=31). Lower pollock concentrations or slower fishing conditions often led to longer tow times. Some respondents stated that they had to try test tows in new areas to ensure that salmon were not present (total N=19).

Some respondents stated that they avoided closures whether or not these closures applied to them (total N=18) and 12 respondents stated that they avoided fishing within close proximity to a closure. This may reflect the fact that some respondents believe that closures are a helpful informational tool to avoid high-bycatch areas (total N=17):

"Whenever a rolling closure was enacted we avoided the area even if we were in Tier 1 so as to reduce salmon by-catch. Also, we tended avoid areas to the immediate West and Northwest as we know that the salmon tend to move in those directions. This would cause us to move further, often several hundred miles from the closed area." CV/Mothership Sector 2014

Other respondents simply stated that they avoided closures or that they never fished in them (total N=70). An additional 18 respondents specifically stated that they avoided closures due to the risk of catching salmon.

Table 8.10: Question 6 responses – Chinook area closure impacts on fishing

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
Travel longer distances (avoid salmon/search for pollock)	0	2	0	1	34	31	30	19	117
Relocate/looked for pollock elsewhere (not in closures)	3	6	3	1	21	28	30	22	114
Avoid all closed areas/All of them were avoided	3	5	5	3	15	11	17	11	70
Increased costs (fuel, time)	0	1	0	0	23	21	13	11	69
Forced out of good pollock fishing	2	2	2	6	2	10	7	11	42
Catching smaller pollock/low roe/lower pollock concentration	0	0	0	2	10	4	10	5	31
Short tows/test tows to minimize salmon bycatch	0	1	0	1	8	5	2	2	19
Avoid all closed areas even if not in effect for us	0	0	1	2	2	3	6	4	18
Avoided closures due to high risk of salmon catch	1	1	1	0	6	1	3	5	18
Closures confirm that salmon are present/helpful	0	0	0	1	4	3	5	4	17
Closures affected where and how we fished/rethink strategy	1	3	0	0	2	2	5	2	15
Closures reduce available fishing ground/eliminated areas for consideration	1	1	0	1	5	3	3	1	15
Avoiding fishing in proximity to closed areas	1	2	0	1	2	2	1	3	12
Fished in shallower water/shift in depth	0	0	0	0	7	1	2	2	12
#/description of closures	0	0	3	0	1	3	2	0	9
potential/loss of income	1	0	1	1	3	3	0	0	9
Slower fishing	0	0	0	0	3	1	4	1	9
Closures don't contain bycatch/ have low bycatch numbers	0	0	0	1	2	0	2	2	7
Fishing in more dangerous conditions when forced to move	0	0	0	0	1	4	1	1	7
New areas not always free of bycatch	0	0	0	0	2	4	0	1	7
Tow longer	0	0	0	0	1	2	1	3	7
Fish just outside of closures	0	0	0	0	0	1	0	2	3
Fish only in daylight	0	0	0	0	0	0	0	3	3
Increased conflicts with fixed gear fisheries	0	0	0	0	2	0	1	0	3
Self-regulate to avoid triggering new closures	0	0	0	0	0	0	0	3	3
Increased gear damage	0	0	0	0	2	0	0	0	2
Need to be aware of closures	0	0	0	0	0	1	1	0	2
Not affected by closures	7	1	4	2	6	14	12	11	57
Other	2	0	2	4	8	14	11	20	61
TOTALS:	22	25	22	27	172	172	169	149	758

Question 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.

See Table 8.11 for Question 7 discussion responses.

Table 8.11: Question 7 responses – non-Chinook area closure impacts on fishing

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	TOTALS:
C: Chum closures	3	2	1	3	22	19	28	17	95
C: Sea lion rookeries/SCA	1	1	2	0	17	19	14	10	64
C: Squid closure	0	0	0	0	0	0	0	32	32
C: Herring savings area	4	0	0	1	3	0	1	14	23
C: Description of other closures	2	2	3	0	5	2	3	3	20
C: Dutch Harbor closure	0	0	0	0	6	3	0	0	9
C: Chinook closures	1	0	0	0	2	2	1	1	7
C: CVOA closures	1	0	3	2	0	1	0	0	7
C: Bird boxes	0	0	0	0	2	3	1	0	6
C: Litzel line	0	0	0	0	2	3	0	0	5
Travel longer distances to unrestricted areas	1	0	2	1	12	14	10	8	48
Forced to relocate/looked for pollock elsewhere (not in closures)	1	0	1	2	5	10	7	11	37
Closures reduce available fishing ground/eliminated areas for consideration	2	1	2	1	16	9	4	1	36
Forced out of good pollock fishing	1	1	0	2	8	6	7	10	35
Closures are avoided	3	1	4	0	5	3	11	7	34
Other closures limit ability to avoid Chinook/other bycatch	0	1	0	0	6	3	4	13	27
B season	2	0	2	3	1	1	8	9	26
Increased costs (fuel, time)	0	0	0	0	8	6	6	6	26
Catching smaller pollock/lower pollock concentration	0	1	0	1	4	3	3	5	17
Shorter tows	0	0	1	0	6	9	1	0	17
Avoiding salmon (general)	0	0	0	1	3	3	4	5	16
General effects of closures	1	1	1	1	2	0	5	5	16
Can't fish in closed areas	0	1	0	2	1	5	2	2	13
A season	0	0	0	1	2	2	3	3	11
Can't fish there even if Chinook aren't present/could fish there w/out catching salmon	0	0	0	0	3	2	0	1	6
Gear conflicts restrict areas	0	0	0	1	2	3	0	0	6
Chum Rolling Hotspot Program works well	0	0	0	0	0	0	5	0	5
Couldn't fish in deep water	0	0	0	0	0	0	0	5	5
Value of catch reduced	0	1	0	0	1	3	0	0	5
Closures are closer to town	0	0	0	0	2	1	0	0	3
Participate in voluntary closures	0	0	0	0	0	0	0	3	3
Product quality suffers/fish not as fresh	0	0	0	0	1	0	2	0	3
Same answer as #6	0	2	0	0	5	4	7	2	20
Not affected	5	6	4	4	15	30	27	22	113
Other Q7	2	5	2	2	11	17	11	11	61
TOTALS:	30	26	28	28	178	186	175	206	857

This question is similar enough to question 6 where respondents are writing "same answer as above" (N=20) or they continue to talk about Chinook closures/avoiding salmon in general (N=16).. Respondents stated that any closed area reduces available fishing grounds (total N=36), and that they inevitability had to travel longer distances to get to unrestricted fishing areas (total N=48). Closures forced them to relocate (total N=37), sometimes away from good pollock fishing conditions (total N=35). Chum closures were the most frequently mentioned closed area (total N=95), followed by sea lion rookery closures/ Steller sea lion Conservation Area (SCA) (total N=64). Other closures mentioned include the squid closures (total N=32), and herring closures (total N=23). Some respondents simply listed closures and did not specify how they affected where and how they fished.

"Closed areas limit where and when we can fish. Most restricted areas are closer to port so we have to travel longer distances to find available fish." CV/Mothership Sector 2013

Specific comments respondents made about how closures affected where and how they fished were largely directed towards the effects of sea lion closures. Some respondents were frustrated by Sea lion rookery closures, mostly because these areas appear to have good pollock fishing, require less travel time, and are sometimes perceived to be salmon-free:

"There are also Stellar Sea Lion closures that we are prohibited from fishing in that pollock also tend to abound. Areas where Salmon are not usually present and could help reduce salmon bycatch while maximizing pollock catch and value. These areas are also closer to town (less fuel cost and fresher fish)." CV/Mothership Sector 2012

"The sea lion rookeries are obsolete & are a great hindrance to effective fishing." CV/Mothership Sector 2013

"Sea lion rookeries push us out of prime pollock fishing lowering CPUE thus raising salmon bycatch." CV/Mothership Sector 2014

Squid closures (N=32), and to a lesser extent herring closures (N=14), emerged as a significant factor in the 2015 B season. Respondents reported that pollock fishing was good in the deeper waters closer to delivery ports; however there was a large amount of squid bycatch that triggered a closure. A few respondents reported that they voluntarily left the area to avoid more stringent closures (N=3). Most respondents felt that these closures were highly problematic because they forced them out of cleaner fishing into areas that had Chinook or other bycatch issues (N=13):

"The squid box closure area North of Akutan caused the fleet to move to other fishing areas where salmon bycatch soon became a problem" CV Sector 2015

Question 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.

See Table 8.12 for Question 8 discussion responses.

The majority of respondents state that weather has been typical for the 2012-2015 fishing seasons (Total N=185) and that there wasn't unusual conditions/problems associated with weather that would impact fishing (Total N=80). The majority of the comments about extreme weather are in regards to sea ice conditions in the 2012 A season.

A total of 26 CV/Mothership respondents and 6 CP respondents indicated that there was more ice/sea ice conditions were worse in 2012, compared to only 3 CV/Mothership respondents and

2 CP respondents in 2013 who indicated that sea ice conditions were worse than a typical year. Statements about worse ice conditions were further substantiated considering that no CV/Mothership respondents stated that ice had less of an impact in 2012, whereas respondents increasingly indicated that there was less sea ice than a typical year for years 2013-2015.

CV/Mothership respondents in 2012 stated that the ice was further south than normal (N=10), and that this limited fishing grounds (N=11). Ultimately ice conditions consolidated the fleet and lead to increased conflicts with other fisheries (crab) that were also consolidated in the same areas (N=11). Some respondents stated that sea ice forced them to change fishing locations (further south, deeper water or on the ice edge) which in turn forced them to fish where bycatch species were more prevalent (N=10). Other respondents said that weather/ice conditions were more severe in 2012, but that these conditions did not impact their fishing strategy or ability to avoid salmon (N=10).

Table 8.12: Question 8 responses – weather and uncommon seasonal impacts on fishing and bycatch avoidance

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
Typical conditions/same impact	2	6	6	9	25	54	41	42	185
Not affected/no impact on fishing	1	1	3	2	19	21	26	27	100
A season	3	2	1	1	20	4	9	4	44
Ice: Less ice/Ice had less of an impact	0	0	2	1	0	13	11	14	41
Ice: More/ worse ice conditions	6	2	0	0	26	3	2	0	39
Weather was better/less impact	0	0	0	0	0	10	11	9	30
Ice limited fishing grounds/ consolidated fleet	4	3	0	0	11	2	2	0	22
Ice changed fishing location (south, deeper, on edge)	2	3	0	0	8	4	2	0	19
Ice forces fishing where bycatch is more prevalent	2	2	0	0	10	3	2	0	19
Weather bad/extreme cold	0	0	2	0	7	0	7	3	19
Ice did not affect Chinook bycatch	2	1	1	1	10	2	1	0	18
Ice further south	1	2	0	0	10	2	2	0	17
Less available grounds = more fishing gear conflicts	0	0	0	0	11	1	2	0	14
B season	0	1	0	0	3	3	2	3	12
Better conditions allowed for better Chinook avoidance	0	0	1	0	0	5	1	2	9
Increased water temp	0	1	0	0	0	0	3	4	8
Weather did not affect Chinook bycatch	0	1	1	0	0	3	0	3	8
Weather negatively impacts avoiding bycatch	0	0	0	0	0	0	4	4	8
Ambiguous weather statements	1	0	0	1	0	1	4	0	7
Ice: No ice	0	2	2	2	0	0	1	0	7
“every year is different”	0	0	0	0	0	2	1	0	3
Catching less valuable pollock	0	0	0	0	2	0	0	0	2
Lack of info after bad weather events makes avoiding salmon difficult	0	0	0	0	0	0	0	2	2
N/A	0	0	0	0	1	5	1	2	9
Other	1	1	4	3	15	7	10	9	50
TOTALS:	25	28	23	20	178	145	145	128	692

Question 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.

See Table 8.13 for Question 9 discussion responses.

Table 8.13: Exceptional factors to fishing year

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
No exceptional factors	9	8	10	11	33	72	57	43	243
Larger populations of small fish (pollock)	4	2	0	0	9	5	9	23	52
Bycatch issues	0	3	3	2	10	3	15	14	50
Mechanical issues/ Shipyard delays	1	1	0	0	7	5	7	3	24
pollock roe issues	0	1	2	0	5	8	2	5	23
Good fishing/ Stock conditions good	0	2	1	0	2	8	5	4	22
Increased costs (fuel, time)	0	0	0	0	11	4	1	0	16
Sea Ice	0	0	0	0	12	2	2	0	16
Prices below average/poor market conditions	0	1	2	0	1	4	3	3	14
Needed to look for larger fish	2	0	0	1	3	3	0	2	11
Traveled longer distances	0	0	0	0	5	2	2	2	11
Bad weather	0	0	1	1	4	2	2	0	10
Fish were located in a different location than anticipated	0	1	0	0	6	3	0	0	10
Forced to move	0	1	3	0	0	0	1	4	9
Larger pollock more scarce	0	0	0	0	6	0	0	3	9
Missed trips/quit early	0	0	0	0	3	2	4	0	9
Consistent issues	0	0	1	0	1	3	3	0	8
Description of fishing/ timing strategy	0	1	1	0	3	0	3	0	8
stock conditions poor	0	0	0	0	3	2	1	1	7
Gear conflicts	0	0	0	1	2	0	3	0	6
Started late	0	0	1	0	0	2	2	1	6
Year class of fish	1	1	0	1	0	0	0	2	5
Market requirements	0	0	0	0	2	0	1	1	4
Slow processor rotation	0	0	0	0	0	0	0	4	4
Better weather	0	0	0	0	0	2	0	1	3
Fishing grounds limited	0	0	0	0	3	0	0	0	3
Income decreased	0	0	0	0	1	0	0	2	3
Better bycatch avoidance	0	0	0	0	0	0	0	2	2
Quicker trips	0	0	0	0	1	1	0	0	2
Slow fishing at first	1	0	0	0	0	0	1	0	2
Other	1	3	0	2	11	5	4	14	40
TOTALS:	19	25	25	19	144	138	128	134	632

Overall, respondents indicated that there were not any specific exceptional factors that affected fishing in any given year (total N=243). It is interesting to note that there were a lot more "no exceptional factors" responses from the CV/Mothership fleet in 2013 (N=71) and 2014 (N=57), as compared to both 2012 (N=33) and 2015 (N=43). The majority of "good fishing" codes in the CV/Mothership also occurred in 2013. It is possible that there is respondent bias towards identifying negative events in the CV/Mothership sector; respondents are more willing to communicate exceptional factors if they are perceived as issues or problems.

Most of the exceptional factors identified had to do with fishing and/or stock conditions. Respondents complained that there were greater populations of smaller pollock (total N=52); this seemed to be particularly problematic for the CV sector in 2015 (N=23). Smaller pollock were problematic because markets preferred larger fish; many respondents reported trying to avoid large schools of small fish: *"There were smaller fish on the grounds in 2015. This resulted in more searching than usual for appropriate sized fish" CV sector, 2015.*

Respondents felt that Chinook bycatch conditions were unusually high or that they had to go to greater lengths to avoid bycatch (total N=50). Many mentioned that bycatch prevented them from fishing in a more favorable or traditional location. These responses were highest in 2014 and 2015 for the CV/Mothership Sector.

Respondents also complained about roe issues (total N=23); this ranged from not being able to find pollock that contained roe to low roe recovery rates. Sea ice also was reported as an exceptional factor as well for the CV/Mothership sector in 2012 (N=10).

A total of 24 Respondents stated that they experienced mechanical issues or shipyard delays; three of these incidents involved fires. All but one of the "Missed trips/quit early" codes (N=9) are associated with mechanical issues. In 2012, CV/Mothership respondents stated that they had increased fuel and time costs from longer tow times and traveling further (N=11).

Question 10: Separate from an Incentive Plan Agreement, were there other incentives for you to reduce Chinook salmon bycatch? If yes, please describe.

See Table 8.14 for Question 10 Yes/No response frequencies and Table 8.15 for Question 10 discussion responses.

Table 8.14: Question 10 responses by year and sector and percent responding 'yes'

Year	Sector	No	Yes	Yes %
2012	CP	9	8	47%
2013	CP	5	13	72%
2014	CP	4	14	78%
2015	CP	5	12	71%
2012	CV + MS	36	81	69%
2013	CV + MS	44	71	62%
2014	CV + MS	32	76	70%
2015	CV + MS	29	73	72%

Respondents identified many other incentives other than the IPA that influenced their behavior. The most common response was that operators felt a personal or moral obligation to avoid salmon bycatch (total N=71). Many respondents stated that this was simply the right thing to do and that they took pride in ensuring their bycatch was minimal. This was a consistent trend across all years, for all sectors, although there is some repetition by the same reporters. Similarly, other operators stated that they have always tried to avoid bycatch and that no one wants to catch salmon (total N=42); this trend increased in 2015. Other respondents stated that their incentive was to maintain the overall health and sustainability of the fisheries (total N=24); this response increased in for the CV/Mothership sector in 2015. Fleet and peer pressure also contributed to operators wanting to reduce salmon bycatch (total N=24), although this pressure was reported as significantly less for the CV/Mothership sector in 2014 and 2015 than the first two survey years. Political pressure to

Table 8.15: Question 10 - Chinook avoidance incentives other than IPAs

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
Personal/moral incentives	1	4	3	3	18	12	15	15	71
Owner/company policy	0	0	0	1	6	19	17	15	58
Always tried to avoid bycatch/fish clean - nobody wants to catch salmon	3	1	2	3	4	9	8	12	42
Political pressure	0	1	3	1	5	5	5	5	25
Fleet/Peer pressure	0	1	0	0	9	8	3	3	24
Health/ Sustainability of the pollock & other fisheries	0	0	1	0	3	6	5	9	24
Want to prosecute full pollock allocation	0	0	0	0	7	5	4	1	17
Don't want to be shutdown/stay in business	0	0	2	0	3	2	0	8	15
Don't want to catch fish that cannot be used/doesn't generate income	0	0	0	0	3	3	4	4	14
Need to reduce bycatch to keep job	1	1	0	1	2	1	3	5	14
Regard for other user groups	0	0	3	0	3	3	2	3	14
Use salmon excluders	1	3	0	3	1	3	1	2	14
Coop incentives and pressure	1	0	0	0	3	2	2	1	9
Don't want to exceed salmon quota	0	0	0	1	4	1	1	2	9
Reputation/ Vessel reputation	0	0	0	0	3	0	5	0	8
"threat of unreasonable regulation in the future"	0	0	0	0	3	1	2	1	7
Pay dock/ fined for catching salmon	0	0	0	0	1	2	2	2	7
Public perception of industry	0	0	0	0	4	1	0	2	7
Support family and crew	0	0	0	0	2	2	1	1	6
Vessel owned by CDQ group	0	0	0	0	3	3	0	0	6
No incentives needed to avoid salmon	0	0	0	0	1	1	3	0	5
CDQ partner incentives	1	2	0	0	0	0	0	0	3
Reduce the risk of more closures	1	0	0	0	0	1	0	1	3
AFA award program	0	0	1	1	0	0	0	0	2
Other Q10	0	2	1	0	9	7	4	6	29
TOTALS:	9	15	16	14	97	97	87	98	433

reduce bycatch was also reported to be a factor (total N=25). The CV/Mothership Sector was the only sector that identified owner/company policy as being a significant driver for reducing bycatch. Owner/ company policy for reducing bycatch more than doubled between 2012 and 2013 Catcher Vessel datasets, remained high in 2014, and slightly decreased in 2015. Finally the fear of being shutdown (total N=15) substantially increased in the CV/Mothership sector in 2015.

It is interesting to note that within the CV/Mothership Sector, many respondents noted multiple incentives for avoiding bycatch. Owner/company policy had the most co-occurrence with Fleet/Peer pressure. This is illustrated well with the following quote:

"Peer pressure from within the fleet, owners, and a personal responsibility as a fisherman to reduce by catch." CV/Mothership 2014

Question 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.

See Table 8.16 for Question 11 Yes/No response frequencies, Table 8.17 for frequencies of species of bycatch impacting fishing other than Chinook, and Table 8.18 for Question 11 discussion responses.

Table 8.16: Question 11 responses by year and sector and percent responding 'yes'

Year	Sector	No	Yes	Yes %
2012	CP	6	11	65%
2013	CP	6	12	67%
2014	CP	4	14	78%
2015	CP	2	15	88%
2012	CV + MS	43	74	63%
2013	CV + MS	63	52	45%
2014	CV + MS	54	54	50%
2015	CV + MS	31	71	70%

Table 8.17: Question 11 responses - species of bycatch impacting fishing other than Chinook

	CP 2012	CP 2013	CP 2014	CP 2015	CV/MS 2012	CV/MS 2013	CV/MS 2014	CV/MS 2015	Total
Chum	5	6	8	6	34	34	35	28	156
Squid	0	0	0	0	4	1	11	48	64
Herring	3	0	1	5	10	3	4	34	60
Halibut	2	5	8	5	7	5	3	4	39
Rockfish	2	0	0	3	2	2	4	5	18
Jellyfish	0	0	0	0	1	6	3	2	12
Flatfish	2	0	1	2	0	3	3	0	11
POP	0	0	3	1	0	1	1	4	10
Mackerel	0	0	0	0	6	1	1	0	8
Crab	0	0	1	2	1	0	1	1	6
TOTALS:	14	11	22	24	65	56	66	126	384

Most participants chose to list specific species that they considered bycatch (Table 8.17). Considering the answers were often just a of species names it was not always possible to ascertain whether these species caused changes in harvesting decisions or whether they were considerations that could affect fishing decisions. Chum salmon was the biggest concern overall in the dataset (total N=156). Not surprisingly, there was a strong correlation between B season and chum; over 80% of B season codes were associated with Chum salmon. Squid was the most commonly mentioned bycatch species for the CV sector in 2015 (N=48), followed by herring (N=34). Herring was reported to be somewhat problematic for operators in 2012, whereas squid was reported to be somewhat problematic in 2014; both of these species jumped drastically in 2015. These trends are explained in the following quote:

"We worry about Chum salmon in the B season. We also had to worry about Herring and Squid this year as well since so many guys were running into bycatch along the deep where fishing was really good close to town." CV Sector 2015.

Table 8.18: Question 11 responses - Changes in harvesting decisions

	CP 2012	CP 2013	CP 2014	CV/MS 2012	CV/MS 2013	CV/MS 2014	TOTALS:
Avoided/moved locations if bycatch	4	6	8	25	17	19	79
B season	3	2	3	9	10	12	39
Pay attention to/Concern affects fishing decisions	0	0	2	9	6	11	28
General bycatch reduction statements	1	2	0	7	3	5	18
Closures	0	2	0	4	2	2	10
Travel longer distances	0	0	1	5	3	0	9
Change fishing technique	0	0	0	6	1	1	8
Problematic	0	1	0	0	2	5	8
"Forces us to fish to the NW"	0	1	1	1	3	0	6
All salmon problematic	0	1	0	2	2	1	6
Increased costs (fuel, time)	0	0	0	2	3	1	6
A season	1	1	0	2	0	0	4
Relocation resulted in less productive grounds/lower quality product	0	1	0	1	1	1	4
Share info/ communication about bycatch	0	0	0	1	2	1	4
Bycatch is where high quality pollock is	0	0	0	1	1	1	3
General statements on how bycatch affects fishing decisions	0	0	0	2	0	0	2
Impacts to season	0	0	0	2	0	0	2
Avoidance of one species impacted bycatch of another	0	0	0	1	0	0	1
Excluders	0	1	0	0	0	0	1
Stopped fishing	0	0	0	1	0	0	1
Other	2	1	3	7	6	6	25
TOTALS:	11	19	18	88	62	66	264

Changes in harvesting decisions are reported in Table 8.18. Respondents generally stated that they would actively avoid or had to move locations if they encountered bycatch (total N=114). The second most common response was that bycatch issues were more prevalent during the B Season (total N=55); the third most common response was that respondents paid attention to potential bycatch situations and that these potential concerns affected fishing decisions (total N=38). Specific changes in harvesting decisions other than actively moving from and avoiding bycatch areas included:

traveling longer distances to avoid bycatch (total N=12), changing fishing technique (total N=9) and moving to the northwest (total N=6) to avoid bycatch.

8.4.4 Master Survey Data Quality Issues

While participants have provided many useful responses to the vessel master surveys, there have been several issues arising both from the design and administration of the survey, and the quality of responses. These issues complicate interpretation of the collected data and may limit the reliability of some conclusions drawn from the results, although the survey provides considerable insight into how vessels are impacted by Amendment 91.

Data quality issues from the survey design include:

- The timing of the survey is problematic, because respondents often complete the survey for the previous year after the current A season. At times, respondents reference the incorrect year (just-completed A season), while other times it is ambiguous which year is being referenced.
- There have been some technical problems with the electronic survey implementation, although these have been addressed and the system functioned excellently in recent years.
- The effort to allow individual skippers to complete the surveys but for vessels owners to also be responsible for survey completion has presented mixed results, as elaborated below.

There have been several issues related to the way the survey is administered and responsibility for survey completion, including: 1) several entire surveys were copied verbatim across years, 2) some respondents recycle their response to a question in a previous year verbatim for the same question the following year, and 3) groups of respondents appear to copy/ or record similar responses to questions. Fortunately, hese problems appeared to decrease in the 2015 survey.

In spite of these vessel master survey data quality issues, we believe the survey does provide useful information to AFSC, industry, the public, and NPFMC about the impacts of Amendment 91 and how vessel behavior has changed in response to the changes in regulation.

8.5. Fuel survey results

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 (Table 8.19).

Table 8.19: Number of fuel survey submissions by year and sector

Year	CP	CV/MS
2012	14	94
2013	15	92
2014	15	89
2015	18	86

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. Data reported for all vessels active in the 2012-2015 Bering Sea AFA pollock fishery are summarized in Table 8.20.

Table 8.20: Vessel Fuel Survey Results

		Annual average fuel consumption rate (gallons per hour), mean (sd)		Annual fuel purchases & expenditures, mean (sd)	
Sector	Year	Fishing	Transiting	Gallons	Cost ($ US)
CP	2012	284 (40)	255 (59)	1,167,836 (180,781)	$4,151,868 (586,951)
	2013	290 (70)	249 (83)	1,170,840 (317,665)	$4,143,717 (1,050,416)
	2014	277 (61)	249 (79)	1,396,123 (394,885)	$4,718,133 (1,201,367)
	2015	288 (40)	277 (105)	1,509,294 (353,355)	$3,368,631 (667,495)
CV	2012	73 (39)	50 (31)	184,300 (173,553)	$707,758 (651,573)
	2013	74 (33)	51 (27)	147,123 (87,028)	$573,259 (338,679)
	2014	74 (33)	51 (27)	142,187 (74,207)	$537,585 (278,567)
	2015	77 (37)	53 (29)	133,249 (55,026)	$369,486 (157,657)

Note: The mothership sector has been excluded from the table for confidentiality.

8.6. Survey Check Box

A limited number of vessels have reported in their electronic logbooks that they moved because of salmon. Instructions to the CP vessels on completing this form are available at `https://elandings.atlassian.net/wiki/display/doc/Trawl+Catcher+Processor+eLogbook+Instructions+for+eLandings`.

Analysis of these data is ongoing and will be reported in subsequent reports.

8.7. CTR

No complete compensated transfer reports have been submitted; a total of two partial submissions have been reported.

8.8. Discussion

In summary, the Vessel Fuel Survey and Vessel Master Survey have been implemented for 2012-2015 to collect data from all active AFA vessels and have yielded new information that is useful for analysis of Amendment 91. However, to date, minimal useful information has been collected through the logbook checkboxes or the Compensated Transfer Report (CTR) form. With more standardization and communication with vessel operators, the checkbox could potentially be made more useful. However, when integrating and comparing the vessel master survey results with the checkbox data, it is clear that only some CP vessel operators are using the check box regularly and that it is impossible to know how frequently this is occurring. Whether or not the current information collected in the CTR is adequate to meet the Council's intent in the data collection is also unclear.

This report provides evidence of both successes and limitations of these data collections over the course of four years, and updates information reported to the Council in 2014 (NPFMC, 2014). Any conclusions that may be drawn regarding the importance of addressing limitations of the data collections, and an appropriate timeline for considering modifications to respective elements of the data collection process, are dependent on further direction from the Council. AFSC is preparing a technical report which will discuss data elements in more detail. Many items could be improved with small changes in the wording of questions.

This report provides a summary analysis of data collected to date as well as an update on ongoing challenges regarding data quality due to the design of the data collections. The 2014 report to the Council identified many of these same concerns and future Council action has the potential to make the data collection more effective in producing information for the Council decision-making process regarding Amendment 91.

8.9. References

Glaser, B. G., & Strauss, A. L. (1967). The discovery of grounded theory: Strategies for qualitative research. Piscataway. NJ: Transaction.

NPRMC. January 2014. "D3: Council Update on the Amendment 91 Chinook Salmon Economic Data Report Program." Written and Presented by the Alaska Fisheries Science Center. Available online: https://npfmc.legistar.com/LegislationDetail.aspx?ID=1616126&GUID=4609D1DE-BAD7-42CC-A6AD-91FF8AD62AE7&FullText=1.

9. BSAI 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 BSAI non-pollock groundfish trawl catcher-processor fleet (referred to in the following as the Amendment 80 fleet) over the period 2008 through 2015, following implementation of the rationalization program in 2008 under Amendment 80 (A80) to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (FMP). This report provides additional detail to supplement information provided elsewhere in the Groundfish SAFE Economic Status Report; a general overview of the program and results of a set of economic performance metrics calculated for the fishery for the period 2005-2007 (the pre-program reference period) and annually for 2008-2015 are provided in the Economic Performance Metrics for North Pacific Groundfish Catch Share Programs section of the report (see especially Figures 11.21-11.30 and accompanying text). In addition, details regarding catch, production, and value of BSAI and Gulf of Alaska groundfish species allocated to A80 fleet are provided in Section 4 of the Annual Fishery Statistics section.

As a requirement of the A80 program designed by the North Pacific Fishery Management Council, annual economic reports are submitted to NMFS by vessel owners and QS permit holders, providing detailed data on vessel costs, earnings, employment, quota transfers, and capital improvements. The Economic Data Report (EDR) program is a mandatory annual reporting requirement for A80 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 A80 program in 2008, EDR data collection program has collected annual economic census data, with the most recent available data representing results from the 2015 calendar year of operations. [1]

Among the goals of A80 is improving economic incentives to increase retention and utilization, and reduce bycatch by the commercial catcher-processor (CP) fleet using trawl gear in the non-pollock groundfish fisheries. The structure of the program was developed to encourage fishing practices and use of vessel capital with lower discard rates and to mitigate the costs of increased retention requirements[2] by improving the opportunity to increase the value of harvest species while improving operational efficiency and lowering costs.

The BSAI non-pollock groundfish trawl CP sector is composed of vessel-entities representing the 24 CPs with history of harvesting groundfish in the BSAI, but that did not qualify for inclusion in

[1] The EDR program is managed collaboratively by Alaska Fisheries Science Center (AFSC) and Pacific States Marine Fisheries Commission (PSMFC), with guidance and oversight from the North Pacific Fishery Management Council (NPFMC, 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 Alaska Fisheries Science Center, Economic and Social Sciences Research Program.

[2] Concurrent with passage of A80, the Council also developed a groundfish retention standard (GRS) program for A80 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, A80 vessels and cooperatives were granted exemptions to the standard under emergency rule beginning in 2010, and the GRS program requirements were permanently rescinded under Amendment 93 to the FMP (77 FR 59852, October 1, 2012), effective March, 2013.

the rationalization of the CP pollock fishery under the American Fisheries Act. Of the original 24 CPs electing to enroll in the catch share program, 22 remained operational as of implementation of the program in 2008, of which 18 vessels continued to operate during 2015. Species allocated to the A80 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 A80 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. A80 allocates the six target species and five prohibited species in the BSAI to the CP sector and allows qualified vessels to form cooperatives. These voluntary harvest cooperatives coordinate use of the target allocations, incidental catch allowances and prohibited species allocations among active member vessels. From 2008-2010, 16 vessels formed a single cooperative (identified as the Best Use Cooperative, renamed Alaska Seafood Cooperative in 2010), with the remainder operating in the limited-access fishery. Since 2011, all vessels are in one of two cooperatives, with the Alaska Groundfish Cooperative being formed with nine member vessels/LLP licenses.

To assess the performance of the fleet under the rationalization program and subsequent changes in fishery management, statistics reported below are intended to indicate trends in a variety of economic indicators and metrics. The reported statistics provide a general overview of fishery performance over time, and are not intended as a rigorous statistical analysis of specific hypotheses regarding economic efficiency or other performance metrics. These generally include changes in the physical characteristics of the participating vessel stock, including productive capacity of vessel physical plant (freezer and processing line capacity and maximum potential throughput) and fuel consumption rates, efficiency and diversification of processing output, investment in vessel capital improvements, operational costs incurred for fishing and processing in the A80 fisheries and elsewhere, and employment and compensation of vessel crews and processing employees. As noted above, these results complement the analysis presented in the catch share metrics section of the Groundfish Economic Status Report for the A80 program for the period 2007-2015. The reader is referred thereto for a comparative presentation of trends in the following: aggregate quota allocations, catch, and quota utilization rates; season length; QS ownership and vessel participation; and earnings concentration among participating vessels. The reader is also referred to the Council's recently completed Five-Year Review of the program for a more detailed and comprehensive analysis of economic effects of A80 (Northern Economics, 2014).

In the following tables, annual statistics are reported for fleet or fishery aggregate total values and vessel-level average (median) values. All monetary values in the report are presented as inflation-adjusted 2014 equivalent U.S. dollars, consistent with data presented in other sections of the Groundfish Economic Status Report. Due to the small number of reporting entities, some results are suppressed to protect the confidentiality of proprietary information, as indicated in tables by the symbol "–". The total count of non-zero reported values are shown in the tables (under the heading "Obs" or "Vessels"); vessel-level median statistics (calculated over reported non-zero values) is reported to represent the average; arithmetic means for the reported indicators can be derived as needed by users of this report by dividing the aggregate total value shown by either the associated number of non-zero observations, or alternately by the total count of vessels (where different). It should be noted, however, that for many of the reported statistics, the underlying data is highly variable and/or irregularly distributed, such that the arithmetic mean may be a poor representation of the population average value.

9.1. Fleet Characteristics and Production Capacity

Table 9.1 shows fleet aggregate and median vessel values for physical size and capacity of the currently active vessel stock in the fishery for 2008-2015. A80-qualified vessels holding quota share and active in EEZ fisheries in the BSAI remained at 18 during 2015, having remained largely stable at 20 vessels from 2010-2012. 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; subsequent reduction in the number of active vessels is indication of further efficiency-driven consolidation and capital improvement in the remaining fleet. Statistics on aggregate and average fleet physical capacity indicate few changes from 2014, apart from an increase in total gross tonnage to 15,897 tons, exceeding the aggregate tonnage reported for the fleet in 2012 before the fleet was reduced and consolidated by the exit of two vessels to the current 18. During that reduction, there was a relatively small decrease in aggregate capacity compared to the previous period; aggregate net and gross tonnage across the fleet declined by 2% and less than 1%, respectively, but with substantial increases in median values for the remaining fleet (e.g. median net- and gross tonnage metrics increasing 26% and 30%) compared to the average over the 2010-2012 period. This is consistent with the smaller vessels exiting the fleet and investment in improvements to expand the physical capacity of remaining vessels, which continued in 2015.

Table 9.2 displays statistics for vessel physical processing capacity, including total aggregate and median number of processing lines on the active fleet and the median estimated throughput in processed pounds per hour, shown for whole-fish products and products over all. There were a total of 28 processing lines in the active fleet of 18 vessels during 2015, which has declined slightly from 30 in 2010, concurrent with two vessels exiting the active fleet, and the number of distinct products produced from the median vessel has also declined slightly to a total of 16. Maximum production throughput, on a median vessel basis, increased incrementally over the 2010-2013 period, but declined from 4.62 in 2013 to 4.18 t per hour in 2015, while maximum throughput of whole-fish product increased from 3.32 to 4.04 t per hour in 2015.

Table 9.3 displays statistics for vessel freezer capacity, in terms of cold storage capacity and maximum operating throughput capacity of plate freezers. Cold storage capacity aggregated over all C/Ps in the fleet has varied around approximately 7,500 t in previous years, but increased by 35% in 2015 to a total of 9,937 t, and by 6% on a median basis to 358 t. Reported data for freezer throughput capacity indicates that vessel-level average throughput has increased by from approximately 2.89 to 3.92 t per hour over the 2010-2013 period, and remained unchanged for the most recent two years. As freezer throughput is commonly cited as the principal limiting factor in processing capacity on A80 CP's, this result indicates a significant increase in the production capacity of the fleet, and the increase in frozen storage adds substantial capacity for longer trips between onshore deliveries.

Table 9.1: Amendment 80 Fleet Characteristics - Vessel Size, including Tonnage, Length, Beam Width, Horsepower, and Fuel Capacity, Fleet Total and Median Vessel Values

	Obs	Gross Tonnage		Net Tonnage		Length Overall (ft)		Beam (ft)		Shaft Horsepower		Fuel Capacity (million gal)	
Year	Count	Median	Total	Median	Total	Median	Total	Median	Total	Median	Total	Median	Total
2008	22	806	17,483	403	9,449	177	3,760	39	826	2,385	54,650	77,920	1.99
2009	21	560	15,482	380	8,723	169	3,546	38	784	2,250	48,300	76,840	1.82
2010	20	775	15,285	403	8,589	177	3,424	39	758	2,385	47,475	77,920	1.78
2011	20	775	15,285	403	8,568	177	3,434	39	748	2,385	47,400	77,920	1.77
2012	20	775	15,880	403	8,712	177	3,434	40	761	2,385	47,400	77,920	1.82
2013	18	1,008	15,495	506	8,451	185	3,218	40	706	2,560	45,075	89,077	1.77
2014	18	1,008	15,495	506	8,451	185	3,218	40	706	2,560	45,075	89,077	1.77
2015	18	1,026	15,897	506	8,403	185	3,218	40	706	2,560	45,075	89,077	1.77

Source: Amendment 80 Economic Data Reports.

Table 9.2: Amendment 80 Fleet Characteristics - Processing Line Capacity, including Production Variety and Throughput

	Obs	Processing Lines on Vessel		Species Processed	Total No. Products Processed (species+product)	Any Product, Max Throughput (mt/hr)	Whole-fish Product, Max Throughput (mt/hr)
Year	Count	Total	Median	Median	Median	Median	Median
2008	22	32	1	12	18	3.63	3.33
2009	21	31	1	12	17	3.63	3.33
2010	20	30	1	12	18	3.85	3.32
2011	19	29	1	12	17	3.92	3.31
2012	19	29	1	12	16	4.43	3.22
2013	18	28	1	12	16	4.62	3.32
2014	18	28	1	12	16	4.30	3.88
2015	18	28	1	-	-	4.18	4.04

Source: Amendment 80 Economic Data Reports.

Table 9.3: Amendment 80 Fleet Characteristics - Vessel Freezer Capacity, including Volume and Throughput

	Obs	Freezer Hold Capacity (t)		Maximum Freezing Capacity (t/hr)	
Year		Median	Total	Median	Total
2008	22	317.51	8,227.42	2.89	99.29
2009	21	317.51	7,693.25	2.68	58.83
2010	20	317.51	7,576.07	2.89	60.01
2011	20	308.76	7,076.30	3.64	64.21
2012	20	317.51	7,558.92	3.90	67.08
2013	18	336.57	7,345.19	3.92	64.28
2014	18	336.57	7,345.19	3.92	64.28
2015	18	357.81	9,937.38	3.92	64.06

Source: Amendment 80 Economic Data Reports.

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

	Obs	Fishing/ Processing (gal/hr)	Steaming Loaded (gal/hr)	Steaming Empty (gal/hr)
Year	Count	Median	Median	Median
2008	22	97	95	97
2009	21	90	89	87
2010	20	97	95	94
2011	20	97	95	93
2012	20	100	105	96
2013	18	103	121	100
2014	18	103	121	101
2015	18	103	117	101

Source: Amendment 80 Economic Data Reports.

Table 9.5: Amendment 80 Fleet Fuel Consumption - Fleet Total and Median Vessel Annual Fuel Use, by Vessel Activity

	Obs	Fishing/Processing		Steaming Empty		Steaming Loaded	
Year	Count	Median (1000 Gal)	Total (million Gal)	Median (1000 Gal)	Total (million Gal)	Median (1000 Gal)	Total (million Gal)
2008	22	522	10.78	52	1.04	70	1.76
2009	21	449	9.27	61	1.04	81	1.77
2010	20	485	9.73	66	1.45	68	1.46
2011	20	457	10.16	85	1.74	63	1.44
2012	20	445	9.26	70	1.31	89	1.64
2013	18	520	9.7	67	1.2	79	1.5
2014	18	551	10.09	63	1.19	88	1.52
2015	18	543	10.03	74	1.19	79	1.64

Source: Amendment 80 Economic Data Reports.

Table 9.4 shows median values for reported estimates of average hourly fuel consumption rate, in gallons per hour (gph), of A80 vessels during fishing and processing, steaming loaded, and steaming empty operational modes, and Table 9.5 shows aggregate and vessel median annual fuel consumption (gallons) by operational mode and annual total. Median reported hourly fuel use rates vary by activity: 101 gph steaming empty, 103 gph fishing and processing, and 117 steaming loaded for 2015. Rates have generally increased over the last eight years, most notably for steaming loaded although there was a slight decrease to a median rate of 117 gph in 2015 (it should be noted that rates reported by individual vessels commonly vary by 10-15 gallons per hour from year to year), reflecting the increase in average tonnage within the currently active fleet. Total A80 fleet fuel consumption in fishing and processing during 2015 was 10.0 million gallons, and a median 543 thousand gallons, both reduced slightly from 2014; total fuel consumption over all vessel activities, including fuel used in vessel transiting, remained approximately equal to the average over the 2008-2014 period at 12.8 million gallons.

9.2. Fishing Effort - A80 Vessel Days at Sea

Table 9.6 reports fleet aggregate and median statistics for vessel activity days reported in EDR data from 2008-2015, representing counts of days during which the vessel undertook fishing operations in A80 and other fisheries, processing operations in A80 and other fisheries, days on which the vessel was in transit (not fishing or processing) or offloading in port, and inactive in shipyard. Note that counts of days fishing and days processing are not mutually exclusive; a given calendar day may be counted as a day fishing as well as a day processing in A80 fisheries, and counts of days processing are generally inclusive of days fishing. As such, the results as reported give a relative account of the distribution of fleet activity among different activities and an approximation of the cumulative duration of vessel use in a given activity. Aggregate and median activity days in the A80 target fisheries continued a downward trend through 2012, when days processing totaled 3,425 (185 days on average), but have increased each subsequent year to 3,611 days fishing and 3,633 days processing in 2015. Participation in fisheries other than those included in the A80 program (primarily sideboard allowances in the Gulf of Alaska) is more variable from year to year, with 12 vessels active during 2013 and 2014, down from 17 in 2011-2012, and sharply declining to four vessels reporting active fishing and 6 vessels reporting processing in the Gulf during 2015. Median number of days fishing in non-A80 fisheries has varied between 25 and 32 per vessel through 2014, but increased to 63 in 2015, while total days declined by nearly half from 818 days in 2014 to 424 days in 2015, consistent with the reduced level of vessel participation.

9.3. Catch, Production, and Value

Table 9.7 reports annual fleet aggregate and vessel average values for catch, discard, volume of production in roundweight and finished weight terms (in t), and estimated wholesale value of finished processed volume (in US$, all years adjusted to 2015-equivalent value using the GDP deflator), stratified by A80, all other target fisheries in the BSAI, and all fisheries in the Gulf of Alaska.[3] Total catch (retained and discarded) aggregated over the six targeted A80 species (Atka mackerel, flathead sole, rock sole, yellowfin sole, Pacific cod, and Pacific Ocean perch) declined in 2015 to 252 thousand t, 248 thousand t retained and 3.1 thousand t discard. The rate of discard has declined substantially since the shift to Amendment 80 in 2008, from 5.34% in 2009 to 1.24% in 2014 and

[3]Note that discrepancies between Table 9.8 and Table 9.7 statistics for finished production volume and product value reflect different data sources for these tables and estimation methods employed in attributing wholesale value to catch accounting production volumes in the latter.

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
Amendment 80 Fisheries	Days Fishing	Obs	22	21	20	20	19	18	18	18
		Median	185	181	182	175	178	200	209	210
		Total	3,821	3,765	3,639	3,405	3,395	3,513	3,567	3,611
	Days Processing	Obs	22	21	20	20	19	18	18	18
		Median	196	181	189	173	185	200	213	210
		Total	4,117	3,774	3,747	3,454	3,425	3,559	3,615	3,633
All Other Fisheries	Days Fishing	Obs	11	11	14	17	17	12	12	4
		Median	25	20	30	32	30	28	27	63
		Total	456	261	535	812	735	648	818	424
	Days Processing	Obs	11	11	14	17	17	12	12	6
		Median	26	20	30	32	30	28	27	28
		Total	455	259	534	819	730	649	818	478
Non-Fishing and Inactive	Days Travel/Offload	Obs	22	21	20	20	20	18	18	18
		Median	58	72	77	80	69	80	65	69
		Total	1,318	1,398	1,681	1,956	1,682	1,560	1,401	1,327
	Days Inactive	Obs	22	21	20	20	20	18	18	18
		Median	94	100	81	78	98	74	73	75
		Total	1,980	2,355	1,928	1,857	2,089	1,466	1,301	1,298

Source: Amendment 80 Economic Data Reports.

2015. Total catch of other species in the BSAI also declined in 2015, to 74.7 thousand *t*, with retained catch of 59.8 thousand *t* (19% below the 2014 level), and discard of 14.9 thousand *t* (37% less than in 2014); the discard rate in non-Amendment 80 target fisheries in the BSAI declined to 24.9% from 32.2% in 2014. Total catch in GOA fisheries nearly doubled for 2014, to 42.2 thousand t, with a retained catch of 39.2 thousand *t*and discard of 3.0 thousand t; the discard rate of 7.56% during 2014 represents a decline of nearly 60% from the previous four-year average of 18.6%.

Finished production and value information displayed in Table 9.7 indicate 2008-2015 total finished production over all A80 target species varying between 153-167 thousand *t*per year, and gross wholesale revenue value varying between $220 million - $340 million over the period. Finished volume and value in 2015 were 153.7 thousand *t* and $245.8 million, respectively, the second lowest values over the eight-year period. On a median basis, production volume declined from 1001 *t* in 2014 to 918 /empht in 2015, while first wholesale value increased slightly from $1.67 million to $1.75 million, which were more consistent with the eight year averages for both metrics. Finished production during 2015 of 33 thousand *t* produced gross wholesale value of $44.6 in non-A80 target species in the BSAI (declining 15% and 22% from 2014, respectively), and 15.3 thousand *t* produced from GOA fisheries produced $30.6 million in first wholesale value (declining 28% and 31% from 2014).

Table 9.8 presents a summary of annual volume and revenue for product sales for A80 vessels and permit holders (including entities that consolidated their harvest quota on other vessels and did not harvest or process thier own allocation), over all fisheries, vessel income from other sources (e.g., tendering, charters, cargo transport), and sales of fishery permits.[4] As of 2015, no A80 entities have sold interests in fishery permits, and only one vessel has reported revenue derived from vessel use other than fishing and processing in each of 2010, 2012, and 2013 (revenue values suppressed for confidentiality). Fishery product sales volume and revenue includes all sales during the year, including product sold from inventory held from prior year, and does not include production completed but not sold during the year. Total reported volume of finished product sold during 2015 was 282.9 thousand t (a 20% increase from 2014), with first wholesale value of $312 million (declining nearly 10% from 2014).

[4]Note that annual statistics shown in Table 9.7 are derived from NMFS Alaska Region At-sea Production Reports data, representing aggregate physical production during the calendar year, with first wholesale value of production estimated based on ADF&G Commercial Operators Annual Reports (COAR) data, whereas statistics shown in Table 9.8 represent volume and value of product sales during the calendar year; differences between values reported in the respective tables are attributable to differences in production output, sales, and fluctuating inventories.

Table 9.7: Amendment 80 Fleet Annual Catch, Discard, Finished Production Volume and Value, by Fishery and Region, Fleet Total and Median Vessel Values

		Fleet Aggregate Total (1000 t)							Average per Active Vessel, median (t)					
	Year	Obs	Retained (1000t)	Discard (1000t)	Discard Rate	Production (round Weight)	Production (finished Weight)	Production Value, ($mill.)	Retained (1000t)	Discard (1000t)	Discard Rate	Production (round Weight)	Production (finished Weight)	Production Value, ($mill.)
BSAI - Amendment 80 target fishery/species	2008	23	270.7	11.4	4.22 %	239.1	152.3	$ 268.1	1,119	12	3.15 %	1,042	660	$ 1.75
	2009	21	239.7	12.8	5.34 %	221.3	140.5	$ 216.9	886	29	5.48 %	1,006	568	$ 1.01
	2010	20	257.6	12.7	4.92 %	247.3	154.9	$ 263.7	1,521	44	3.01 %	1,518	820	$ 1.55
	2011	20	262.3	6.5	2.48 %	259.2	163.6	$ 340.2	1,368	15	1.80 %	1,356	719	$ 1.93
	2012	20	265.0	6.8	2.57 %	261.7	167.2	$ 340.6	1,386	26	1.77 %	1,528	790	$ 2.02
	2013	18	260.4	6.8	2.61 %	260.8	159.8	$ 246.3	2,175	26	1.80 %	2,195	1,202	$ 2.07
	2014	18	255.0	3.2	1.24 %	254.2	158.2	$ 252.3	1,950	12	1.02 %	1,823	1,001	$ 1.67
	2015	18	248.0	3.1	1.24 %	250.4	153.7	$ 245.8	1,704	15	1.13 %	1,790	913	$ 1.75
BSAI - All other fishery/species	2008	23	44.8	25.8	57.63 %	36.3	22.3	$ 38.2	103	225	69.23 %	122	56	$ 0.18
	2009	21	55.4	20.9	37.78 %	47.7	29.7	$ 44.8	79	198	49.28 %	77	45	$ 0.11
	2010	20	63.2	20.5	32.43 %	56.3	34.3	$ 48.7	170	127	27.71 %	216	122	$ 0.19
	2011	20	62.1	17.4	28.10 %	56.9	34.8	$ 63.4	123	92	16.56 %	194	107	$ 0.33
	2012	20	60.3	13.5	22.39 %	55.1	34.0	$ 67.7	71	78	15.19 %	197	100	$ 0.28
	2013	18	70.9	20.3	28.61 %	63.3	37.9	$ 55.3	198	166	17.37 %	173	94	$ 0.28
	2014	18	73.9	23.8	32.22 %	64.9	38.7	$ 57.2	224	209	23.35 %	420	217	$ 0.44
	2015	18	59.8	14.9	24.90 %	54.4	33.0	$ 44.6	366	102	22.70 %	715	475	$ 0.64
GOA - All fishery/species	2008	13	20.7	3.8	18.40 %	19.9	11.2	$ 23.6	27	10	26.43 %	18	9	$ 0.04
	2009	17	20.2	6.1	30.15 %	18.9	10.9	$ 21.9	27	6	21.59 %	24	15	$ 0.04
	2010	16	21.4	5.3	24.60 %	21.0	12.2	$ 28.7	31	4	13.75 %	28	16	$ 0.05
	2011	16	24.3	4.4	18.17 %	24.3	13.8	$ 41.9	32	4	13.57 %	23	12	$ 0.05
	2012	16	24.2	3.4	14.06 %	23.7	13.2	$ 35.2	27	4	12.69 %	17	11	$ 0.04
	2013	13	20.5	3.6	17.64 %	20.7	11.7	$ 23.4	26	4	16.42 %	20	11	$ 0.04
	2014	10	39.2	3.0	7.56 %	36.6	21.3	$ 44.6	48	2	4.16 %	38	23	$ 0.06
	2015	9	27.1	2.5	9.36 %	27.0	15.3	$ 30.6	69	11	9.15 %	65	40	$ 0.07

Notes: All dollar values are inflation-adjusted to 2015-equivalent value. Fleet aggregate catch and production volumes are shown in 1000s of metric tons(t), and fleet aggregate and average revenue values are shown in $million.

Source: NMFS Alaska Region Catch-accounting System estimates; NMFS Alaska Region At-sea Production Reports; ADF&G Commercial Operators Annual Reports (COAR). Data compiled and provided by the Alaska Fisheries Information Network (AKFIN).

Table 9.8: Amendment 80 Fleet Annual Revenue from All Sources, including Volume and Value of Total Fishery Product Sales, Other Vessel Income, and License Sales, Fleet Total and Median Vessel Values

		Volume (1,000t)			Revenue ($million)		
	Year	Obs	Median	Total	Obs	Median	Total
Total Fishery Product Sales	2008	22	7.47	176.85	22	$ 13.63	$ 305.43
	2009	21	8.45	168.31	21	$ 11.58	$ 259.22
	2010	20	9.76	183.48	20	$ 14.69	$ 319.96
	2011	20	10.17	196.97	20	$ 20.65	$ 422.18
	2012	20	9.39	198.31	20	$ 19.45	$ 405.52
	2013	18	10.38	195.42	18	$ 15.87	$ 314.07
	2014	18	10.65	202.93	18	$ 17.95	$ 346.64
	2015	18	10.77	282.34	18	$ 15.87	$ 311.97
Other Income from Vessel Operations	2008	-	-	-	0	$ -	$ 0.00
	2009	-	-	-	0	$ -	$ 0.00
	2010	-	-	-	1	$ *	$ *
	2011	-	-	-	0	$ -	$ 0.00
	2012	-	-	-	1	$ *	$ *
	2013	-	-	-	1	$ *	$ *
	2014	-	-	-	0	$ -	$ 0.00
	2015	-	-	-	0	$ -	$ 0.00
LLP License Sales, All	2008	-	-	-	0	$ -	$ 0.00
	2009	-	-	-	0	$ -	$ 0.00
	2010	-	-	-	0	$ -	$ -
	2011	-	-	-	0	$ -	$ 0.00
	2012	-	-	-	0	$ -	$ -
	2013	-	-	-	0	$ -	$ -
	2014	-	-	-	0	$ -	$ -
	2015	-	-	-	0	$ -	$ 0.00

Notes: All dollar values are inflation-adjusted to 2015-equivalent value. Fleet aggregate catch and production volumes are shown in 1000s of metric tons(t), and fleet aggregate and average revenue values are shown in $million. “*”, indicates value is suppressed for confidentiality.

Source: Amendment 80 Economic Data Reports.

9.4. Quota Share Transfers

Table 9.9 reports information available for A80 quota share (QS) lease transfer activity over the period since the program was implemented. Transfer activity within the fishery has been limited, largely reflecting the continued operation of most of the eligible vessels. Due to the small number of transfers, with the exception of lease transfers of yellowfin sole QS during 2014, reporting of these results is largely limited to the number of QS permits for which owners reported some volume of lease transfer activity, either as lessor or lessee. The number of QS permit holders leasing out QS to A80 vessels has ranged from zero (0) to as many as 9, and vessels leasing QS permits from A80 QS permit holders ranges from 0 to 8; the most active leasing has occurred in yellowfin sole QS, in 2012 and 2014, respectively. During 2014, a total of 18 thousand t of yellowfin sole QS was leased, for a total of $1.3 million (not shown in Table 9.9), or approximately $70 per t. With the exception of one lessor reported for 2012, no Amendment 80 entity has leased halibut prohibited species catch (PSC) allocation.

Table 9.9: Amendment 80 Quota Share (QS) Transfer and Lease Activity

	Year	QS Leased To Others	QS Leased From Others
Atka mackerel	2008	6	2
	2009	3	3
	2010	4	1
	2011	5	1
	2012	0	0
	2013	0	0
	2014	0	0
	2015	0	0
Flathead sole	2008	0	0
	2009	0	0
	2010	0	0
	2011	0	1
	2012	1	1
	2013	0	0
	2014	0	0
	2015	0	0
Rockhead sole	2008	0	0
	2009	0	0
	2010	0	0
	2011	0	1
	2012	4	3
	2013	0	0
	2014	0	0
	2015	0	0
Yellowfin sole	2008	0	0
	2009	0	0
	2010	0	0
	2011	5	3
	2012	9	3
	2013	7	3
	2014	7	8
	2015	4	6
Pacific cod	2008	0	0
	2009	1	1
	2010	4	1
	2011	1	5
	2012	1	1
	2013	3	3
	2014	0	0
	2015	0	1

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Table 9.9: Continued

	Year	QS Leased To Others	QS Leased From Others
Pacific Ocean perch	2008	0	1
	2009	2	1
	2010	2	1
	2011	2	2
	2012	3	1
	2013	0	0
	2014	1	0
	2015	0	2
Other species	2008	1	0
	2009	0	0
	2010	0	0
	2011	2	1
	2012	0	1
	2013	0	0
	2014	0	2
	2015	4	3
Halibut PSC	2008	0	0
	2009	0	0
	2010	0	0
	2011	0	0
	2012	1	0
	2013	0	0
	2014	0	0
	2015	0	0
Crab PSC	2008	0	0
	2009	0	0
	2010	0	0
	2011	0	0
	2012	0	0
	2013	0	0
	2014	0	0
	2015	0	0

Notes: Quantity and value of lease transfers cannot be shown due to confidentiality restrictions.

Source: Amendment 80 Economic Data Reports.

9.5. Capital Expenditures and Vessel Operating Costs

Table 9.10 reports capital expenditures in the fishery for investments in on-board fishing and processing equipment, maintenance and improvements to the vessel and onboard equipment, and other capital expenditures associated with operations of the vessel. Data reported exclude any expenditures for onshore equipment or facilities, and reflect the capitalized cost of new investments purchased during the year; payments for principal and debt servicing on financed assets previously purchased are not included. Due to the infrequency of large investments, capital expenditures by category vary widely at both the fleet and vessel level, with many owners reporting no expenditures for one or more categories of investment in some or most years. Total fleet aggregate capital expenditures have varied between \$8.9-\$18.4 million over the 2008-2015 period, declining over the most recent for years to \$12.14 million during 2015. On an average basis, aggregate capital expenditure has varied between \$531 thousand to a high of \$885 thousand, the latter occurring in 2013, and declined to \$591 million during 2015. General maintenance and improvements in vessel capital, including hull, propulsion, onboard electronics and other equipment, exclusive of fishing and processing equipment, have comprised the largest and most frequently reported category of investment overall (accounting for 53% of all capital investment costs reported over the period). Twelve vessels reported such investment in 2015, totaling nearly \$4 million, with a median of \$90,880.

Table 9.11 summarizes the reported annual costs incurred by A80 CPs as operating expenses for fishing and processing operations, by expense item and year, and provides results of prorata indexing for each cost item in terms of cost per day (fleet aggregate and median vessel-activity days), cost per metric ton of finished product for the year, and as a ratio of cost to aggregate revenue. Costs are grouped into the following categories: materials (fuel, lubrication and fluids, production and packaging materials, and raw fish purchases); gear (repair and maintenance, fishing gear, and equipment leases); labor costs (including wage and payroll tax payments for fishing crews, processing employees, and other on-board personnel, benefits and other payroll-related costs, and food and provisions); overhead (administrative costs and insurance); fees; and 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, quota lease costs that are incurred by a small number of vessels cannot be reported due to confidentiality; see Table 9.9 below). As such, the cost-to-revenue index, along with other prorata indices, provides a relative index of profitability in the fishery, but does not represent a comprehensive metric of operating profit.

Aggregate operating expenses for the active fleet during 2015 totaled \$283 million, up 8.4% from 2014. Consistent with previous years, labor costs, including direct wages, benefits, and at-sea provisions, represented the largest category of expenses at \$111 million in total (36% of total operating costs for the year), with a median vessel cost of \$5.25 million. Direct payments to labor totaled \$94 million for 2015, including approximately \$12.6 million paid to fishing crews, \$39.8 million to processing employees, and \$41 million to other on-board employees (captains and other officers, engineers, and others). On a daily basis, aggregate fishing crew payment during 2015 was \$2,394, and represented 4% of daily gross revenue, with processing labor accounting for \$7,500 per day, 12.75% of daily gross revenue.

Fuel costs for the fleet for 2015 declined from 2014, totaling \$38 million, 13% as a proportion of overall costs, and approximately \$1.9 million on a median vessel basis. Repair and maintenance expenses for 2015 increased to \$35 million across the fleet, representing 12% of overall costs, and \$1.8 million on a median basis. General administrative and insurance costs increased to \$23.8 million and \$16.8 million, respectively (8.4% and 5.7% of total aggregate expenses). The remaining operating cost items shown in Table 9.11, including fishing gear purchase, vessel and equipment lease costs, freight and shipping, and taxes and fees, made up an additional 16.8% of total operating expenses for 2015. Reported operating costs for 2015 in total were \$283 million, averaging \$1,003 per t of finished product sold, approximately 91% of total sales revenue.

Table 9.10: Amendment 80 Fleet Capital Expenditures by Category and Year, Fleet Total and Median Vessel Values

	Year	Obs	Expenditure Per Vessel, Median ($1,000)	Total Fleet Expenditure ($million)	Percent Of Total Annual Capital Expenditures
Fishing gear	2008	12	$ 102.21	$ 1.70	19 %
	2009	8	$ 55.78	$ 0.65	7 %
	2010	8	$ *	$ *	* %
	2011	9	$ 105.56	$ 1.32	15 %
	2012	10	$ 280.36	$ 2.96	16 %
	2013	9	$ 76.23	$ 1.53	9 %
	2014	9	$ 70.37	$ 0.93	7 %
	2015	11	$ 214.80	$ 2.14	18 %
Other capital expenditures	2008	9	$ 93.01	$ 3.11	35 %
	2009	5	$ 44.90	$ 0.64	7 %
	2010	4	$ *	$ *	* %
	2011	8	$ 145.20	$ 1.91	21 %
	2012	7	$ 100.20	$ 0.87	5 %
	2013	8	$ 112.43	$ 0.86	5 %
	2014	10	$ 171.45	$ 4.40	31 %
	2015	10	$ 150.80	$ 4.24	35 %
Processing gear	2008	11	$ 129.49	$ 1.93	21 %
	2009	9	$ 96.69	$ 1.04	12 %
	2010	13	$ 162.25	$ 3.07	28 %
	2011	10	$ 157.76	$ 2.51	28 %
	2012	14	$ 82.90	$ 3.13	17 %
	2013	9	$ 142.30	$ 5.04	28 %
	2014	8	$ 113.87	$ 2.19	16 %
	2015	10	$ 134.60	$ 1.73	14 %
Vessel and other onboard equipment	2008	11	$ 55.43	$ 1.94	22 %
	2009	13	$ 428.47	$ 6.72	75 %
	2010	15	$ 115.00	$ 5.65	51 %
	2011	11	$ 130.63	$ 3.16	35 %
	2012	18	$ 67.35	$ 11.45	64 %
	2013	11	$ 554.47	$ 10.58	59 %
	2014	13	$ 395.00	$ 6.67	48 %
	2015	12	$ 90.88	$ 4.02	34 %
Total over all capital costs	2008	12	$ 380.14	$ 8.69	- %
	2009	13	$ 625.84	$ 9.04	- %
	2010	15	$ 555.03	$ 10.88	- %
	2011	11	$ 539.14	$ 8.89	- %
	2012	18	$ 530.82	$ 18.41	- %
	2013	11	$ 885.43	$ 18.01	- %
	2014	13	$ 750.69	$ 14.18	- %
	2015	12	$ 591.08	$ 12.14	- %

Notes: All dollar values are inflation-adjusted to 2014-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.

Source: Amendment 80 Economic Data Reports.

Table 9.11: Amendment 80 Fleet Fishing and Processing Operating Expenses, by Category and Year, Fleet Total and Median Vessel Values, with Prorata Indices

		Year	Obs	Cost Per Vessel, Median ($1,000)	Total Fleet Cost ($million)	Cost Percent Of Total Annual Expenses	Cost/Vessel - Day Fleet, Total $US	Cost/t Sold Fleet, Total $US	Cost Percent Of Total Vessel Revenue
Labor	Food and Provisions	2008	19	$ 288	$ 6.85	2.63 %	$ 1,133	$ 39	2.24 %
		2009	18	$ 288	$ 5.51	2.47 %	$ 1,037	$ 33	2.13 %
		2010	17	$ 297	$ 5.02	2.02 %	$ 935	$ 27	1.57 %
		2011	17	$ 359	$ 5.79	1.91 %	$ 1,064	$ 29	1.37 %
		2012	17	$ 348	$ 5.75	1.90 %	$ 1,103	$ 29	1.42 %
		2013	15	$ 344	$ 5.79	2.35 %	$ 1,135	$ 30	1.84 %
		2014	15	$ 291	$ 6.11	2.34 %	$ 1,159	$ 30	1.76 %
		2015	15	$ 356	$ 6.72	2.37 %	$ 1,274	$ 24	2.15 %
	Labor Payment, Fishing Crew	2008	22	$ 728	$ 16.25	6.22 %	$ 2,685	$ 92	5.32 %
		2009	21	$ 656	$ 13.05	5.86 %	$ 2,459	$ 78	5.04 %
		2010	20	$ 663	$ 14.19	5.71 %	$ 2,641	$ 77	4.43 %
		2011	20	$ 914	$ 17.79	5.88 %	$ 3,268	$ 90	4.21 %
		2012	20	$ 795	$ 17.02	5.62 %	$ 3,266	$ 86	4.20 %
		2013	18	$ 667	$ 13.27	5.38 %	$ 2,601	$ 68	4.23 %
		2014	18	$ 792	$ 14.40	5.52 %	$ 2,734	$ 71	4.15 %
		2015	18	$ 714	$ 12.62	4.46 %	$ 2,394	$ 45	4.05 %
	Labor Payment, Other Employees	2008	21	$ 1,205	$ 28.81	11.04 %	$ 4,761	$ 163	9.43 %
		2009	21	$ 1,085	$ 25.58	11.48 %	$ 4,817	$ 152	9.87 %
		2010	20	$ 1,494	$ 30.27	12.19 %	$ 5,635	$ 165	9.46 %
		2011	20	$ 2,002	$ 38.09	12.59 %	$ 6,997	$ 193	9.02 %
		2012	20	$ 2,114	$ 38.96	12.87 %	$ 7,477	$ 196	9.61 %
		2013	18	$ 1,662	$ 29.32	11.88 %	$ 5,745	$ 150	9.34 %
		2014	18	$ 1,663	$ 30.93	11.85 %	$ 5,870	$ 152	8.92 %
		2015	18	$ 1,550	$ 41.13	14.52 %	$ 7,802	$ 146	13.18 %

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Table 9.11: Continued

		Year	Obs	Cost Per Vessel, Median ($1,000)	Total Fleet Cost ($million)	Cost Percent Of Total Annual Expenses	Cost/Vessel - Day Fleet, Total $US	Cost/t Sold Fleet, Total $US	Cost Percent Of Total Vessel Revenue
Labor	Labor Payment, Processing Employees	2008	22	$ 2,018	$ 44.35	16.99 %	$ 7,331	$ 251	14.52 %
		2009	21	$ 1,854	$ 38.60	17.32 %	$ 7,268	$ 229	14.89 %
		2010	20	$ 1,982	$ 44.22	17.81 %	$ 8,232	$ 241	13.82 %
		2011	20	$ 2,695	$ 54.17	17.90 %	$ 9,952	$ 275	12.83 %
		2012	20	$ 2,666	$ 54.10	17.87 %	$ 10,381	$ 273	13.34 %
		2013	18	$ 1,992	$ 40.56	16.43 %	$ 7,947	$ 208	12.91 %
		2014	18	$ 2,264	$ 43.84	16.79 %	$ 8,321	$ 216	12.65 %
		2015	18	$ 2,014	$ 39.78	14.04 %	$ 7,545	$ 141	12.75 %
	Other Employment Related Costs	2008	22	$ 277	$ 8.85	3.39 %	$ 1,463	$ 50	2.90 %
		2009	21	$ 361	$ 8.38	3.76 %	$ 1,579	$ 50	3.23 %
		2010	20	$ 428	$ 9.33	3.76 %	$ 1,737	$ 51	2.92 %
		2011	20	$ 545	$ 12.44	4.11 %	$ 2,285	$ 63	2.95 %
		2012	20	$ 519	$ 9.81	3.24 %	$ 1,883	$ 49	2.42 %
		2013	18	$ 605	$ 10.43	4.23 %	$ 2,044	$ 53	3.32 %
		2014	18	$ 557	$ 10.30	3.95 %	$ 1,955	$ 51	2.97 %
		2015	18	$ 602	$ 11.04	3.90 %	$ 2,094	$ 39	3.54 %
Gear	Fishing Gear	2008	19	$ 287	$ 6.87	2.63 %	$ 1,136	$ 39	2.25 %
		2009	21	$ 412	$ 9.54	4.28 %	$ 1,797	$ 57	3.68 %
		2010	20	$ 432	$ 8.77	3.53 %	$ 1,632	$ 48	2.74 %
		2011	20	$ 366	$ 9.62	3.18 %	$ 1,768	$ 49	2.28 %
		2012	19	$ 395	$ 9.58	3.17 %	$ 1,839	$ 48	2.36 %
		2013	18	$ 479	$ 8.61	3.49 %	$ 1,687	$ 44	2.74 %
		2014	18	$ 396	$ 7.80	2.99 %	$ 1,481	$ 38	2.25 %
		2015	18	$ 402	$ 9.17	3.24 %	$ 1,740	$ 32	2.94 %
	Freight	2008	22	$ 49	$ 1.52	0.58 %	$ 251	$ 9	0.50 %
		2009	21	$ 57	$ 2.07	0.93 %	$ 390	$ 12	0.80 %
		2010	20	$ 74	$ 1.67	0.67 %	$ 311	$ 9	0.52 %
		2011	20	$ 65	$ 1.86	0.61 %	$ 341	$ 9	0.44 %
		2012	20	$ 67	$ 1.86	0.61 %	$ 356	$ 9	0.46 %
		2013	18	$ 87	$ 1.84	0.75 %	$ 361	$ 9	0.59 %
		2014	18	$ 109	$ 2.33	0.89 %	$ 442	$ 11	0.67 %
		2015	18	$ 111	$ 2.23	0.79 %	$ 423	$ 8	0.71 %

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Table 9.11: Continued

		Year	Obs	Cost Per Vessel, Median ($1,000)	Total Fleet Cost ($million)	Cost Percent Of Total Annual Expenses	Cost/Vessel - Day Fleet, Total $US	Cost/t Sold Fleet, Total $US	Cost Percent Of Total Vessel Revenue
Gear	Lease Expenses	2008	1	$ *	$ *	* %	$ *	$ *	* %
		2009	5	$ 4	$ 0.06	0.02 %	$ 10	$ 0	0.02 %
		2010	6	$ 5	$ 0.14	0.06 %	$ 27	$ 1	0.05 %
		2011	7	$ 7	$ 0.09	0.03 %	$ 17	$ 0	0.02 %
		2012	8	$ 10	$ 0.11	0.04 %	$ 21	$ 1	0.03 %
		2013	6	$ 8	$ 0.08	0.03 %	$ 15	$ 0	0.02 %
		2014	5	$ 18	$ 0.10	0.04 %	$ 19	$ 0	0.03 %
		2015	5	$ 3	$ 0.03	0.01 %	$ 6	$ 0	0.01 %
	Repair and Maintenance	2008	22	$ 984	$ 27.81	10.65 %	$ 4,596	$ 157	9.10 %
		2009	21	$ 1,243	$ 30.93	13.88 %	$ 5,824	$ 184	11.93 %
		2010	20	$ 1,799	$ 41.34	16.65 %	$ 7,695	$ 225	12.92 %
		2011	19	$ 1,527	$ 36.21	11.97 %	$ 6,652	$ 184	8.58 %
		2012	20	$ 1,778	$ 43.37	14.33 %	$ 8,323	$ 219	10.70 %
		2013	18	$ 1,907	$ 35.96	14.56 %	$ 7,045	$ 184	11.45 %
		2014	18	$ 1,511	$ 27.57	10.56 %	$ 5,233	$ 136	7.95 %
		2015	18	$ 1,776	$ 34.64	12.23 %	$ 6,570	$ 123	11.10 %
Overhead	General Administrative Cost	2008	22	$ 481	$ 21.40	8.20 %	$ 3,537	$ 121	7.01 %
		2009	21	$ 756	$ 16.62	7.46 %	$ 3,130	$ 99	6.41 %
		2010	16	$ 771	$ 12.12	4.88 %	$ 2,256	$ 66	3.79 %
		2011	16	$ 1,209	$ 28.24	9.33 %	$ 5,189	$ 143	6.69 %
		2012	20	$ 744	$ 28.33	9.36 %	$ 5,438	$ 143	6.99 %
		2013	18	$ 555	$ 13.40	5.43 %	$ 2,626	$ 69	4.27 %
		2014	16	$ 1,272	$ 20.46	7.84 %	$ 3,883	$ 101	5.90 %
		2015	11	$ 2,025	$ 23.77	8.39 %	$ 4,510	$ 84	7.62 %
	Insurance	2008	22	$ 496	$ 11.91	4.56 %	$ 1,969	$ 67	3.90 %
		2009	21	$ 487	$ 11.76	5.28 %	$ 2,215	$ 70	4.54 %
		2010	20	$ 523	$ 11.19	4.51 %	$ 2,084	$ 61	3.50 %
		2011	20	$ 523	$ 14.22	4.70 %	$ 2,612	$ 72	3.37 %
		2012	20	$ 596	$ 16.04	5.30 %	$ 3,079	$ 81	3.96 %
		2013	17	$ 572	$ 9.45	3.83 %	$ 1,852	$ 48	3.01 %
		2014	17	$ 703	$ 12.67	4.85 %	$ 2,405	$ 62	3.66 %
		2015	18	$ 475	$ 16.26	5.74 %	$ 3,084	$ 58	5.21 %

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Table 9.11: Continued

		Year	Obs	Cost Per Vessel, Median ($1,000)	Total Fleet Cost ($million)	Cost Percent Of Total Annual Expenses	Cost/Vessel - Day Fleet, Total $US	Cost/t Sold Fleet, Total $US	Cost Percent Of Total Vessel Revenue
Services	Freight and Storage	2008	9	$ 2,156	$ 16.85	6.46 %	$ 2,785	$ 95	5.52 %
		2009	10	$ 268	$ 13.23	5.94 %	$ 2,491	$ 79	5.10 %
		2010	8	$ 1,523	$ 15.21	6.13 %	$ 2,832	$ 83	4.75 %
		2011	4	$ *	$ *	* %	$ *	$ *	* %
		2012	4	$ *	$ *	* %	$ *	$ *	* %
		2013	4	$ *	$ *	* %	$ *	$ *	* %
		2014	7	$ 2,962	$ 20.31	7.78 %	$ 3,854	$ 100	5.86 %
		2015	10	$ 3,009	$ 30.85	10.89 %	$ 5,851	$ 109	9.89 %
Fees	Cooperative Costs	2008	16	$ 28	$ 0.53	0.20 %	$ 88	$ 3	0.18 %
		2009	15	$ 74	$ 1.18	0.53 %	$ 222	$ 7	0.46 %
		2010	14	$ 77	$ 1.10	0.44 %	$ 204	$ 6	0.34 %
		2011	16	$ 84	$ 1.34	0.44 %	$ 247	$ 7	0.32 %
		2012	16	$ 83	$ 1.21	0.40 %	$ 232	$ 6	0.30 %
		2013	14	$ 92	$ 1.10	0.44 %	$ 215	$ 6	0.35 %
		2014	14	$ 67	$ 0.96	0.37 %	$ 183	$ 5	0.28 %
		2015	14	$ 69	$ 1.47	0.52 %	$ 279	$ 5	0.47 %
	Fish Tax	2008	22	$ 144	$ 3.09	1.18 %	$ 510	$ 17	1.01 %
		2009	21	$ 150	$ 3.28	1.47 %	$ 617	$ 19	1.26 %
		2010	20	$ 87	$ 2.08	0.84 %	$ 387	$ 11	0.65 %
		2011	20	$ 104	$ 2.19	0.72 %	$ 402	$ 11	0.52 %
		2012	20	$ 143	$ 3.22	1.06 %	$ 617	$ 16	0.79 %
		2013	18	$ 161	$ 3.25	1.31 %	$ 636	$ 17	1.03 %
		2014	18	$ 152	$ 2.78	1.06 %	$ 527	$ 14	0.80 %
		2015	18	$ 155	$ 3.07	1.09 %	$ 583	$ 11	0.99 %
	Observer	2008	22	$ 201	$ 4.72	1.81 %	$ 780	$ 27	1.55 %
		2009	21	$ 186	$ 3.92	1.76 %	$ 737	$ 23	1.51 %
		2010	20	$ 203	$ 3.97	1.60 %	$ 738	$ 22	1.24 %
		2011	20	$ 204	$ 3.84	1.27 %	$ 705	$ 19	0.91 %
		2012	19	$ 196	$ 3.75	1.24 %	$ 720	$ 19	0.92 %
		2013	18	$ 209	$ 3.76	1.52 %	$ 738	$ 19	1.20 %
		2014	18	$ 213	$ 3.86	1.48 %	$ 733	$ 19	1.11 %
		2015	18	$ 227	$ 4.24	1.50 %	$ 804	$ 15	1.36 %

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Table 9.11: Continued

		Year	Obs	Cost Per Vessel, Median ($1,000)	Total Fleet Cost ($million)	Cost Percent Of Total Annual Expenses	Cost/Vessel - Day Fleet, Total $US	Cost/t Sold Fleet, Total $US	Cost Percent Of Total Vessel Revenue
Materials	Fuel	2008	22	$ 2,325	$ 49.84	19.09 %	$ 8,237	$ 282	16.32 %
		2009	21	$ 1,595	$ 33.26	14.93 %	$ 6,263	$ 198	12.83 %
		2010	20	$ 1,968	$ 37.78	15.21 %	$ 7,032	$ 206	11.81 %
		2011	20	$ 2,230	$ 46.78	15.46 %	$ 8,595	$ 238	11.08 %
		2012	20	$ 2,491	$ 48.12	15.90 %	$ 9,234	$ 243	11.87 %
		2013	18	$ 2,778	$ 49.27	19.95 %	$ 9,653	$ 252	15.69 %
		2014	18	$ 2,619	$ 48.91	18.73 %	$ 9,283	$ 241	14.11 %
		2015	18	$ 1,857	$ 37.69	13.31 %	$ 7,149	$ 133	12.08 %
	Lubrication and Fluids	2008	22	$ 92	$ 3.00	1.15 %	$ 497	$ 17	0.98 %
		2009	21	$ 112	$ 2.30	1.03 %	$ 432	$ 14	0.89 %
		2010	20	$ 101	$ 5.71	2.30 %	$ 1,064	$ 31	1.79 %
		2011	20	$ 116	$ 8.30	2.74 %	$ 1,524	$ 42	1.97 %
		2012	19	$ 116	$ 2.42	0.80 %	$ 465	$ 12	0.60 %
		2013	18	$ 136	$ 2.70	1.09 %	$ 529	$ 14	0.86 %
		2014	18	$ 109	$ 2.39	0.91 %	$ 453	$ 12	0.69 %
		2015	18	$ 119	$ 2.62	0.92 %	$ 496	$ 9	0.84 %
	Product and Packaging Materials	2008	22	$ 219	$ 4.67	1.79 %	$ 771	$ 26	1.53 %
		2009	21	$ 159	$ 3.56	1.60 %	$ 670	$ 21	1.37 %
		2010	20	$ 182	$ 4.16	1.67 %	$ 774	$ 23	1.30 %
		2011	20	$ 262	$ 4.77	1.58 %	$ 876	$ 24	1.13 %
		2012	20	$ 253	$ 5.20	1.72 %	$ 998	$ 26	1.28 %
		2013	18	$ 224	$ 4.83	1.96 %	$ 947	$ 25	1.54 %
		2014	18	$ 284	$ 5.38	2.06 %	$ 1,020	$ 26	1.55 %
		2015	18	$ 199	$ 4.08	1.44 %	$ 774	$ 14	1.31 %
	Raw Fish Purchases	2008	2	$ *	$ *	* %	$ *	$ *	* %
		2009	0	$ -	$ 0.00	0.00 %	$ 0	$ 0	0.00 %
		2010	1	$ *	$ *	* %	$ *	$ *	* %
		2011	1	$ *	$ *	* %	$ *	$ *	* %
		2012	1	$ *	$ *	* %	$ *	$ *	* %
		2013	1	$ *	$ *	* %	$ *	$ *	* %
		2014	0	$ -	$ 0.00	0.00 %	$ 0	$ 0	0.00 %
		2015	4	$ *	$ *	* %	$ *	$ *	* %

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Table 9.11: Continued

	Year	Obs	Cost Per Vessel, Median ($1,000)	Total Fleet Cost ($million)	Cost Percent Of Total Annual Expenses	Cost/Vessel - Day Fleet, Total $US	Cost/t Sold Fleet, Total $US	Cost Percent Of Total Vessel Revenue
Total Over All Expenses	2008	22	$ 13,836	$ 261.00	100.00 %	$ 43,143	$ 1,476	85.46 %
	2009	21	$ 9,748	$ 223.00	100.00 %	$ 41,959	$ 1,324	85.95 %
	2010	20	$ 12,645	$ 248.00	100.00 %	$ 46,222	$ 1,353	77.61 %
	2011	20	$ 18,574	$ 303.00	100.00 %	$ 55,589	$ 1,536	71.67 %
	2012	20	$ 17,920	$ 303.00	100.00 %	$ 58,085	$ 1,526	74.64 %
	2013	18	$ 16,621	$ 247.00	100.00 %	$ 48,380	$ 1,264	78.62 %
	2014	18	$ 15,979	$ 261.00	100.00 %	$ 49,556	$ 1,287	75.33 %
	2015	18	$ 16,083	$ 283.00	100.00 %	$ 53,719	$ 1,003	90.78 %

Notes: All dollar values are inflation-adjusted to 2014-equivalent value; average dollar values are shown in $1000 and total aggregate values are shown in $million. "*" indicates value is suppressed for confidentiality.

Source: Amendment 80 Economic Data Reports.

9.6. Employment

Table 9.12 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 107, largely constand over the last three years, and the total number of individuals participating as crew during 2015 was 327, increased from 239 in 2014. Median crew positions per vessel and distinct crew members employed per vessel remained unchanged at 6 and 11, respectively. Processing employment shows the same pattern over the most recent 3-year period, remaining largely constant at about 449 total positions, while median number of positions per vessel is largely constant at 23-24, and employment of other types of positions, which include officers, engineers, and others involved in onboard management and record-keeping, remained at approximately 140 across the fleet during 2015, from the previous high of 170 during 2012.

Table 9.12: Amendment 80 Fleet Employment, Fishing, Processing, and Other Positions On-Board, Fleet Total and Median Vessel Values

		Year	Obs	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	327
	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
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
	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

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Table 9.12: Continued

		Year	Obs	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
	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

Notes: Average positions on board reflects the number of individuals employed at one time, by employment category; number of employees during the year counts each unique person employed over the course of the year. The latter reflects turnover in employment when compared to the average number of positions.

Source: Amendment 80 Economic Data Reports.

9.7. Citations

Northern Economics, Inc., 2014. Five-Year Review of the Effects of Amendment 80. Prepared for the North Pacific Fishery Management Council. September, 2014.

10. COMMUNITY PARTICIPATION IN NORTH PACIFIC GROUNDFISH FISHERIES

The American Community Survey of the U.S. Census Bureau reports a total of 355 "Places" in Alaska which are cities, towns, and communities documented with populations.[1] Fishing involvement in Alaska communities is significant and contributes to local and State economies and social organization of Alaska. This community participation in North Pacific groundfish fisheries section provides a socio-economic background of Alaska communities relevant to fisheries. This section will be updated annually and expanded to include greater information on the socioeconomic status and trends of Alaska fishing communities.

10.1. People and Place

Location

Alaska exhibits extreme variation in climate, from maritime zones in the Gulf of Alaska to arctic zones in the far north. All regions are influenced to some extent by storms from the North Pacific Ocean as they move eastward from Asia. There is also a great deal of annual variability in Alaska's weather, primarily due to the shifting path of the jet stream.

Latitude, climate, and topography influence the ecology of Alaska's regions, and species composition of fish and patterns of human use. Alaska's diverse marine and terrestrial ecosystems provide habitat for 436 fish species, including 52 freshwater or anadromous species and 384 saltwater species.[2] Alaska ecosystems produce a high volume of aquatic life including pelagic, benthic, estuarine, and freshwater species living in inland lakes and streams.

The people of Alaska, including Native Alaskans, with ancestral histories of thousands of years, and European settlers, depend upon coastal and marine resources for their livelihoods.

The geographical dispersion of Alaska's communities reflects historical settlement patterns of Alaska Natives, and later Europeans beginning in the 18th century, and is based on resource extraction activities, particularly in coastal-marine environments.

10.1.1 Population composition

Alaska fishing communities represent a diversity of demographic, socio-economic and historical conditions. In terms of size, some are large municipalities that serve as regional economic hubs, such as Anchorage, while other communities are relatively isolated and have only a few dozen inhabitants. Many Alaskan communities have experienced rapid demographic change. Population in certain communities has grown in recent years, a trend that is largely driven by resource extraction including fisheries. Unalaska, for example, was transformed from a community of less than 200

[1] ADLWD. 2016. Cities and Census Designated Places (CDPs), 2010 to 2015. Available at: `http://live.laborstats.alaska.gov/pop/index.cfm` (accessed 24 August 2016). Alaska Department of Labor and Workforce Development, Research and Analysis Section.

[2] Armstrong, Rober H. (1996) *Alaska's Fish: A guide to selected species. Anchorage: Alaska Northwest Books.*

people in 1970, into a city of over 4,600 residents by 2016.[3] This dramatic transformation coincided with the Magnuson-Stevens Fisheries Management and Conservation Act's "Americanization" of the groundfish fleet in North Pacific waters and the subsequent growth of the fish processing industry, both onshore and at sea. Communities in Southeast Alaska underwent a similar transformation in response to the growth of the international market in salmon, which has been tempered in recent years by foreign competition from the salmon farming industry.

Some communities that have experienced rapid population growth have also seen an influx of ethnic diversity as the fishing industry has become a global enterprise that draws labor from around the world. By 2013, there were high percentages of non-Alaskan and foreign-born residents working in fish processing plants and the majority of foreign-born individuals were residing in the Aleutian Islands and Kodiak Island[4]. Asian migrant workers comprise a large portion of fish processing workers in many communities. Akutan, for example, has a high percentage of Asian processing workers (43.2% of the 2009-2013 estimated population).

In contrast, some communities have experienced population decline in recent years as local economic conditions such as lack of employment and high cost of living drive migration to urban areas such as Anchorage. Some small communities may experience economic collapse from seafood processing or cannery closures leading to out-migration[5] demonstrating the reliance of small communities on fisheries. Many small communities had no population data as of 2010. These include Annette Island, Cube Cove, Meyers Chuck, and Hobart Bay among others. Indigenous Americans comprise up to 82% of the population of small communities in remote areas and more Native Americans reside in Alaska than any U.S. State[6]. However, there has been increased migration of Alaska Natives from rural to urban areas[7]. The communities that maintain the highest percentages of Native residents are predominantly located in Western and Northern Alaska.

The ratio of men to women in many Alaska communities is indicative of labor mobility in industries such as fisheries and oil extraction. The majority of communities have more men than women (Figure 10.1), but this is particularly true of communities that rely heavily on fishing and fish processing. When compared to the U.S. population, which is almost equally distributed between men and women (49.1% male in 2000 and 49.2% in 2009-2013), and compared to the population of Alaska State (51.7% male in 2000 and 52.2% in 2009-2013), the majority of communities are comprised of male residents. A considerable number of communities which have the highest ratio of men to women are located in Southwest Alaska (in the Alaska Peninsula and Aleutian Islands), and in Southeast Alaska.

These areas are heavily involved in commercial fishing and fish processing; labor sectors that tend to be male-dominated. For example, as of 2014, Akutan's population composition was 77% male and 23% female, and Unalaska's 61% male and 39% female. Both of these communities are heavily engaged in fisheries with among the highest fishery landings in the State.

[3] ADLWD. 2016. Cities and Census Designated Places (CDPs), 2010 to 2015. Available at: `http://live.laborstats.alaska.gov/pop/index.cfm` (accessed 24 August 2016). Alaska Department of Labor and Workforce Development, Research and Analysis Section.

[4] ADLWD 2015. Alaska Economic Trends. Foreign-Born Alaskans. Alaska Department of Labor and Workforce Development. March 2015, Volume 35, No 3.

[5] Donkersloot, R., Carothers, C., 2016. The Graying of the Alaskan Fishing Fleet. Environment: Science and Policy for Sustainable Development 58, 30-42. Online: `http://dx.doi.org/10.1080/00139157.00132016.01162011`.

[6] Goldsmith, S., Angvik, J., Howe, L., Hill, A., Leask, L. 2004. Status of Alaska Natives 2004. Institute of Social and Economic Research, University of Alaska Anchorage.

[7] Williams, J. G. 2004. Migration. Alaska Economic Trends. July: 3-12.

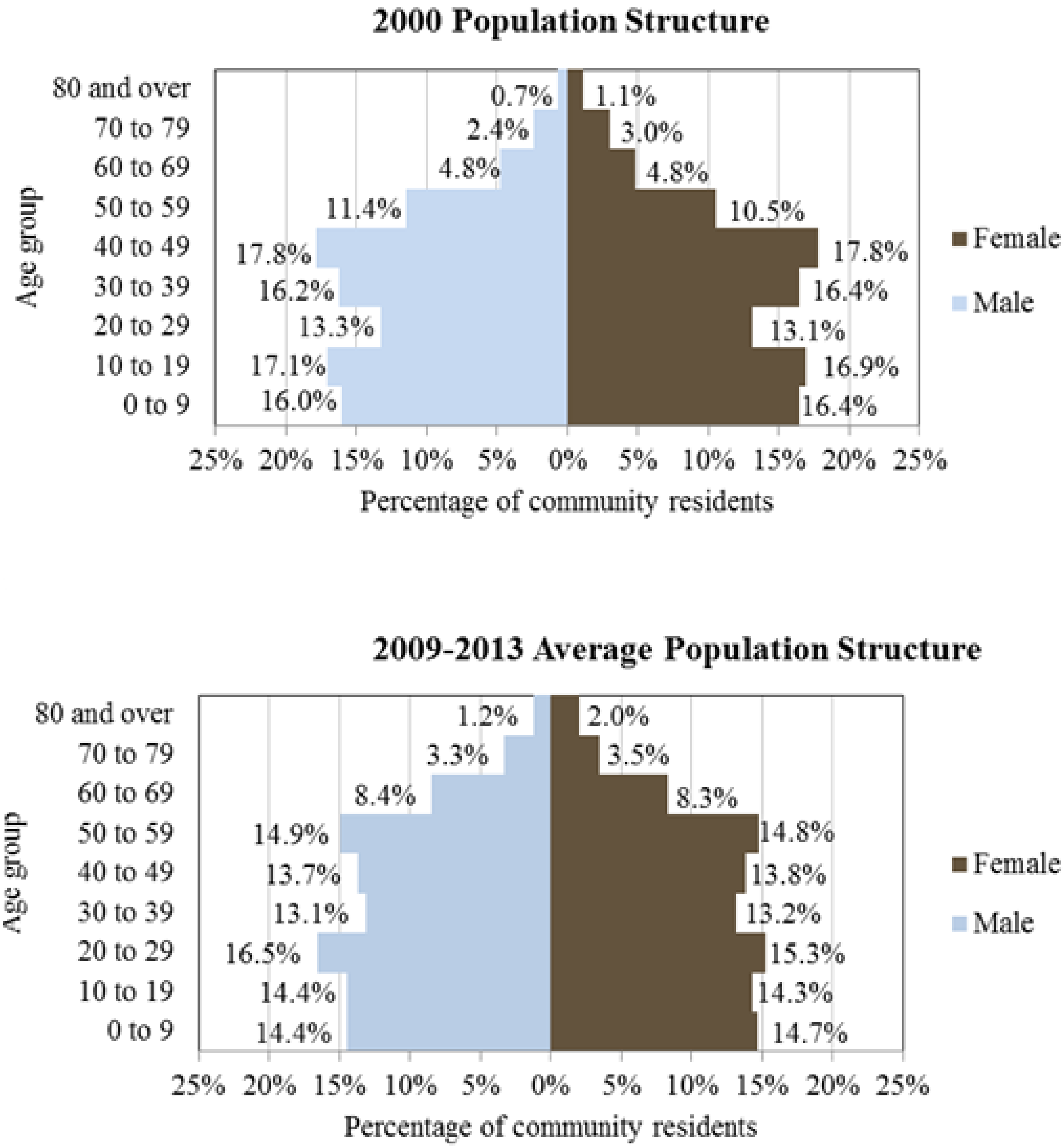


Figure 10.1: Population structure of the population as a whole in Alaska.
Source: U.S. Census Bureau. (n.d.). *Profile of selected social, economic and housing characteristics of all places within Alaska*. Datasets utilized include the 2000 Decennial Census (SF1 100% and SF3 sample data) and 2013 5-year estimates from the American Community Survey. Retrieved August 11, 2015 from `http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml`.

In contrast, large communities, communities with less transient populations, and some Native communities, are more balanced in population gender composition. Anchorage (50.6% male in 2000 and 50.9% in 2009-2013), Ketchikan (50.4% male in 2000 and 53.1% in 2009-2013), and Juneau (50.4% male in 2000 and 51.4% in 2009-2013) are all relatively equal in gender composition and all have large populations by Alaska standards. These communities also have diverse employment opportunities in tourism, finance, real estate, communications, government, and in mining, timber, and oil and gas industries.

Some remote Native communities, such as Newhalen (50% male in 2000 and 43.1% in 2009-2013) and Hooper Bay (49.7% male in 2000 and 52.2% in 2009-2013), have balanced gender structures as well, in part because of more limited commercial fishing opportunities; neither community had a fish processing plant. Iliamna, Kasaan, Point Baker and Rampart all have balanced gender structures and these communities have a population under 100 and lack commercial crew or processing employment. Some communities in Alaska have more females than males, but this is less common (roughly 25% of all communities in 2013).

Alaska also has a relatively young population composition. The average median age of communities was 32.7 years in 2000 and 35.5 years in 2009-2013, somewhat younger than the U.S. median of 35.3 years in 2000 and 37.3 in 2009-2013. There is a younger working-age population in Alaska State as approximately 56.3% of Alaska communities have a lower median age than the U.S. average. Extractive industries, including fisheries, has drawn young laborers to the State in recent decades.

10.2. Current Economy

Marine species were among the earliest and most important of Alaska's commercial resources, especially marine mammals. The fur trade, based on sea otter and fur seals, drove the economics of the Russian colonial empire. Commercial whaling was an important factor in the late 19th century. Some marine mammal populations have recovered from over-exploitation, while other populations remain low or are declining, affecting subsistence users and commercial fisheries.

Commercial fisheries began in the mid-1800s with salted cod, salmon, and herring, and later canned salmon. Lucrative offshore fisheries were conducted by fishing fleets from Russia, Japan and Korea, until the 1976 Magnuson Fishery Conservation and Management Act claimed the area between 3 and 200 miles offshore as the exclusive economic zone of the U.S.[8] Crab and other shellfish, herring, halibut, salmon and groundfish have all contributed to this important industry for the state, supporting a fishing economy that ranges from family fishing operations to multinational corporations, and transforming the social landscape by the immigration of workers from around the world.

There were 307,990 Alaskan residents employed throughout the state in 2013, compared to 284,000 in 2000. The government sector—including state and local levels—was the largest in terms of employment figures, with 69,644 jobs in 2013 and 74,500 jobs in 2000. In 2000, this was followed by services/miscellaneous (73,300), trade (57,000), transportation, communications and utilities (27,300), manufacturing (13,800, with seafood processing contributing the bulk of jobs at 8,300) and mining (10,300, with oil and gas extraction contributing the most jobs at 8,800). This changed slightly in 2013 to where trade transportation and utilities (62,919 or 20.4%) providing the most jobs, followed by educational and health services (44,716 or 14.5%), leisure and hospitality (30,240 or 9.8%) and professional and business services (27,768 or 9.0%).[9] Employment in commercial fishing

[8] Rigby, Phillip W., Ackley, David R., Funk, Fritz, Geiger, Harold J., Kruse, Gordon H., and Murphy, Margaret C. (1995). *Management of the Marine Fisheries Resources of Alaska.* Regional Information Report 5J95-04. Juneau, AK: Alaska Department of Fish and Game.

[9] Statistics in this paragraph are sourced from 1) Alaska Department of Labor and Workforce Development. (2001). The Year 2000 in Review: Growth Picks up in Alaska in 2000. *Alaska Economic Trends 2001.* Anchorage:

has declined over the past decade. Despite this decline, the commercial fishing and fish processing industries remain important in Alaska's economy.[10] Major industries including oil, military and commercial fishing are integral to the state's continued growth. At the same time, new sectors such as tourism have begun to contribute noticeably to Alaska's economy. Cruise ships, recreational fishing excursions, cultural tourism and eco-tourism are on the rise.

Unemployment rates in Alaska reflect national trends as unemployment was highest in 1992, and peaked in 2003 and 2010 (Figure 10.2). However, unemployment in Alaska was higher than national levels until 2009. Between 2009 and 2014, during the Great Recession, the State had lower unemployment rates than the Nation as a whole. The Northern Bering Sea and Arctic ecoregions have had the highest unemployment rates in the State since 1990. The Gulf of Alaska and Aleutian Islands chain had lower unemployment rates and these regions are more heavily engaged in commercial fishing.

10.2.1 Labor in Alaska's Commercial Fishing Industry

The commercial fishing sector is the largest private employer in Alaska. The fishing industry provides a variety of employment opportunities, including fishing, processing, transport, and dock and harbor work. In 2013, total of 212 communities had at least one resident that held a CFEC fishing permit. According to the CFEC, in 2000 there were 21,009 commercial fisheries permits sold to Alaska residents; 58% of which were actively fished. The number of permits issued to residents of Alaskan communities declined over the decade to 17,764 in 2013 with 56.5% being actively fished.

The number of licensed Alaskan crew members employed annually in Alaskan commercial fisheries has ebbed and flowed over recent decades, from more than 20,140 in 1993 to approximately 10,461 in 2003 to 12,094 in 2013.[11] In addition, the number of communities with at least one licensed crew member has decreased from 209 in 2000 to 195 in 2013. The decline is likely due to a combination of declining salmon prices, fishery management policy changes, and other factors. Although the majority of licensed crew members are Alaska residents, the labor pool also draws from Washington, other U.S. states, and around the world. The industry remains male-dominated, with women accounting for just 14% of licensed crew over the past decade. In addition, personnel turnover is high; the average crew member holds a license for just 1.8 years.[12] Similar declines were seen in the total number of vessels primarily owned by Alaskan residents, vessels homeported in Alaskan communities and vessels landing catch in Alaskan communities.

The employment data collected by the U.S. Census noticeably under-represents those involved in the fishing industry. The figures originate from Census form questions which are phrased in a way

Alaska Department of Labor and Workforce Development; and 2) Alaska Department of Labor and Workforce Development (n.d.). *Alaska Local and Regional Information Database.* Retrieved August 11, 2015 from `http://live.laborstats.alaska.gov/alari/`.

[10] Carothers, Courtney and Jennifer Sepez. (2005). Commercial Fishing Crew Demographics and Trends in the North Pacific. Poster presented at the *Managing Our Nation's Fisheries: Focus on the Future* Conference, Washington D.C., March 2005. Available at `ftp://ftp.afsc.noaa.gov/posters/pCarothers01_comm-fish-crew-demographics.pdf`.

[11] Alaska Department of Fish and Game. (2015). *Alaska sport fish and crew license holders, 2000 – 2013.* ADF&G Division of Administrative Services. Data compiled by Alaska Fisheries Information Network for Alaska Fisheries Science Center, Seattle. [URL not publicly available as some information is confidential.]

[12] Carothers, Courtney and Jennifer Sepez. (2005). Commercial Fishing Crew Demographics and Trends in the North Pacific. Poster presented at the *Managing Our Nation's Fisheries: Focus on the Future* Conference, Washington D.C., March 2005. Available at ftp://ftp.afsc.noaa.gov/posters/pCarothers01_comm-fish-crew-demographics.pdf.

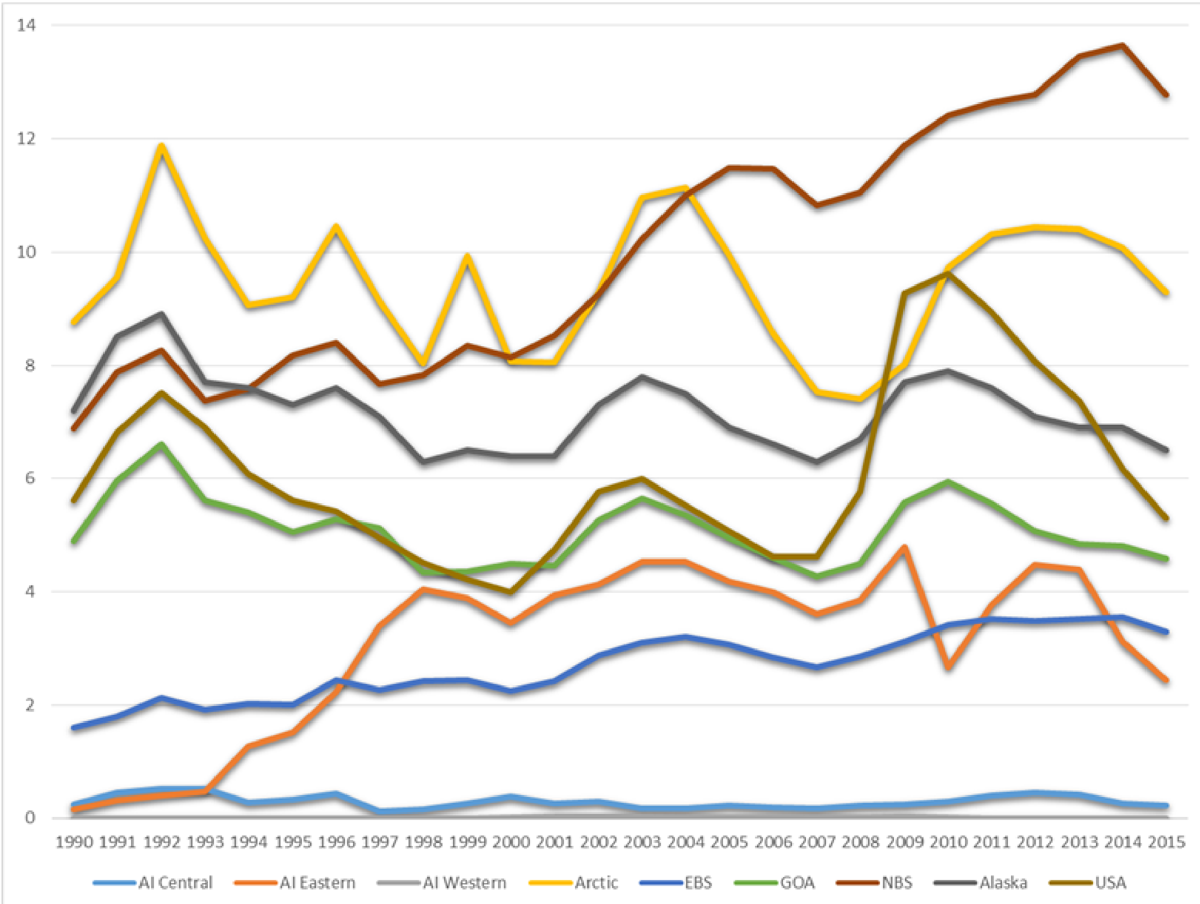


Figure 10.2: Unemployment rates for all regions, Alaska and USA.
Source: ADLWD. 2016a.
`http://live.laborstats.alaska.gov/pop/estimates/data/TotalPopulationPlace.xls` Cities and Census Designated Places (CDPs), 2010 to 2015. Available at:
`http://live.laborstats.alaska.gov/pop/index.cfm` (accessed August 24, 2016). Alaska Department of Labor and Workforce Development, Research and Analysis Section.

that likely deters answers from self-employed persons (as most fishermen are). In the results of the Census, agriculture, forestry, fishing and hunting were combined together into one reported figure, which makes it difficult to discern which individuals were involved in the fishing portion of the category. In addition, processing sector employment data is not available to at the community level. However, processing sector data is available at a higher aggregation level, such as at regional levels. Employment information for the important offshore processing sector is also not discussed because the effect on Alaska communities is indirect and is brokered for the most part out of Seattle.

Fish Taxes in Alaska

Taxes generated by the fishing industry, particularly the fish processing sector, are important revenue sources for communities, boroughs and the state. The Fisheries Business Tax, implemented in 1913, is levied on businesses that process or export fisheries resources from Alaska. The tax is generally levied on the act of processing, but it is often referred to as a "raw fish tax," since it is based on the ex-vessel value paid to commercial fishers for their catch. Tax rates vary under the Fisheries Business Tax, depending on a variety of factors, including how well established the fishery is, and whether processing takes place on a shoreside or offshore processing facility. Although the Fisheries Business Tax is typically administered and collected by the individual boroughs, revenue from the tax is deposited in Alaska's General Fund. According to state statute, each year the state legislature appropriates half the revenue from the tax to the municipality where processing takes place or to the Department of Community and Economic Development. The Fisheries Business Tax contributed $18.2 million in fiscal year 2000 and $45 million in fiscal year 2013 to total Alaska state revenue. [13]

In addition to the Fisheries Business Tax, the state has collected the Fisheries Resource Landing Tax since 1993. This tax is levied on processed fishery resources that were first landed in Alaska, whether they are destined for local consumption or shipment abroad. This tax is collected primarily from catcher-processor and at-sea processor vessels that process fishery resources outside of the state's three-mile management jurisdiction, but within the U.S. Exclusive Economic Zone, and bring their products into Alaska for transshipment to other locales. Fishery Resource Landing Tax rates vary from 1% to 3%, depending on whether the resource is classified as "established" or "developing." According to state statute, all revenue from the Fishery Resource Landing Tax is deposited in the state's General Fund, but half of the revenue is available for sharing with municipalities. The Fishery Resource Landing Tax contributed $2.2 million in fiscal year 2000 and $13.4 million in fiscal year 2013 to total Alaska state revenue. Taken together, the Fisheries Business Tax and the Fishery Resource Landing Tax make up only a small portion of Alaska's budget, contributing only 0.87% of total state fiscal revenues in both 2000 and 2013.[14]

In addition to these state taxes, many communities have developed local tax programs related to the fishing industry. These include taxes on raw fish transfers across public docks, fuel transfers, extraterritorial fish and marine fuel sales, and fees for bulk fuel transfer, boat hauls, harbor usage, port and dock usage, and storing gear on public land. There is no one source for data on these revenue streams; however, many communities report them in their annual municipal budgets. In addition, a request was made to communities to report this information in the 2011 AFSC survey. Where this information was provided, it has been reported in each community's profile.

10.3. Infrastructure

The accessibility of Alaska communities varies tremendously, largely due to significant varying levels of economic development across different regions of Alaska. While some communities such as Anchorage, Dutch Harbor/Unalaska, and Bethel have airport facilities capable of handling jet aircraft, others have only small airstrips; still others are accessible primarily by sea. Many small communities in the Bethel and Dillingham Census Areas of Western Alaska, for example, have no roads at all, relying primarily on marine and river transport, and in some places, winter ice landing strips; ground transportation in these areas is by ATVs in the summer and snowmobiles in the winter. There is also variation in access to facilities, such as hospitals, hotels, and shopping

[13] Figures are reported in two sources: (1) Alaska Department of Revenue, Tax Division. (2000). *Fiscal Year 2000 Annual Report.* Anchorage: Alaska Department of Revenue. Retrieved November 5, 2012 from `http://www.tax.alaska.gov/programs/annualrpt2000.pdf`. (2) Alaska Department of Labor and Workforce Development (n.d.). *Alaska Local and Regional Information Database.* Retrieved August 11, 2015 from `http://live.laborstats.alaska.gov/alari/`.

[14] Figures are reported in two sources: (1) Alaska Department of Revenue, Tax Division. (2000). *Fiscal Year 2000 Annual Report.* Anchorage: Alaska Department of Revenue. Retrieved November 5, 2012 from `http://www.tax.alaska.gov/programs/annualrpt2000.pdf`. (2) Alaska Department of Revenue, Tax Division 2013. *2013 Annual Report.* Retrieved August 11, 2015 from: `http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?1095r`.

centers. Few large and small metropolises serve as regional hubs, providing an array of services to surrounding villages.

Similarly, there is a great deal of variation between the communities in terms of fisheries-related and other marine facilities, also reflecting significant differences in economic development. Some of the larger communities, such as Juneau and Kodiak, serve as major commercial fishing and seafood processing centers. These communities have more than one boat harbor with moorage for hundreds of vessels, several commercial piers as well as numerous shore-side processing plants. By contrast, many smaller coastal communities, especially in Western and Northern Alaska, lack dock and harbor facilities. Many of these communities do not have stores, and residents rely on coastal supply shipments by barge from Seattle. Where there are no harbor facilities, residents must use small skiffs to offload the supplies and lighter them to shore. Although fishing activity occurs in these areas and provides a vital source of employment and income, the relative underdevelopment of infrastructure and facilities remains a significant barrier to economic development and fishery engagement[15].

10.4. History of Commercial Fishing in Alaska

Fisheries in Alaska have a high volume of landings compared to other areas of the country. A notable characteristic of Alaska fisheries from a statewide perspective is that the types of fisheries conducted are fairly diverse. Groundfish, salmon, crab, and herring all make substantial contributions to the state's fishery profile, and except for herring, each of those resource groupings involves multiple species which can be very different from one another. Diverse fishing fleets, with vessels ranging in size from small skiffs to more than 300 feet, engage in Alaska fisheries. These vessels utilize many harvest methods, including pelagic trawl, bottom trawl, troll, longline, purse seine, drift gillnet, setnet, pot, jig, and other commercial gear types. Divided, as they are, by species, gear type, vessel size and management area, the State limited entry permit system issues harvest permits in 326 different categories.[16] However, this diversity at the state level does not necessarily translate to communities. While a few communities, such as Kodiak, participate in the broadest range of fisheries, most communities are sustained largely by a few dominant fisheries and/or gear types.

The North Pacific's commercial fisheries have changed through time with increased technology, man-power, demand, and legislation. The 1860s saw the earliest commercial fishing efforts by U.S. vessels in Alaskan waters, primarily targeting Pacific cod.[17] After the purchase of Alaska from Russia in 1867, U.S. interest in Alaska fisheries increased. Salmon and herring were two of the earliest commercial fisheries in Alaska. In the late 1800s, the product was salted for storing and shipment.[18] Improved canning technology and expanded markets led to dramatic growth in the Alaska salmon industry, with 59 canneries throughout Alaska by 1898 and 160 in operation

[15]Lyons, C., Carothers, C., Reedy, K., 2016. Means, meanings, and contexts: A framework for integrating detailed ethnographic data into assessments of fishing community vulnerability. Marine Policy. In press.

[16]State of Alaska, Commercial Fisheries Entry Commission. (2011). *Current Fishery Codes Description Table.* Retrieved November 5, 2012 from `http://www.cfec.state.ak.us/misc/FshyDesC.htm`.

[17]Rigby, Phillip W., Ackley, David R., Funk, Fritz, Geiger, Harold J., Kruse, Gordon H., and Murphy, Margaret C. (1995). *Management of the Marine Fisheries Resources of Alaska.* Regional Information Report 5J95-04. Juneau, AK: Alaska Department of Fish and Game.

[18]Woodby, Doug, Dave Carlile, Shareef Siddeek, Fritz Funk, John H. Clark, and Lee Hulbert. (2005). *Commercial Fisheries of Alaska.* Alaska Dept. of Fish and Game, Special Publication No. 05-09. Retrieved December 29, 2011 from `http://www.adfg.alaska.gov/FedAidPDFs/sp05-09.pdf`.

by 1920.[19] With the development of diesel engines, commercial fisheries for Pacific halibut and groundfish had also expanded north to the Gulf of Alaska (GOA) and into the Bering Sea region by the 1920s.[20] Catch of herring for bait began around 1900. A boom in processing herring for fish meal and oil took place from the 1920 to 1960s, and sac roe fisheries developed in the 1970s to provide high value product to Japanese markets. By the mid-1900s, fisheries were also developing for crab, shrimp and other shellfish, as well as an expanding variety of groundfish species. Substantial commercial exploitation of crab began in the 1950s with the development of Bering Sea king crab fisheries. Today, king crab harvests are well below their peak in 1980, when crab fisheries rivaled the highly profitable salmon industry in terms of landings value.[21]

10.5. Community Fisheries Participation Indices for Alaska Communities

The National Marine Fisheries Service (NMFS) has developed a framework to create quantitative indices to help understand community well-being and participation in marine fisheries (Jepson and Colburn, 2013). The Alaska Fisheries Science Center's Economic and Social Sciences Research Program has adapted this framework to develop a set of performance metrics to track fisheries participation over time using pre-existing data for all Alaska communities participating in commercial fisheries. These performance metrics provide information to examine the degree to which Alaska communities participate in different aspects of commercial, recreational, and subsistence fisheries (Kasperski and Himes-Cornell, 2014; Himes-Cornell and Kasperski, 2016). The analysis presented here examines community participation in the commercial sector of Alaska fisheries by Alaska communities. The purpose of this analysis is to explore the degree to which communities participate in Alaska fisheries and how their participation has changed over time.

This analysis considers three performance metrics of community fisheries participation to understand the different ways that communities are invovled in Alaska fisheries: commercial processing engagement, commercial harvesting engagement, and the processing regional quotient with measures the percentage of all Alaska landings occurring in each community. These indicators provide a quantitative measure of community participation in Alaska fisheries and how their participation has changed from 1991 through 2015.

10.5.1 Methods

Data on community participation comes from AKFIN's Community Profile database which includes data on commercial, recreational, and subsistence fishing activities from 1991-2015 for communities within Alaska. However, this analysis is restricted to only commercial participation and includes all Alaska communities with some commercial participation in Alaska fisheries, either by having landings in the community or having vessel owners residing in the community.

[19] Clark, McGregor, Mecum, Krasnowski and Carroll. 2006. "The Commercial Salmon Fishery in Alaska." *Alaska Fisheries Research Bulletin* 12(1):1-146. Alaska Dept. of Fish and Game. Retrieved January 4, 2012 from `http://www.adfg.alaska.gov/static/home/library/PDFs/afrb/clarv12n1.pdf`.

[20] International Pacific Halibut Commission. 1978. *The Pacific Halibut: Biology, Fishery, and Management.* Technical Report No. 16 (Revision of No. 6).

[21] Woodby, Doug, Dave Carlile, Shareef Siddeek, Fritz Funk, John H. Clark, and Lee Hulbert. (2005). *Commercial Fisheries of Alaska.* Alaska Dept. of Fish and Game, Special Publication No. 05-09. Retrieved December 29, 2011 from `http://www.adfg.alaska.gov/FedAidPDFs/sp05-09.pdf`.

Commercial Fisheries Engagement Indices

Communities were included in the study population if any landings were made in the community or if the owner of a vessel that fished in the fisheries resided in the community for any year from 1991 through 2015.[22] The analysis separates variables into two categories of fisheries involvement: commercial processing and commercial harvesting. Processing engagement is represented by the amount of landings and associated revenues from landings in the community, the number of vessels delivering any commercial species in the community, and the number of processors in the community processing any commercial species. Harvesting engagement is represented by the landings and revenues associated with vessels owned by community residents, the number of vessels with landings owned by residents in the community, and the number of distinct vessel owners with landings in the community. By separating commercial processing from commercial harvesting, the engagement indices highlight the importance of fisheries in communities that may not have a large amount of landings or processing in their community, but have a large number of fishermen and/or vessel owners that participate in commercial fisheries that are based in the community.

To examine the relative harvesting and processing engagement of each community, a separate principal components factor analysis (PCFA) was conducted each year for each category to determine a community's engagement relative to all other Alaska communities. There are 25 years in the study and two PCFAs are conducted each year (processing engagement and harvesting engagement) for a total of 50 different PCFAs.

PCFA is a variable reduction strategy that separates a large number of correlated variables into a set of fewer, linearly independent components. These components are used to create quantitative indices of engagement for each community by using the regression method of summing the standardized coefficient scores multiplied by the included variable values. A unique processing index and harvesting index value for each community in each year is created using the first un-rotated extracted factor from the PCFA. Each index is normalized to have a mean of zero and a standard deviation of one for each year. These indices are relative scores in that they represent each community's engagement in commercial fisheries within a single year relative to all other communities in that year. Indices are then combined across all years to create a time series of relative engagement in commercial fisheries over time.

Communities that scored above one (above one standard deviation from the mean of zero) for any year are classified as highly engaged for that particular year. These communities are used in additional analyses to explore the changes in their participation for communities that were highly engaged from 1991-2015 for at least 20 of the 25 years for processing engagement and all 25 years for harvesting engagement. It is important to note that since these are relative indices, a large change in the number of active vessels over time will only cause a change in the indices if one community loses a larger share of their vessels (or other commercial fisheries activities) than another community. If the losses are proportional to the existing commercial fisheries related activities, there will not be a change in the indices over time.

Regional Quotient

The regional quotient is a measure of the importance of the community relative to all Alaska fisheries in terms of pounds landed or revenue generated within Alaska. It is calculated as the landings or revenue attributable to a community divided by the total shore-based landings or revenue from

[22]The owner's community is determined from the CFEC vessel registration each year.

all communities within Alaska (excluding catcher/processors, motherships, and inshore floating processors). The regional quotient is reported for both pounds and revenue from landings in a community (similar to processing engagement) but cannot be calculated based on vessel owner residency because residents may participate in fisheries outside Alaska. The regional quotient uses the same criteria for inclusion as the processing engagement index and is presented for all communities that were highly engaged at least 20 of the 25 years from 1991-2015.

10.5.2 Results

This section will report performance metrics of community participation in Alaska fisheries from 1991-2015. Data were collected for 252 communities within Alaska that had either some commercial fisheries landings or residents who owned vessels that were used in commercial fishing during this period. There were 87 communities that had some landings occurring in their community and were included in the commercial processing engagement analysis. In contrast, 248 of the 252 communities had a resident who owned a vessel that participated in commercial fishing and therefore were included in the commercial harvesting engagement analysis.

Commercial Processing Engagement

The results of the commercial processing engagement PCFA analyses are shown in Table 10.1 which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient (Armor, 1974) for all of the variables included in each PCFA. The results suggest somewhat strong relationships among variables and that a single index based on the first extracted factor explains over 60% of the variation in each of the variables in each year.

In addition to the goodness of fit statistics of the analyses provided in Table 10.1, each PCFA provides an index score for each of the 87 communities included in the analyses. These index scores are presented in Table 10.2 for the 15 communities that were highly engaged (index score above one, which is one standard deviation above the mean of zero) for at least one year from 1991-2015, and these cells are shaded in Table 10.2. The index is an indicator of the degree of participation in a community relative to the participation of other communities. It is a measure of the presence of commercial fishing through fishing activity including pounds landed, revenue, processors and the number of delivering vessels in all commercial fisheries.

Of the 15 communities found in Table 10.2, the 8 communities that were highly engaged in commercial processing for 20 or more years from 1991-2015 are shown in Figure 10.1 and includes Akutan, Cordova, Ketchikan, Kodiak, Naknek, Petersburg, Sitka, and Unalaska/Dutch Harbor. Unalaska/Dutch Harbor has the highest engagement scores over time, despite a declining engagement index since it reached a peak in 2002. The communities with increasing processing engagement scores experienced fairly substantial increases of 11%, 13%, 14%, and 10% for Unalaska/Dutch Harbor, Akutan, Kodiak, and Naknek, respectively (Figure 10.2). Cordova and Sitka both experienced a moderate decline of 5% in processing engagement in 2015 relative to the previous five year period (2010-2014), while Petersburg and Ketchikan experienced a 19% and 32% decline over the same period (Figure 10.3).

Table 10.1: Commercial processing engagement PCFA results.

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Ex-vessel value	Pounds landed in community	# of vessels delivering	# of processors	% variance explained	Armor's Theta
1991	3.06	0.78	0.14	0.02	0.946	0.819	0.811	0.916	77%	0.90
1992	2.96	0.85	0.16	0.03	0.946	0.801	0.786	0.899	74%	0.88
1993	2.96	0.78	0.24	0.01	0.954	0.837	0.761	0.878	74%	0.88
1994	2.89	0.85	0.23	0.03	0.946	0.789	0.808	0.852	72%	0.87
1995	2.85	0.82	0.31	0.03	0.945	0.824	0.778	0.818	71%	0.86
1996	2.78	0.87	0.31	0.04	0.947	0.782	0.821	0.776	70%	0.85
1997	2.91	0.8	0.25	0.03	0.953	0.832	0.747	0.871	73%	0.88
1998	2.92	0.76	0.28	0.03	0.955	0.848	0.736	0.865	73%	0.88
1999	2.85	0.81	0.31	0.03	0.939	0.847	0.773	0.811	71%	0.87
2000	2.51	1.11	0.35	0.03	0.921	0.822	0.759	0.640	63%	0.80
2001	2.56	1.17	0.23	0.03	0.901	0.794	0.778	0.719	64%	0.81
2002	2.57	1.16	0.24	0.03	0.895	0.815	0.756	0.733	64%	0.82
2003	2.53	1.18	0.26	0.03	0.896	0.809	0.751	0.712	63%	0.81
2004	2.57	1.19	0.21	0.03	0.903	0.770	0.790	0.730	64%	0.81
2005	2.6	1.2	0.17	0.02	0.899	0.771	0.804	0.741	65%	0.82
2006	2.52	1.24	0.21	0.03	0.903	0.752	0.780	0.726	63%	0.80
2007	2.62	1.17	0.18	0.03	0.902	0.770	0.801	0.758	66%	0.83
2008	2.59	1.23	0.15	0.02	0.890	0.779	0.812	0.732	65%	0.82
2009	2.73	1.12	0.12	0.03	0.902	0.770	0.845	0.782	68%	0.85
2010	2.71	1.04	0.2	0.04	0.923	0.766	0.842	0.751	68%	0.84
2011	2.64	1.11	0.22	0.03	0.915	0.763	0.811	0.748	66%	0.83
2012	2.54	1.2	0.23	0.03	0.912	0.752	0.800	0.705	63%	0.81
2013	2.65	1.08	0.24	0.03	0.922	0.763	0.817	0.745	66%	0.83
2014	2.56	1.23	0.18	0.03	0.893	0.733	0.823	0.737	64%	0.81
2015	2.59	1.17	0.23	0.02	0.902	0.817	0.795	0.688	65%	0.82

Processing Regional Quotient

Another measure of a community's participation in commercial fisheries is its processing regional quotient, defined as the share of commercial landings/revenues within a community out of the Alaska total landings/revenues. It is an indicator of the percentage contribution in pounds or revenue landed in that community relative the total shore-based landings or revenue from all communities within Alaska (excluding catcher/processors, motherships, and inshore floating processors). Figures 10.4 and 10.5 show the processing regional quotient both in pounds and revenue from 1991-2015.

The most prominent communities for processing have been Unalaska/Dutch Harbor and Akutan accounting for approximately 51% of the regional pounds landed from 1991-2015 as a result of the high volume pollock and other groundfish fisheries in the Eastern Bering Sea. The next highest volume community was Kodiak whose processing regional quotient averaged 13% from 1991-2015. Ketchikan, Cordova, Petersburg, Naknek, and Sitka represented 4%, 3%, 3%, 2%, and 2% of total

Table 10.2: Communities highly engaged in commercial processing for one or more years from 1991-2015*.

	Akutan	Cordova	Dillingham	Egegik	Homer	Juneau	Kenai	Ketchikan	King Cove	Kodiak	Naknek	Petersburg	Seward	Sitka	Unalaska/Dutch Harbor
1991	**1.7**	0.5	-0.4	-0.4	**2.2**	0.5	0.6	0.7	0.2	**4.3**	-0.4	**1.9**	**1.7**	**1.9**	**6.1**
1992	1	0.8	**2**	-0.6	**1.3**	0.4	**2**	**1.6**	0.7	**3.3**	**1.5**	**2.3**	1	**1.8**	**5.7**
1993	1	0.6	**1.1**	-0.2	**1.4**	0.7	**1.1**	**1.8**	1	**3.6**	**1.9**	**2.8**	1	**1.6**	**5.7**
1994	1	**1.2**	0.5	-0.5	**1.9**	0.8	**1.3**	**2.3**	0.9	**3.5**	**1.5**	**2.9**	0.8	**1.9**	**5.3**
1995	**1.1**	1	0.3	0.4	**1.8**	0.9	0.8	**2.2**	1	**3.3**	**1.7**	**2.5**	1	**1.9**	**5.7**
1996	**1.6**	**1.3**	0.5	-0.4	**2.2**	**1.1**	**1.1**	**1.9**	0.9	**2.9**	**2**	**2.2**	**1.4**	**2.1**	**5.3**
1997	**1.6**	**1.5**	0.2	0.1	**1.6**	0.8	**1.3**	**2.4**	0.7	**3**	**1.1**	**1.7**	**1.2**	**2.1**	6
1998	**1.5**	**1.4**	0.4	0.2	**1.7**	0.8	0.7	**2.4**	**1.2**	**3.3**	**1.2**	**1.5**	**1.1**	**1.9**	6
1999	**1.6**	**1.6**	0.4	0	**1.6**	0.7	0.4	**2.4**	**1.2**	**3.4**	**1.4**	**1.7**	**1.2**	**1.9**	**5.7**
2000	**2.3**	**2.3**	0.2	0.5	1	0.4	0.4	**1.2**	**1.4**	**3.1**	**1.4**	1	0.8	**3.5**	**5.5**
2001	**1.9**	**1.6**	0.7	0.7	**1.3**	0.7	0.8	**1.8**	1	**3**	0.1	**1.5**	0.8	**3.3**	**5.8**
2002	**1.9**	**1.5**	**1.2**	0.7	**1.5**	0.5	0.4	**1.5**	0.2	**2.6**	0.6	**1.5**	0.7	**2.9**	**6.1**
2003	**2**	**1.6**	**1.3**	0.8	**1.2**	0.9	**1.6**	**1.7**	0.4	**2.6**	0.8	**1.8**	0.8	**2.1**	6
2004	**1.8**	**1.3**	1	**1.3**	1	**1.2**	**1.6**	**2.3**	0.7	**2.8**	0.8	**1.8**	0.6	**2.9**	**5.4**
2005	**1.9**	**1.6**	**1.3**	1	0.9	**1.9**	**1.6**	**2.2**	0.8	**3.1**	**1.1**	**1.5**	0.4	**2.7**	**5.2**
2006	**1.8**	**1.4**	**1.6**	0.9	0.9	**2.2**	**1.3**	**1.8**	0.8	**3**	**1.3**	**1.3**	0.4	**3.2**	**5.1**
2007	**1.8**	**2**	**1.3**	0.9	0.8	**1.8**	**1.5**	**1.9**	0.3	**2.9**	**1.3**	**1.4**	0.6	**3.5**	5
2008	**1.9**	**1.9**	**1.1**	0.7	0.6	**2.1**	**1.2**	**2.1**	0.5	**2.9**	**1.5**	**1.5**	0.5	**3.6**	**4.9**
2009	**1.7**	**1.7**	**1.2**	**1.4**	0.9	**1.7**	**1.2**	**2.3**	0.3	**3.2**	**1.4**	**1.7**	0.4	**4.1**	**4.3**
2010	**1.7**	**2.5**	**1.2**	1	**1.1**	**1.6**	1	**2.5**	0.7	**3.1**	**2**	**1.6**	0.7	**3.6**	4
2011	**2**	**1.6**	0.5	0.7	0.8	**1.7**	1	**2.6**	0.7	**3**	**2.1**	**1.9**	0.6	**3.6**	**4.4**
2012	**2.1**	**1.7**	0.3	0.4	0.7	**1.8**	1	**2.8**	0.6	**3.1**	**2.5**	**1.2**	0.6	**3.1**	**4.6**
2013	**1.8**	**2**	0.3	0.4	0.6	**2**	1	**3.2**	0.6	**3.1**	**2.4**	**1.8**	0.6	**3.1**	**4.3**
2014	**2**	**1.7**	0.5	0.2	0.5	**1.7**	1	**2.4**	0.5	**3**	**2.9**	**1.5**	0.5	**3.7**	**4.5**
2015	**2.2**	**1.8**	0.3	0.1	0.7	**1.6**	0.5	**1.8**	0.9	**3.5**	**2.6**	**1.3**	0.6	**3.2**	**4.8**

Notes: *Values in bold are index scores above one (which is one standard deviation above the mean of zero) for at least one year from 1991-2015.

landings on average from 1991-2015, respectively, while all other communities represented 22% over the same period.

In slight contrast to the processing regional quotient of pounds, the three communities of Unalaska/Dutch Harbor, Akutan, and Kodiak represented 21%, 8%, and 12% of the regional revenue on average from 1991-2015. The highly engaged communities for at least 20 years represented 62% of the regional value on average from 1991-2015.

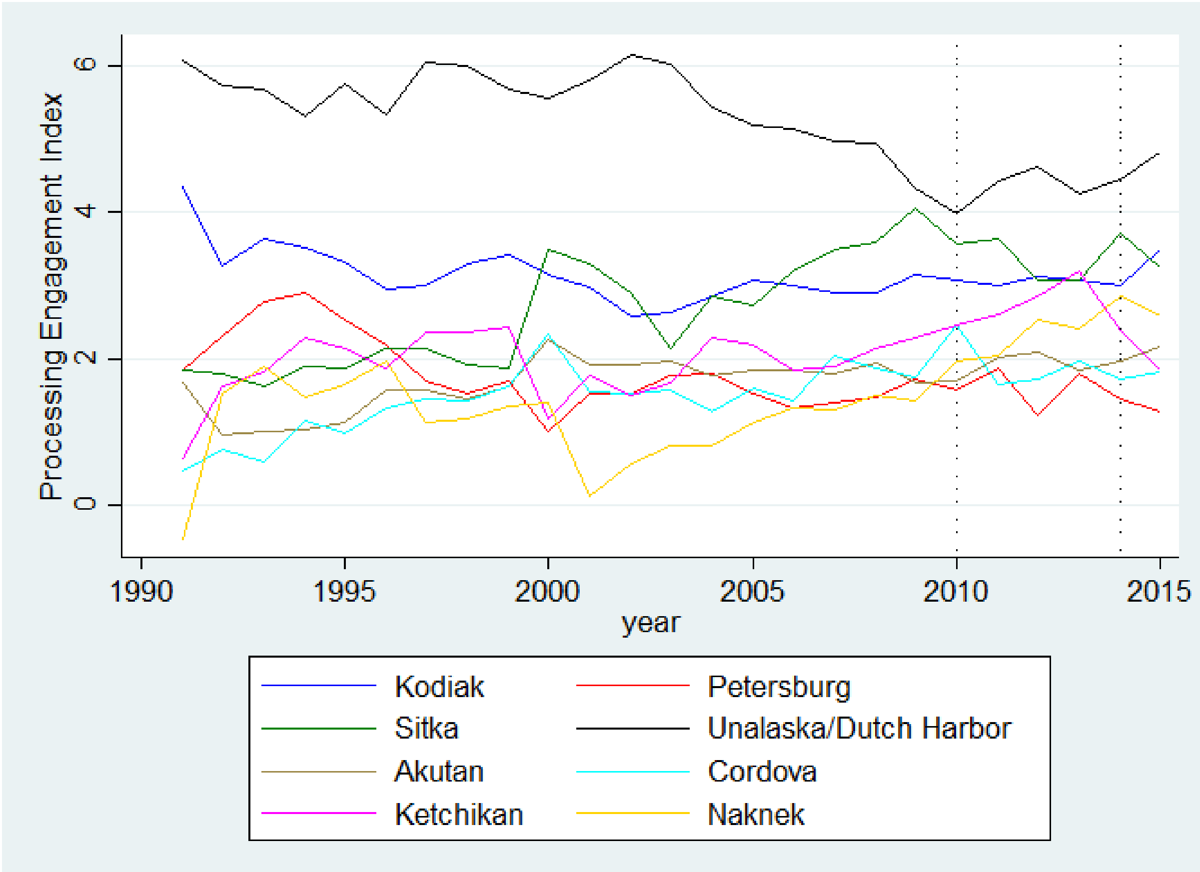


Figure 10.3: Index scores of communities highly engaged in commercial processing for at least 20 years from 1991-2015. Dotted lines indicate the previous 5 year period (2010-2014).

Commercial Harvesting Engagement

The results of the commercial harvesting engagement PCFA analyses are shown in Table 10.3 which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient (Armor, 1974) for all of the variables included in each PCFA. The results suggest a strong relationship among variables and that a single index based on the first extracted factor explains over 80% of the variation in each of the variables in each year.

Index scores derived from the PCFA results are presented in Table 10.4 for the 16 communities that were highly engaged (index score above one, which is one standard deviation above the mean of zero) for all years from 1991-2015, and these cells are shaded in 4. The harvesting engagement index is an indicator of the degree of participation in a community relative to the participation of all other communities in Alaska. It is a measure of the presence of commercial fishing through residents who own commercial fishing vessels including pounds landed, revenue, the number of vessels, and the total number of owners in a community.

Of the 16 communities listed in Table 10.4, 10 communities were highly engaged in commercial harvesting for all years from 1991-2015 (Figure 6). They are Anchorage, Cordova, Homer, Juneau, Ketchikan, Kodiak, Petersburg, Sand Point, Sitka, and Wrangell.

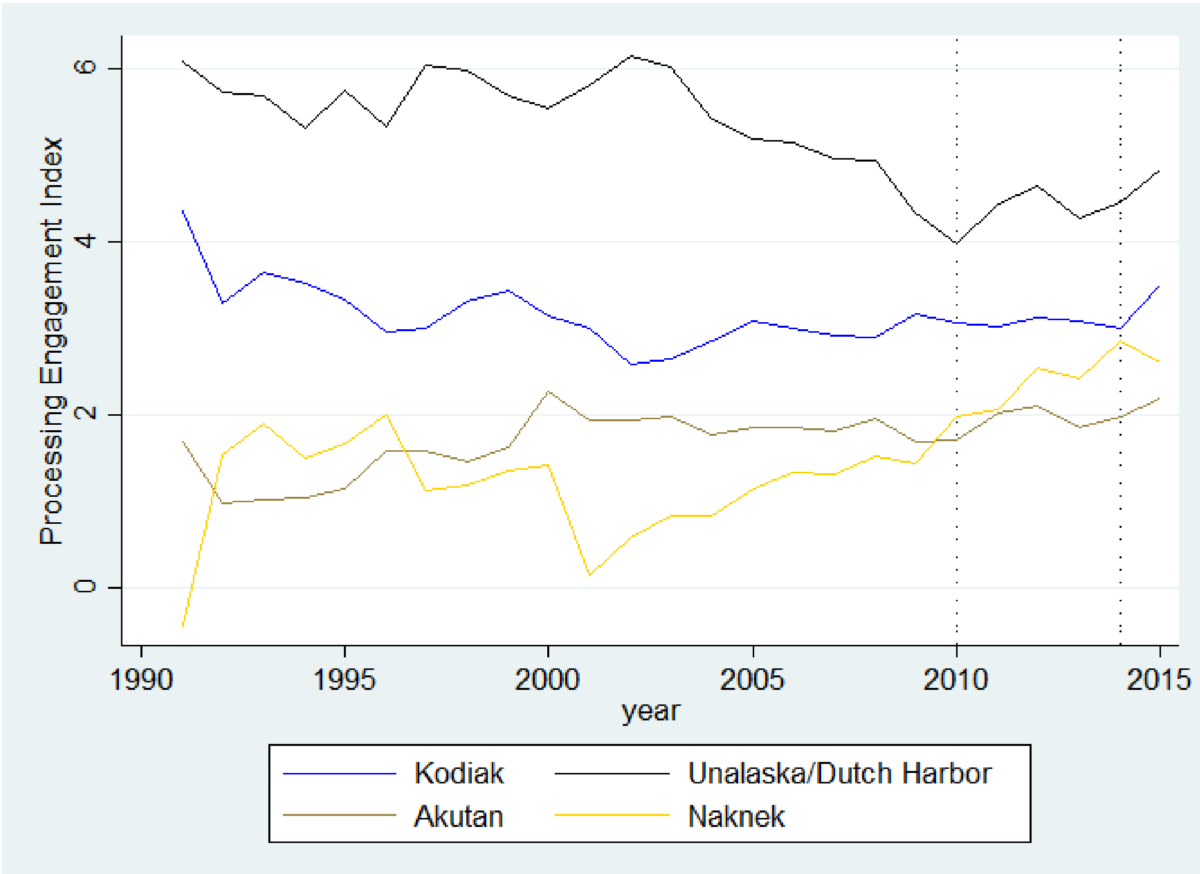


Figure 10.4: Index scores of communities highly engaged in commercial processing for at least 20 years with increasing engagement in 2015 relative to previous 5 year average from 2010-2014.

Kodiak has the highest harvesting engagement scores over time, despite a declining engagement index throughout most of the time series from 1991-2015. The communities with increasing harvesting engagement scores experienced small to moderate increases of 1%, 4%, 2%, 5%. 17%, and 4% for Anchorage, Homer, Ketchikan, Kodiak, Sand Point, and Wrangell, respectively (Figure 10.7). Cordova, Juneau, Petersburg, and Sitka experienced decreases in harvesting engagement between in 2015 relative to the previous five year period (2010-2014) by 0.2%, 11%, 12%, and 4%, respectively (Figure 10.8).

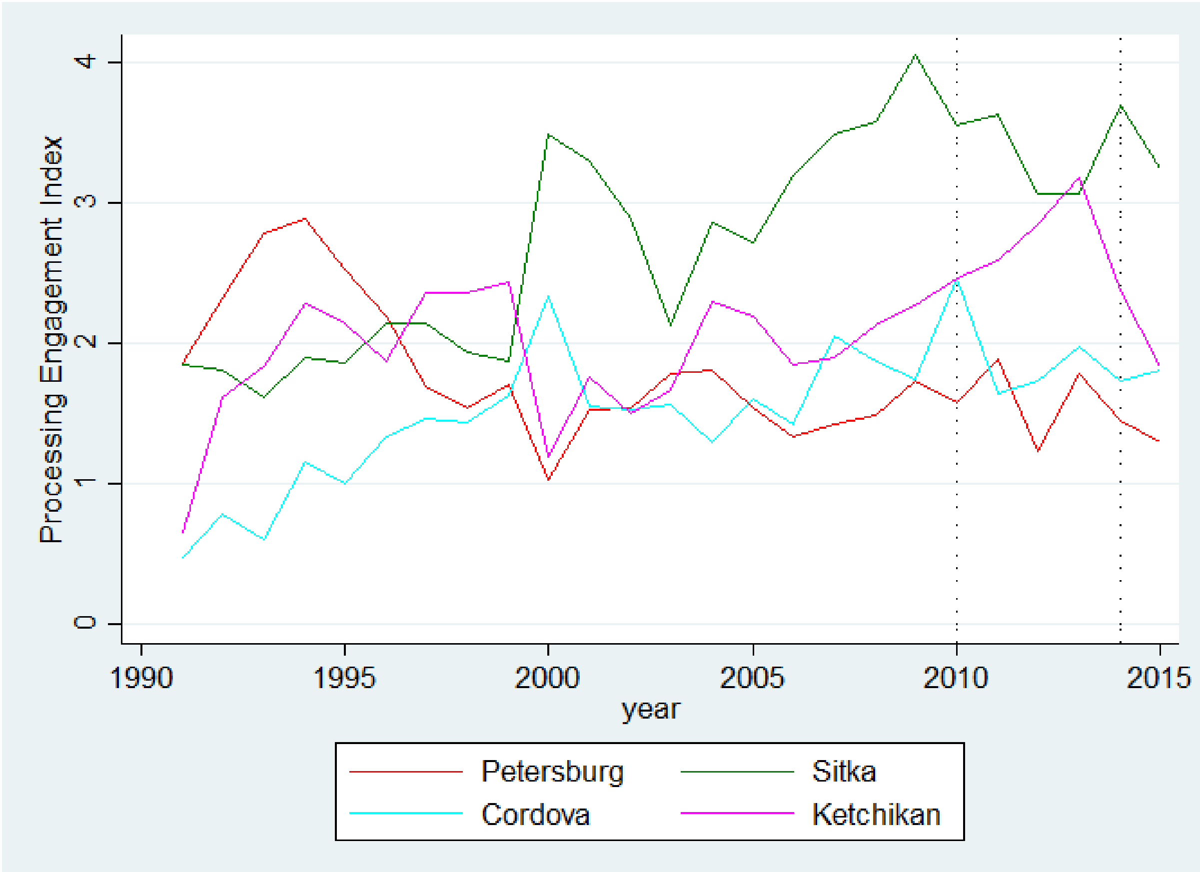


Figure 10.5: Index scores of communities highly engaged in commercial processing for at least 20 years with decreasing engagement in 2015 relative to previous 5 year average from 2010-2014.

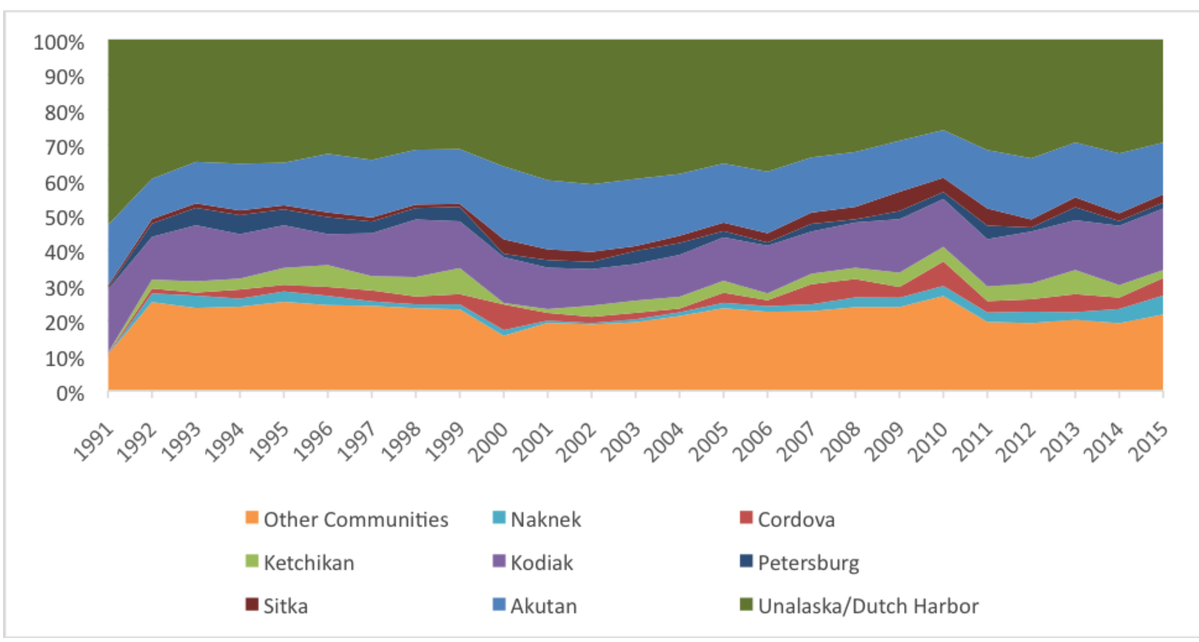


Figure 10.6: Processing regional quotient of pounds for communities highly engaged in commercial processing for at least 20 years from 1991-2015.

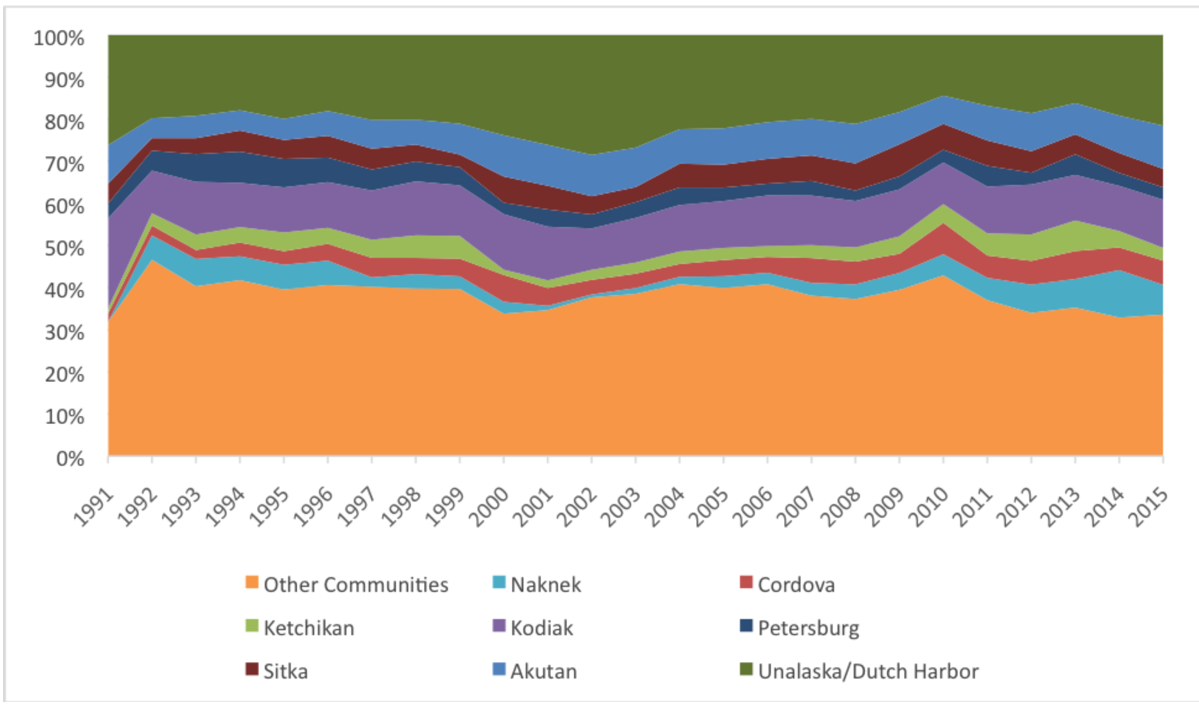


Figure 10.7: Processing regional quotient of revenue for communities highly engaged in commercial processing for at least 20 years from 1991-2015.

Table 10.3: Commercial Harvesting Engagement PCFA Results.

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Ex-vessel value	Pounds landed in community	# of vessels delivering	# of processors	% variance explained	Armor's Theta
1991	3.44	0.54	0.01	0.01	0.940	0.914	0.915	0.941	86%	0.95
1992	3.38	0.56	0.06	0.01	0.947	0.865	0.919	0.943	84%	0.94
1993	3.27	0.66	0.06	0.01	0.940	0.839	0.905	0.930	82%	0.93
1994	3.4	0.54	0.05	0.01	0.955	0.858	0.923	0.946	85%	0.94
1995	3.35	0.62	0.02	0.01	0.958	0.850	0.911	0.938	84%	0.94
1996	3.37	0.6	0.02	0.01	0.952	0.868	0.916	0.933	84%	0.94
1997	3.33	0.64	0.02	0.01	0.944	0.867	0.913	0.925	83%	0.93
1998	3.33	0.65	0.02	0.01	0.939	0.877	0.910	0.921	83%	0.93
1999	3.39	0.59	0.02	0.01	0.933	0.907	0.917	0.925	85%	0.94
2000	3.38	0.58	0.03	0.01	0.936	0.895	0.923	0.923	84%	0.94
2001	3.43	0.52	0.04	0.01	0.945	0.898	0.932	0.930	86%	0.94
2002	3.39	0.57	0.03	0.01	0.944	0.889	0.927	0.921	85%	0.94
2003	3.42	0.55	0.03	0	0.940	0.902	0.929	0.925	85%	0.94
2004	3.41	0.55	0.04	0	0.947	0.888	0.933	0.926	85%	0.94
2005	3.62	0.35	0.03	0	0.969	0.922	0.946	0.966	90%	0.96
2006	3.54	0.44	0.02	0	0.974	0.887	0.942	0.955	88%	0.96
2007	3.61	0.37	0.02	0	0.971	0.921	0.944	0.964	90%	0.96
2008	3.56	0.41	0.02	0	0.968	0.909	0.939	0.958	89%	0.96
2009	3.55	0.43	0.01	0	0.972	0.902	0.938	0.955	89%	0.96
2010	3.62	0.36	0.01	0	0.976	0.918	0.947	0.965	91%	0.97
2011	3.6	0.38	0.01	0	0.972	0.918	0.944	0.961	90%	0.96
2012	3.57	0.42	0.01	0	0.975	0.903	0.941	0.957	89%	0.96
2013	3.67	0.32	0.01	0	0.980	0.928	0.952	0.969	92%	0.97
2014	3.55	0.43	0.01	0	0.982	0.881	0.943	0.959	89%	0.96
2015	3.57	0.41	0.01	0	0.977	0.901	0.942	0.959	89%	0.96

Table 10.4: Communities highly engaged in commercial harvesting for one or more years from 1991-2015.*

	Anchorage	Cordova	Craig	Dillingham	Homer	Juneau	Kenai	Ketchikan	Kodiak	Petersburg	Sand Point	Seward	Sitka	Soldotna	Wasilla	Wrangell
1991	**5.7**	**4.1**	0.6	**1.2**	**4.1**	**2.8**	**1.2**	**3.1**	**10.3**	**4.2**	**1.9**	1	**3.5**	**1.5**	0.3	**1.2**
1992	**6**	**3.7**	0.7	**1.3**	**4.4**	**3**	**1.4**	**3.3**	**9.7**	**4.2**	**1.9**	**2.1**	**3.5**	**1.6**	0.3	**1.2**
1993	**5.3**	**3.5**	0.9	**1.5**	**4**	**3**	1	**3.5**	**10.2**	**4.5**	**1.7**	**1.9**	**3.8**	**1.3**	0.3	**1.3**
1994	**5.4**	**4**	0.9	**1.4**	**4.2**	**3.3**	1	**3.6**	**9.4**	**4.9**	**1.8**	**1.9**	**4.3**	**1.3**	0.2	**1.4**
1995	**5.3**	**3.4**	0.9	**1.4**	**4.5**	**3.1**	0.9	**3.6**	**9.8**	**4.6**	**2**	1	**4.1**	**1.4**	0.4	**1.4**
1996	**5.4**	**3.5**	0.9	**1.3**	**4.4**	**3.3**	1	**3.6**	**9.6**	**5**	**1.8**	0.6	**4.2**	**1.5**	0.4	**1.3**
1997	**5.2**	**3.5**	1	**1.1**	**4.3**	**3.2**	0.9	**3.3**	**10**	**4.8**	**1.9**	0.7	**4.2**	**1.5**	0.5	**1.3**
1998	**5.2**	**3.5**	0.9	**1.1**	**4.4**	**3**	0.8	**3.4**	**9.9**	**4.7**	**2.1**	0.7	**4.3**	**1.5**	0.6	**1.3**
1999	**5.5**	**3.7**	0.9	**1.3**	**4.2**	**3**	0.8	**3.3**	**9.7**	**4.8**	**2.1**	0.7	**4.4**	**1.5**	0.5	**1.3**
2000	**5.6**	**3.6**	0.9	**1.2**	**4.4**	**3.1**	0.7	**2.7**	**9.8**	**4.7**	**1.8**	0.6	**4.8**	**1.5**	0.6	**1.2**
2001	**5.7**	**3.6**	0.9	0.9	**4.4**	**3.1**	0.7	**3.1**	**9**	**5.5**	**2**	0.6	**5**	**1.6**	0.6	**1.3**
2002	**5.7**	**3.2**	0.9	0.8	**4.5**	**3.3**	0.7	**3.1**	**9.3**	**5.1**	**1.6**	0.6	**5.1**	**1.6**	0.6	**1.4**
2003	**5.4**	**3.5**	0.9	0.9	**4.6**	**3.4**	0.7	**3.1**	**9.1**	**5.4**	**1.6**	0.6	**5.1**	**1.7**	0.5	**1.3**
2004	**5**	**3.2**	1	0.9	**4.8**	**3.3**	0.8	**3.1**	**9**	**5.5**	**1.7**	0.6	**5.5**	**1.7**	0.5	**1.4**
2005	**4.1**	**4.2**	0.9	0.9	**5.4**	**2.9**	0.7	**2.9**	**9**	**5.9**	**1.8**	0.4	**5.3**	0.5	0.3	**1.6**
2006	**3.6**	**3.6**	1	**1.1**	**5.4**	**3.6**	0.6	**2.7**	**9.3**	**5.8**	**1.4**	0.5	**5.3**	0.4	0.5	**1.6**
2007	**4.2**	**4.6**	1	0.9	**5.5**	**3.1**	0.6	**2.7**	**8.9**	**5.8**	**1.3**	0.6	**5**	0.4	0.6	**1.6**
2008	**4.4**	**4.5**	1	0.9	**5.7**	**3.2**	0.6	**2.5**	**8.8**	**5.6**	**1.8**	0.5	**5**	0.3	0.7	**1.5**
2009	**4.2**	**3.6**	1	0.9	**5.9**	**3.1**	0.6	**2.6**	**8.9**	**5.9**	**1.5**	0.4	**5.4**	0.3	0.7	**1.6**
2010	**4.6**	**4.9**	0.9	0.8	**6.4**	**3**	0.6	**2.4**	**8.2**	**5.6**	**1.3**	0.6	**5.2**	0.3	0.8	**1.4**
2011	**5.5**	**3.7**	1	0.7	**5.9**	**3**	0.7	**2.6**	**8.5**	**5.7**	**1.3**	0.5	**5.1**	0.4	0.8	**1.4**
2012	**5.2**	**3.9**	0.9	0.7	**6.2**	**3.2**	0.7	**2.6**	**8.7**	**5.1**	**1.3**	0.6	**5**	0.3	**1.1**	**1.4**
2013	**5.5**	**4.3**	0.9	0.7	**6.3**	**2.9**	0.6	**2.7**	**8**	**5.5**	**1.1**	0.5	**5**	0.4	**1.1**	**1.5**
2014	**5.4**	**3.8**	1	0.8	**6.2**	**3**	0.6	**2.5**	**8.7**	**5.2**	**1.1**	0.4	**5.2**	0.4	**1.1**	**1.5**
2015	**5.3**	**4.1**	1	0.7	**6.4**	**2.7**	0.5	**2.6**	**8.8**	**4.7**	**1.4**	0.5	**4.9**	0.4	**1.1**	**1.5**

Notes: *Values in bold are index scores above one (which is one standard deviation above the mean of zero) for at least one year from 1991-2015.

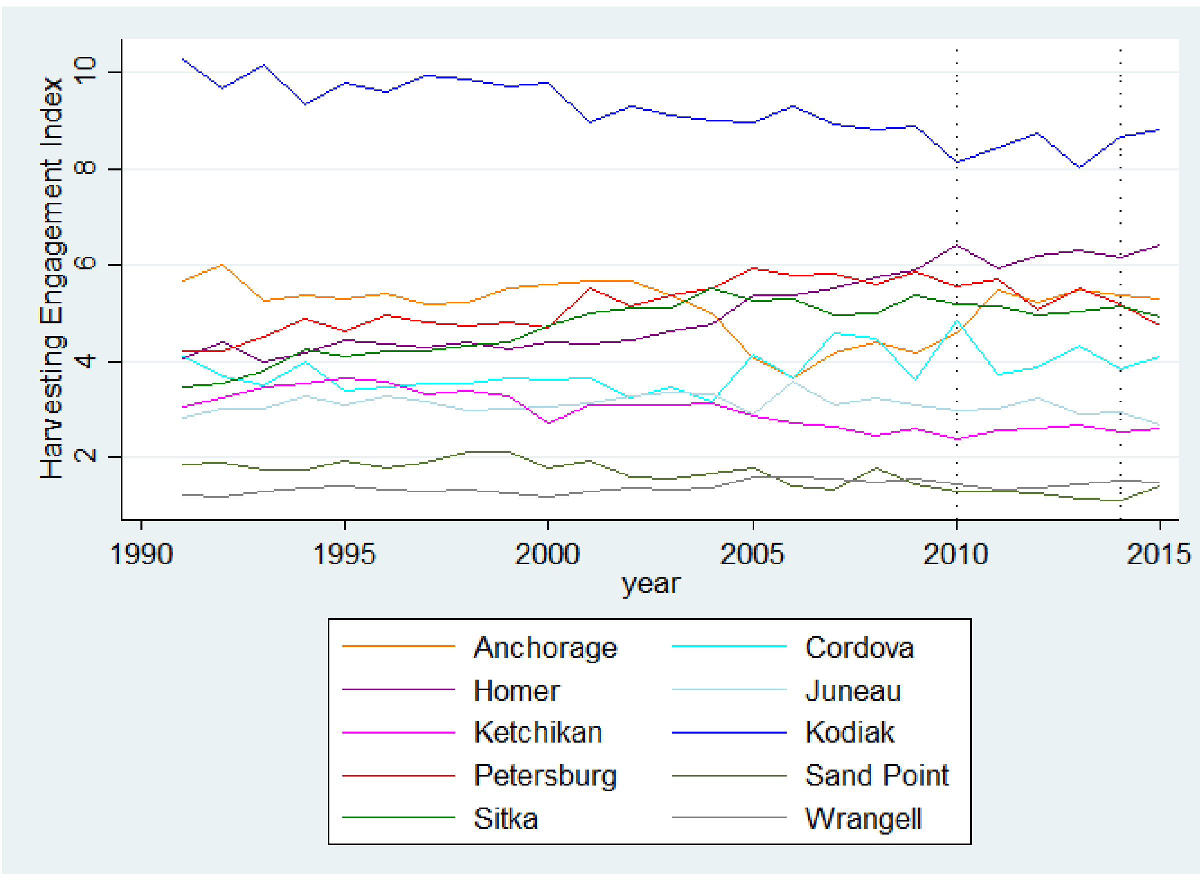


Figure 10.8: Index scores of communities highly engaged in commercial harvest for all years from 1991-2015. Dotted lines indicate the previous 5 year period (2010-2014).

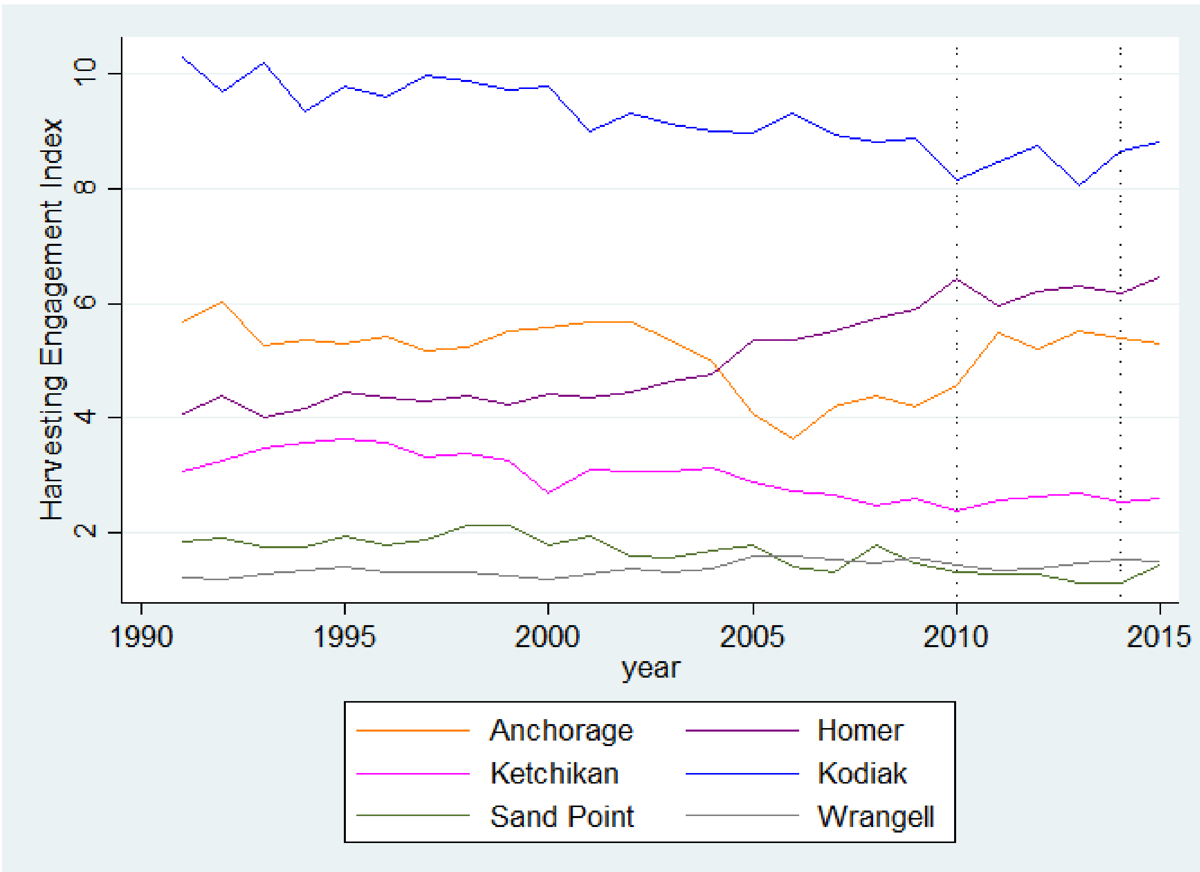


Figure 10.9: Index scores of communities highly engaged in commercial harvesting for all years with increasing engagement in 2015 relative to previous 5 year average from 2010-2014.

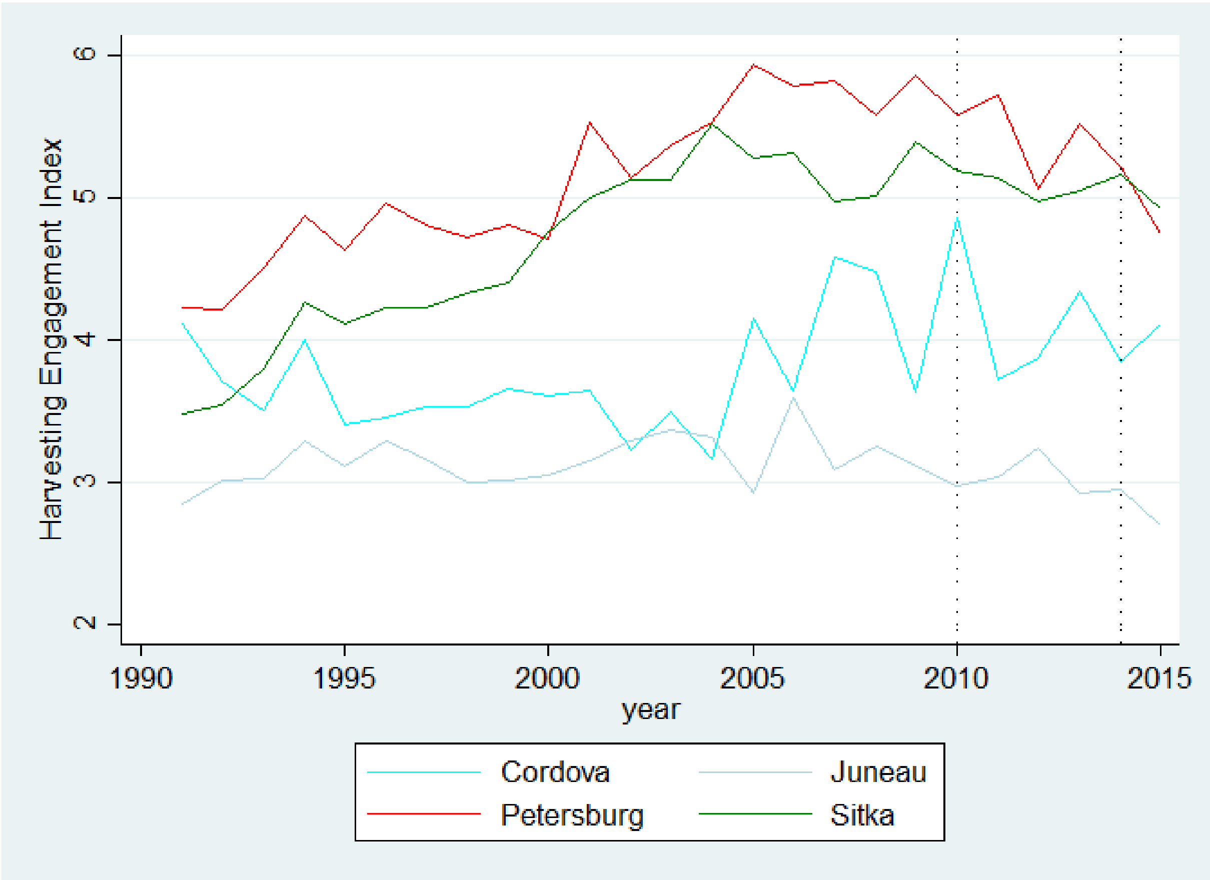


Figure 10.10: Index scores of communities highly engaged in commercial harvesting for years with decreasing engagement in 2015 relative to previous 5 year average from 2010-2014.

10.5.3 Participation Summary

Based on the community engagement index scores for both commercial processing and commercial harvesting engagement, communities were categorized into low (index scores below the mean of 0), medium (index scores between 0 and 1), and high engagement (index scores above 1) for each year. The number of years a community is in each category for the processing and harvesting engagement indices is presented in Table 10.5. There are 53 communities in Table 10.5 that had medium or high engagement in either harvesting or processing and 21 communities were highly engaged in one aspect of commercial fisheries in any year from 1991-2015. There were 16 communities that were highly engaged in processing engagement and 15 that were highly engaged in harvesting engagement for at least one year from 1991-2015.

Table 10.5: Number of years by processing and harvesting engagement level for all commercial fisheries. Alaska communities not listed had low processing and harvesting engagement in all years.

	Processing Engagement			Harvesting Engagement		
Community	Low	Medium	High	Low	Medium	High
Anchor Point	2	23	0	0	0	0
Anchorage	0	0	25	21	4	0
Angoon	16	9	0	0	0	0
Bethel	16	9	0	23	2	0
Chignik Lagoon	3	22	0	0	0	0
Cordova	0	0	25	0	3	22
Craig	0	22	3	3	22	0
Dillingham	0	14	11	1	14	10
Egegik	24	1	0	6	15	4
Fairbanks	10	15	0	0	0	0
Haines	0	25	0	11	14	0
Homer	0	0	25	0	10	15
Hoonah	0	25	0	4	21	0
Juneau	0	0	25	0	12	13
Kake	7	18	0	0	0	0
Kasilof	0	25	0	22	3	0
Kenai	0	22	3	0	10	15
Ketchikan	0	0	25	0	1	24
King Cove	0	25	0	0	22	3
King Salmon	16	9	0	0	0	0
Kipnuk	11	14	0	0	0	0
Klawock	14	11	0	0	0	0
Kodiak	0	0	25	0	0	25
Manokotak	18	7	0	0	0	0
Metlakatla	0	25	0	0	0	0
Naknek	0	25	0	1	4	20
Nelson Lagoon	24	1	0	0	0	0
Ninilchik	11	14	0	23	2	0
Old Harbor	16	9	0	0	0	0
Palmer	2	23	0	0	0	0
Pelican	7	18	0	19	6	0
Petersburg	0	0	25	0	0	25
Port Alexander	24	1	0	0	0	0
Sand Point	0	0	25	0	25	0
Seldovia	15	10	0	0	0	0
Seward	0	22	3	0	18	7
Sitka	0	0	25	0	0	25
Soldotna	0	11	14	24	1	0
Sterling	17	8	0	0	0	0
Togiak	0	25	0	11	14	0

11. ECONOMIC PERFORMANCE METRICS FOR NORTH PACIFIC GROUNDFISH CATCH SHARE PROGRAMS

11.1. Introduction

Catch share programs are a fishery management tool that allocates a secure share of the fishery resource to individual fishermen, fishing cooperatives, fishing communities, or other entities to harvest a fixed quantity of fish each year. Catch shares do not directly impact the total allowable catch (TAC) of each species, and are merely a mechanism to allocate the TAC across various individuals and user groups. The North Pacific region has been the most active region in the U.S. in developing catch share programs, and contains 6 of the 16 programs currently in operation throughout the U.S. These programs are the Western Alaska Community Development Quota (CDQ) (implemented in 1992), Alaska Halibut and Sablefish IFQ (implemented in 1995), American Fisheries Act (AFA) Pollock Cooperatives (implemented in 1999/2000), BSAI Crab Rationalization (implemented in 2005), Non-Pollock Trawl Catcher/Processor Groundfish Cooperatives (Amendment 80, implemented in 2008), and the Central Gulf of Alaska (GOA) Rockfish Program (extended the Rockfish Pilot Program in place from 2007-2011 and was implemented in 2012). The programs included in this report, which exclude the CDQ and BSAI Crab Rationalization programs but also includes Bering Sea Freezer Longline Catcher/Processors fishery, account for approximately 69% of all state and federal North Pacific groundfish landings in 2015 as reported in SAFE Table 1.

Catch share programs have a variety of designs which reflect unique circumstances in each fishery and stated goals of the program. In Alaska, these designs include individual fishing quota (IFQ) programs such as the Alaska Halibut and Sablefish IFQ program, cooperative programs such as AFA pollock, Amendment 80, and the Central GOA Rockfish Program, combined IFQ and cooperative programs such as the BSAI Crab Rationalization, as well as community allocation programs such as the CDQ program. There have been several stated goals for these programs, including: meeting conservation requirements, improving economic efficiency and/or flexibility, improving bycatch management, reducing excess capacity, eliminating derby fishing conditions, and improving safety at sea.

This section develops a consistent set of indicators to assess various dimensions of the economic performance of five catch share programs including the halibut IFQ program (which is managed by NOAA Fisheries and the International Pacific Halibut Commission), the sablefish IFQ program (implemented together with the halibut IFQ program but will be considered separately), the AFA pollock cooperatives program, the Amendment 80 program, and the central GOA Rockfish Program as well as one quasi catch share program, the Bering Sea Freezer Longline Catcher/Processors.

These indicators were developed by NOAA Fisheries' regional economists, anthropologists, and sociologists as the most representative indicators of economic performance for which data are available and can be regularly updated and were first summarized in Brinson and Thunberg (2013). They can be broken down into three general categories: catch and landings, effort, and revenue, and their descriptions are listed in Table 11.1.

The catch and landings metrics are the annual catch limit (ACL) or quota level, aggregate landings, the % of the quota that was utilized, as well as whether the ACL or quota was exceeded for any

Table 11.1: Definitions of Economic Performance Indicators.

Indicator	Definition
Catch and Landings	
Quota allocated to Catch Share Program	Annual quota of combined catch share program species, in terms of weight.
Aggregate landings	Annual total weight of combined catch share program species generated by vessels that fish quota.
% Utilization	Portion of target species TAC that is caught and retained within a fishing year. Aggregate Landings/Quota allocated to catch share program
Fishing Effort	
Season length index	The number of days in which at least one vessel was fishing divided by the number of days in the regulatory fishing season.
Active vessels	Annual number of vessels that fish quota and landing one or more pounds of any catch share program species.
Entities holding share	Annual total number of entities/individuals/vessel owners/permit holders receiving quota share at the beginning of the year.
Landings Revenue	
Aggregate revenue from Catch Share species	Annual total revenue of combined catch share program species generated by vessels that fish quota.
Average price	Aggregate revenue from catch share species/aggregate landings
Revenue per active vessel	Aggregate revenue/active vessels
Gini Coefficient	A measure of the evenness of the distribution of revenue among the active vessels. The Gini coefficient increases as revenues become more concentrated on fewer vessels.

species in the program. While the quota amount is set based on the biological condition of the species in the program, the landings and the percentage of the quota that is landed (% utilization) reflect economic conditions and regulatory constraints of the fishery.

The effort metrics are the season length index, the number of active vessels, and the number of entities holding share. The season length index is defined as the number of days in which at least one vessel was fishing divided by the number of days in the regulatory fishing season. This index enables the creation of a single unit-less metric of season length that can be aggregated over multiple areas or species with different season lengths within the same program. The index measures the relative proportion of the legal fishing season during which some or all vessels actively fished. The aggregate program level season length index is calculated as the weighted harmonic mean number of days in which at least one vessel was fishing by area using catch as weights and then divided by the regulatory fishing season length. The number of active vessels is one indicator of the scale of participation and effort in the fishery and can indicate changes in the expansion or consolidation of vessels in the fishery after rationalization. The number of entities holding share reflects the number of quota share owners that may be reduced as a result of consolidation or increase with new entrants over time and indicates the level of ownership accumulation in the fishery.

The revenue metrics are the aggregate revenue from catch share species, average prices of catch share species, the revenue per active vessel, and the Gini coefficient. Revenues are a function of the landings and prices, which may trend in opposite directions due to changes in the demand for the species that may or may not be caused by the movement to catch share management. Prices may be affected by catch share management, but they are also influenced by external factors such as substitute species, fluctuating exchange rates, changes in demand. While changes in prices cannot be solely tied to catch shares, they provide a useful metric to compare the performance of the fishery over time. The Gini coefficient is a measure of the evenness of the distribution of revenue among the active vessels which increases as revenues become more concentrated on fewer vessels or as marginal participants with low levels of revenue exit the fishery, and is useful to examine the distributional impacts of catch share programs across vessels.

Where possible, performance metrics are compared to a baseline period prior to catch share program implementation (typically the average of three years prior to program implementation). However, other factors that occur concurrently with, but are unrelated to, catch share implementation, such as changing market conditions or species biomass, will affect the economic performance of the fishery and are not accounted for in this analysis. Therefore, while these metrics may increase or decrease after catch share implementation, one should be cautious in assuming cause and effect. These metrics are useful to track changes in the economic performance of North Pacific catch share programs over time, but are not necessarily a comprehensive evaluation of the economic performance of these fisheries or of catch share programs in general. Some attempt is made to interpret the trends and provide context for the results, but a thorough examination of what is driving the trends is currently beyond the scope of this report and is left for future analysis.

11.2. North Pacific Halibut IFQ Program

Management Context

The North Pacific Halibut IFQ program was implemented simultaneously with the North Pacific Sablefish IFQ Program, but the sablefish IFQ program will be considered separately below. Halibut in the North Pacific are commercially caught by catcher vessels (CVs) that deliver their catch onshore and catcher/processor vessels (CPs) that catch and process their catch at sea using longline gear. Halibut are also caught as prohibited species catch (PSC) by vessels using trawl gear which means they cannot be retained by these vessels. The IFQ program only applies to halibut caught with longline gear in the directed commercial fishery. In addition to the directed commercial fishery, there are substantial recreational and subsistence sectors that depend on the halibut resource. Beginning in 2014, charter operators are able to lease a limited amount of commercial IFQ in areas 2C and 3A as part of the Pacific Halibut Catch Sharing Plan.[1] Additionally, through the Community Development Quota (CDQ) Program, a percentage of the Bering Sea and Aleutian Islands (BSAI) halibut catch limits, which varies by management area, is allocated to entities representing eligible Western Alaska communities designated in the Magnuson-Stevens Act. However, this section only examines the performance of the halibut IFQ portion of the program.

Halibut fisheries off the coast of Alaska are managed by two agencies: the International Pacific Halibut Commission (IPHC) and the North Pacific Fishery Management Council (NPFMC). The IPHC is responsible for assessment of the halibut stock and establishes the annual Total Constant

[1] `http://alaskafisheries.noaa.gov/sustainablefisheries/halibut/csp/cspoverview0214.pdf`.

Exploitation Yield (which is comparable to an ACL for the directed commercial fishery). The NPFMC is responsible for allocating the catch limits established for the halibut management areas off the coast of Alaska among various user groups. The halibut IFQ program was developed by the NPFMC and implemented by NOAA Fisheries in 1995 to manage the directed commercial halibut fishery in Alaska. Prior to the IFQ program, the fishery operated as a derby and often only lasted a few days per year (but the season length varied by area). Quota Share (QS) was initially issued based on both historic and recent participation of persons who, in 1988, 1989, or 1990, owned or leased vessels with qualifying landings. QS were issued in amounts commensurate with creditable halibut landings during the "best five" of 7 years from 1984-1990. The primary objectives of the IFQ Program are to 1) eliminate gear conflicts; 2) address safety concerns; and 3) improve product quality and value.

The Halibut and Sablefish IFQ program includes a cost recovery provision in which the fishermen pay a fee based on the cost to the government to manage the program. Recoverable costs cannot exceed 3% of the total ex-vessel value of the fishery and include the costs related to management, data collection, and enforcement of a Limited Access Privilege Program (LAPP) or Community Development Quota Program. Cost recovery began in 2000 for the halibut IFQ program and has ranged from $1.91 million to $3.22 million and 1.0% to 3% of the ex-vessel value of the fishery, with 2015 being the first year the fishery reached the 3% limit.[2]

Catch Share Privilege Characteristics

There are two forms of quota in the Halibut and Sablefish IFQ Program, QS and the annual allocation of IFQ in pounds derived from the QS. The QS are a revocable, indefinite privilege that entitles the holder to a share of the total area- and vessel class-specific IFQ allocated each year. Individuals as well as non-individuals (such as a corporation) can hold QS and IFQ. Prior to the beginning of each fishing season, IFQ is allocated to QS holders based upon their held QS, the total allowable catch (TAC) in each area which is recommended by the IPHC, and the total amount of QS in each management area (QS pool). QS and the resulting IFQ are designated for use in specific areas and on vessels of a specific size. These provisions are intended to limit catch by area and maintain a fleet with a range of vessel sizes. The IFQ Program also contains a number of QS and IFQ use restrictions, including use caps and designation of small QS blocks that are intended to prevent consolidation and maintain participation opportunities for small operations and new entrants. IFQ are valid only for one year, but there are rollover provisions that allow QS holders to carry over to the next year up to 10% of their unused IFQ and any overages (up to 10%) are taken from the following year's IFQ allocation. There are a total of 32 species and area specific quota allocations with a total of 55 unique types of halibut IFQ due to the existence of blocked and unblocked QS in some areas.

Catcher vessel QS are transferable to other initial issuees or to those who have become transfer-eligible through obtaining NOAA Fisheries' approval by submitting an Application for Eligibility to Receive QS/IFQ. To be eligible, potential QS/IFQ recipients must be a U.S. citizen and have 150 or more days of experience working as part of a harvesting crew in any U.S. commercial fishery. Halibut QS can be sold with or without the annual IFQ derived therefrom (plus adjustments from prior year QS used). However, CV IFQ can be leased annually to other eligible permit holders only under limited circumstances. Non-individual entities new to the program are only able to purchase QS or lease IFQ for the largest vessel class of "catcher/processor" quota (category A).

[2] The cost recovery fee for the Halibut and Sablefish IFQ Program is assessed for halibut and sablefish together, these numbers reflect our apportionment of the total fees collected to halibut based on the ratio of ex-vessel value.

The IFQ Program has a number of excessive share provisions. There are QS holding caps on both individuals as well as entities. No person, individually or collectively, can hold/control more than 0.5%-1.5% of halibut QS in specific areas and combinations of areas. In addition, vessel use caps limit each vessel to harvesting from 0.5%-1% of the halibut TAC in specific areas and combinations of areas. Halibut CDQ fishing is not subject to excessive share provisions. There are also owner on board requirements for CV QS and IFQ to limit the use of hired skippers. The NPFMC and NOAA Fisheries have also implemented a revolving loan program to assist entry level and small vessel fishermen acquire loans. The loan program is funded through a portion of the cost recovery fees collected.

Catch and Landings Performance Metrics

The catch and landings performance metrics include the amount of IFQ allocated to the program, the landings of IFQ halibut, and the percentage of the IFQ that is landed (percent utilization). Annual metrics are compared with a "baseline" period prior to program implementation, which is the average of the three years prior to program implementation (1992-1994). Between the baseline and 2015, IFQ allocated and landings have fallen by 64% and 65%, respectively, while the percent utilization fell from 102.2% (on average exceeding the allocation) during the baseline to 97.4% in 2015. The IFQ and landings had an initial decline for 2 years after IFQ implementation, but then steadily increased to a high in 2002 of 58.1 million pounds caught of the total allocation of 59.1 million pounds (Figures 11.1 and 11.2). With the exception of keeping the same 59 million pound allocation in 2003, the IFQ and landings of IFQ halibut have dropped every year since 2002. The IFQ allocation and landings in 2015 are 71.0% and 71.3% less than their peak IFQ program values in 2002.

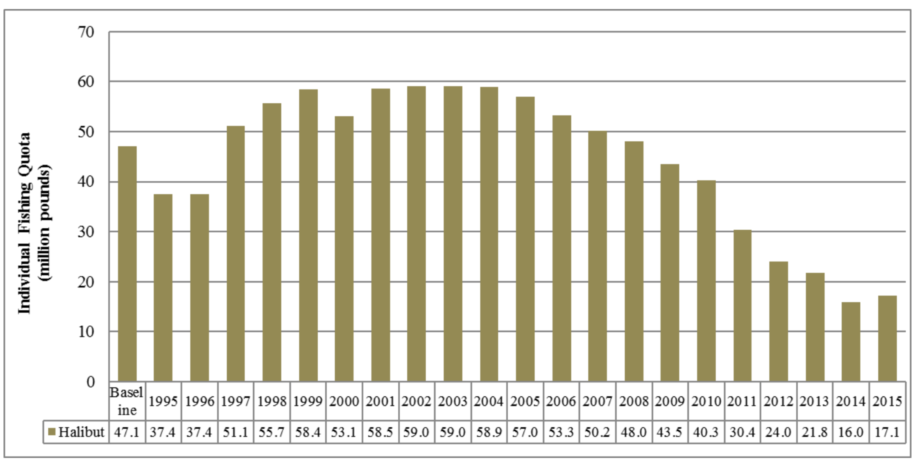


Figure 11.1: IFQ allocated under the halibut IFQ program.

Utilization initially fell from over 100% of the allocation to 86% in the first year after program implementation. While IFQ utilization varies from year to year, it has only dropped below 95% in two years, 1995 at 86% and 1998 at 92%, and overall averages 96.5% for all years following program implementation (Figure 11.3).

The statewide catch limit (similar to an ACL) was exceeded during the baseline period in 1993, but has not been exceeded since program implementation. Additionally, there were several area allocations that were exceeded during the baseline period, 4 in 1992, 8 in 1993, and 5 in 1994. In contrast, only 4 area allocations have been exceeded since program implementation in 1995 including area 3B in 2003, areas 3A and 3B in 2010, and area 3A in 2014.

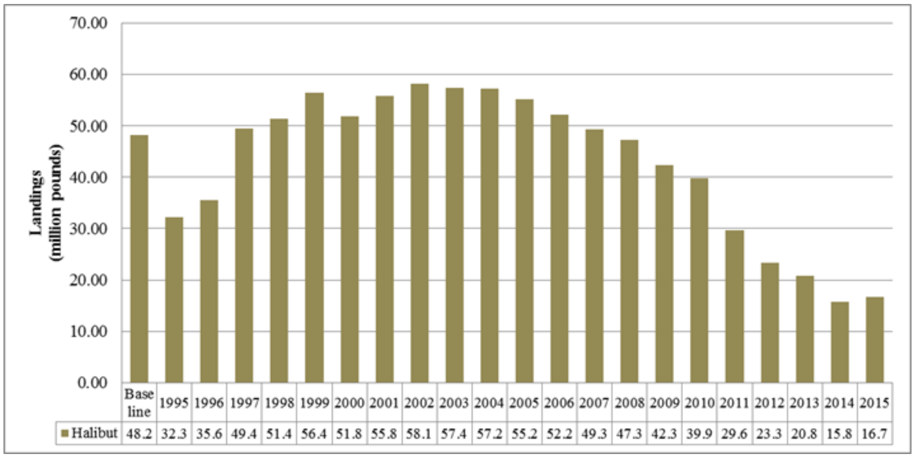


Figure 11.2: Landings of halibut in the halibut IFQ program.

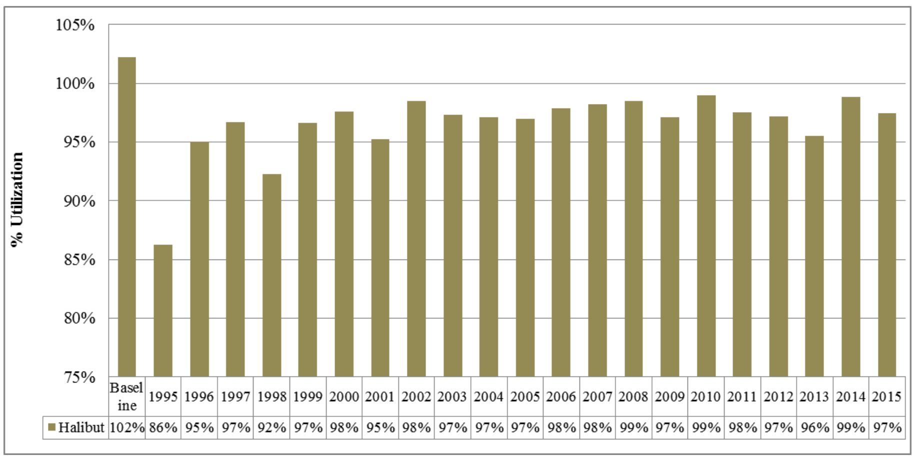


Figure 11.3: Percent of the allocated IFQ that is landed in the halibut IFQ program.

Effort Performance Metrics

The effort performance metrics include the season length index, the number of active vessels, and the number of entities holding QS. The season length index is defined as the number of days in which at least one vessel was fishing divided by the number of days in the regulatory fishing season. This index is necessary to create a single unit-less metric of season length that can be aggregated over all 8 areas, in which vessel participation varies throughout the season. This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished for halibut IFQ. During the baseline, some areas were only open to fishing for halibut for a few days (for the most demanded areas) while others were open for most of the year. To calculate an aggregate halibut IFQ program season length index, we use the weighted harmonic mean number of days active by area using catch as weights and then divide by the regulatory fishing season length. For the baseline period, we assume a 246 day regulatory fishing season which is the number of days allowed for the first 8 years post-IFQ and is the best hypothetical season length to use to compare pre-IFQ with post-IFQ. Using these definitions, the season length index in the baseline period is 0.01, which corresponds to 3.27 active days per year during the baseline period. Upon implementation of the IFQ Program, fishing was allowed for 246 days and there were 176 active days in the halibut IFQ fishery in 1995 which corresponds to a season length index of 0.72. Over the course of the halibut

IFQ program, the season length index has fluctuated between 0.65 – 0.81 (Figure 11.4), with 2015 using the lowest percentage of available time to fish since program implementation.

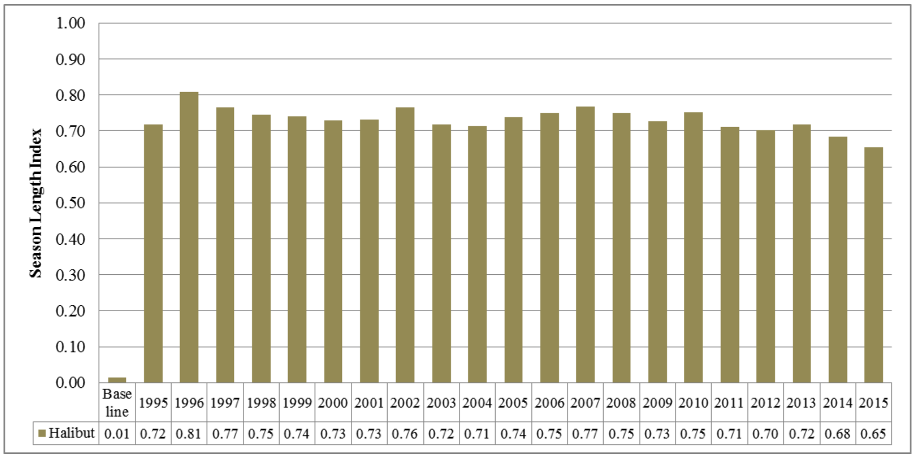


Figure 11.4: Halibut IFQ program season length index.

The number of active vessels reflects the number of halibut vessels with any commercial landings of IFQ Program halibut in a given year. The baseline value represents the average number of unique vessels per year with commercial halibut landings from 1992-1994. After IFQ program implementation, there was a 40% reduction in the number of active vessels overall, from 3,432 vessels in the baseline period to 2,060 vessels in 1995 (Figure 11.5). In years after program implementation (1996-2015), the average annual decrease in the number of active vessels fishing halibut was 4%, leaving 874 unique vessels active in the halibut IFQ fishery in 2015.

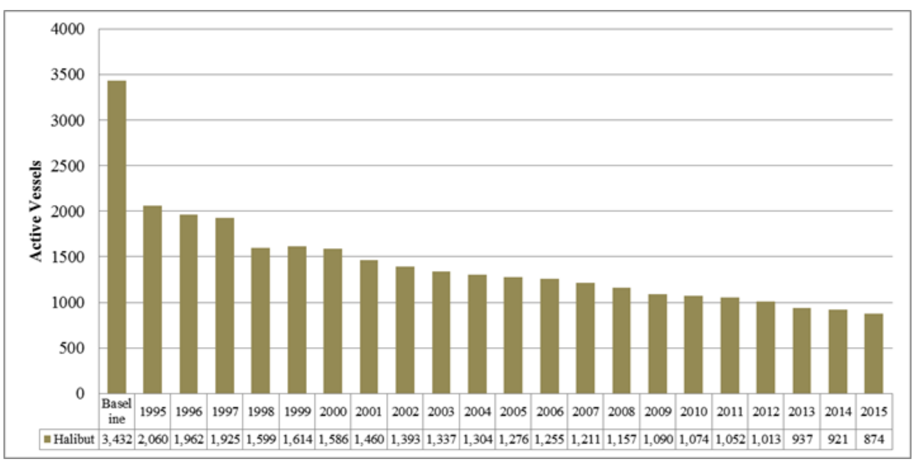


Figure 11.5: Number of active vessels in the halibut IFQ program.

There were 4,829 entities holding halibut QS at the beginning of the program. The number of entities has declined steadily since initial allocation. In 2015, 2,468 entities held QS, which is a reduction of 49% relative to the initial level in 1995 (Figure 11.6).

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from halibut IFQ, average prices of halibut IFQ, the revenue per active vessel, and the Gini coefficient which measures the concentration of revenues among active vessels. Revenues are adjusted for inflation by using the Gross Domestic

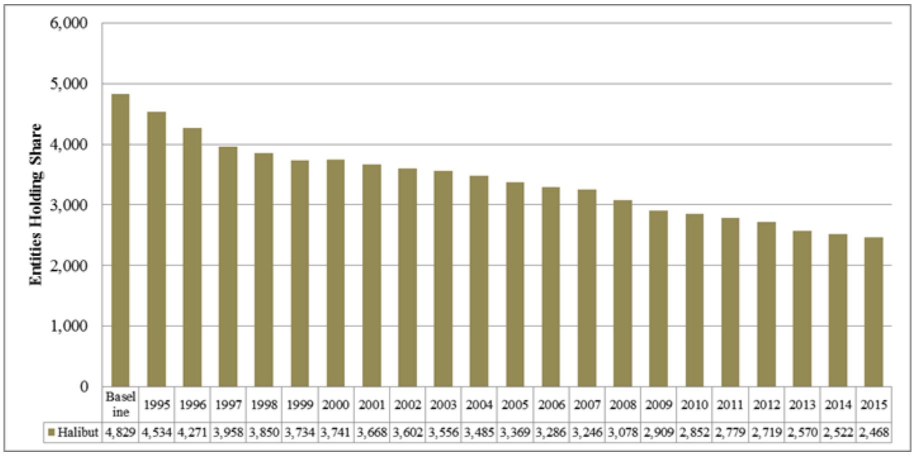


Figure 11.6: Number of entities holding QS in the halibut IFQ program.

Product (GDP) price deflator and are reported in 2010 equivalent dollars. Aggregate revenue from halibut IFQ has been higher for all years after program implementation relative to the baseline period (Figure 11.7). Halibut IFQ revenue was generally increasing through 2007, when revenues reached a peak of $223 million, but has declined since that time, falling to $90 million in 2014 but rebounded slightly in 2015 to $95 million.

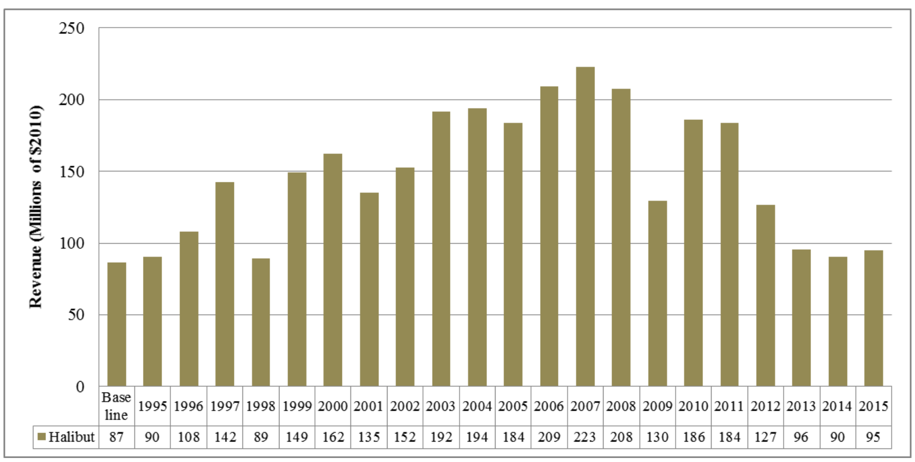


Figure 11.7: Halibut IFQ program revenue.

The average real price per pound of halibut has been higher in each year since program implementation, with the exception of 1998. Real average prices of halibut increased by 210% from $1.83/lb during the baseline to $5.68/lb in 2015 (Figure 11.8). There is substantial variation in the average prices which varied annually by -40% to 53% over the course of the halibut IFQ program, but there is a general upward trend with an average annual rate of change of 8.6%.

Halibut IFQ revenue per vessel has been above the baseline value for all years after program implementation as a function of both revenue increasing and the number of vessels declining relative to the baseline. The real revenue per active vessel increased by 330% from a baseline value of $25,000 to $109,000 in 2015 (Figure 11.9). Revenue per vessel increased from the baseline nearly every year and reached a high in 2007 at over $180,000 per vessel, but has generally declined after 2007, with a substantial reduction beginning in 2012. As revenues increased and the number of active vessels declined in 2015 relative to 2014, revenue per vessel increased by 11% in 2015.

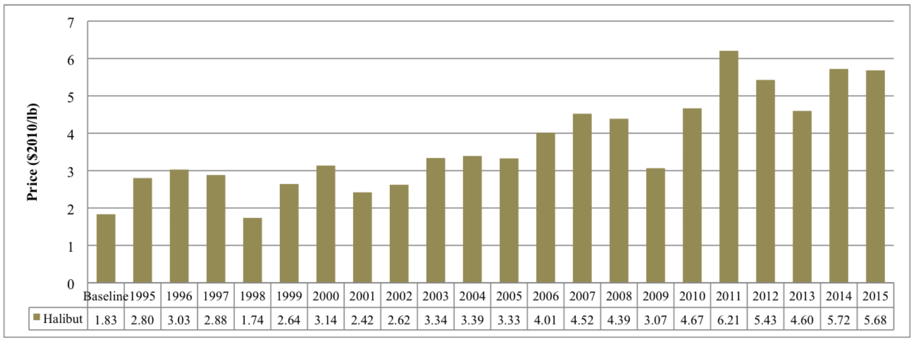


Figure 11.8: Halibut IFQ program price per pound.

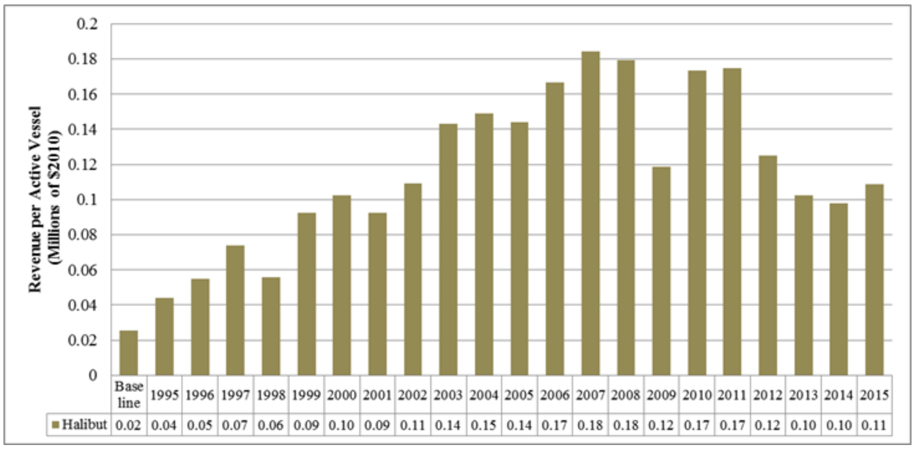


Figure 11.9: Halibut IFQ program revenue per active vessel.

The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the halibut IFQ program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore, revenue becomes more concentrated on fewer vessels as the Gini coefficient increases. The Gini coefficient for the baseline period (Gini = 0.59) is lower than at any point since IFQ program implementation, which implies a more even distribution of vessel revenues before program implementation (Figure 11.10). After the initial increase in the Gini coefficient from 0.59 during the baseline to 0.66 in 1995, the Gini coefficient remained relatively stable after program implementation through 2011. The four most recent years have experienced a large decline in the gini coefficient from 0.70 in 2011 to the lowest Gini coefficient since program implementation of 0.60 in 2015.

11.3. North Pacific Sablefish IFQ Program

Management Context

The North Pacific Sablefish IFQ Program was implemented simultaneously with the North Pacific Halibut IFQ Program, but they will be assessed separately in this report. Sablefish (also known as black cod) in the North Pacific are commercially caught by catcher vessels (CVs) that deliver their catch onshore and catcher/processor vessels (CPs) that catch and process their catch at sea using longline (hook-and-line, jig, troll, and handline), pot, and trawl gear, but the IFQ program only

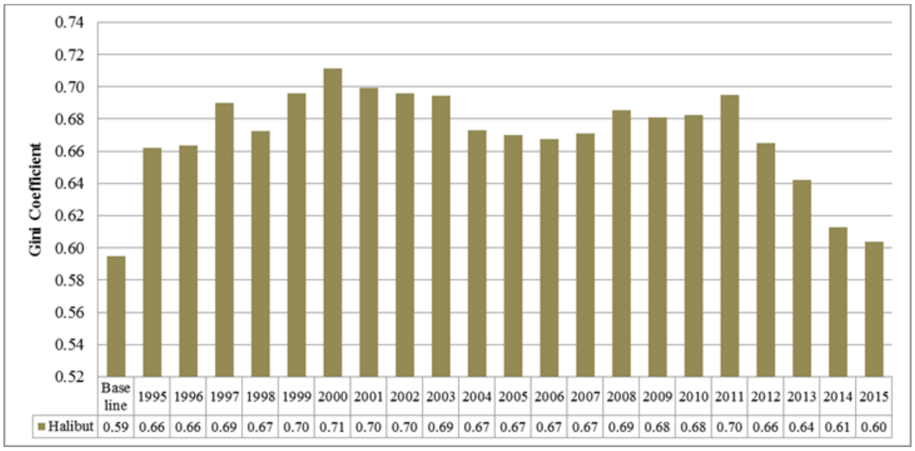


Figure 11.10: Halibut IFQ program Gini Coefficient.

applies to longline and pot gears. Twenty percent of the Bering Sea and Aleutian Islands (BSAI) sablefish total allowable catch (TAC) allocated to vessels using hook-and-line or pot gear and 7.5% of the sablefish TAC allocated to trawl gear are reserved for use in the Community Development Quota (CDQ) program. There is not a substantial recreational sector for sablefish in the North Pacific. Similar to the Halibut IFQ program, this section only examines the performance of the sablefish IFQ portion of the program.

The sablefish IFQ program was developed by the North Pacific Fishery Management Council (NPFMC) and implemented by NOAA Fisheries in 1995. The sablefish IFQ program is managed by the NPFMC, which is responsible for establishing Annual Catch Limits (ACLs) and TACs for sablefish and allocating TACs among various user groups. Prior to the IFQ program, the fisheries operated as a derby fishery which often lasted a few days per year in some management areas. Quota Share (QS) was initially issued to persons based on both historic and recent participation of persons who, in 1988, 1989, or 1990, owned or leased vessels with qualifying landings. Quota share were issued in amounts commensurate with creditable landings during the “best five” of 6 years 1985-1990. The primary objectives of the IFQ Program are to 1) eliminate gear conflicts; 2) address safety concerns; and 3) improve product quality and value.

The Halibut and Sablefish IFQ Program includes a cost recovery provision whereby the fishermen are assessed a fee based on the cost to the government to manage the program. The costs that can be recovered include the costs related to management, data collection, and enforcement of a Limited Access Privilege Program (LAPP) or Community Development Quota Program, and cannot exceed 3% of the total ex-vessel value of the fishery. Cost recovery began in 2000 for sablefish IFQ and has ranged from $0.75 million to $2.30 million and 1.0% to 3% of the ex-vessel value of the fishery, with 2015 being the first year the fishery reached the 3% limit.[3]

Catch Share Privilege Characteristics

There are two forms of quota in the sablefish IFQ Program, QS and annual IFQ in pounds derived from QS. Quota shares are a revocable, indefinite privilege that entitles the holder to a share of the total area- and vessel class-specific IFQ allocated each year. Quota share holders can be individuals or non-individuals (such as a corporation). Prior to the beginning of each fishing season, IFQ is

[3]The cost recovery fee for the Halibut and Sablefish IFQ Program is assessed for halibut and sablefish together. These numbers reflect our apportionment of the total fees collected to sablefish based on the ratio of ex-vessel value.

allocated to QS holders based upon their held QS, the total amount of quota in each management area (QS pool), and the total allowable catch (TAC) in each area. Quota shares and the derived IFQ are specified for use in particular areas and on vessels of a particular size. These conditions are intended to maintain a diverse fleet of vessels and limit catch by area. The IFQ program also includes use caps and small QS blocks that are intended to limit consolidation and maintain participation opportunities for small operations and new entrants. IFQ are valid only for one year, but there are provisions that allow QS holders to carry over to the next year up to 10% of their unused IFQ and any overages (up to 10%) are taken from the following year's IFQ allocation. There are a total of 18 species and area specific quota allocations with a total of 36 unique types of sablefish QS due to the existence of blocked and unblocked QS in each area.

Sablefish quota share can be sold with or without the annual IFQ derived from the quota share. Catcher vessel quota share can be transferred to other initial issuees or to those who have become eligible to receive QS by transfer. To be eligible, potential QS/IFQ recipients must be a U.S. citizen and have worked as part of a harvesting crew in any U.S. commercial fishery for at least 150 days. IFQ can be leased annually to other eligible permit holders under limited circumstances. Non-individual entities that are not initial issuees are only able to purchase QS or lease IFQ for the largest vessel class of "catcher/processor" quota (category A). The IFQ Program has a number of excessive share provisions. There are ownership caps on both individuals as well as entities. No individual can hold/control more than 1% of sablefish QS in specific areas and combinations of areas. In addition, vessel use caps limit each vessel to harvesting 1% of the sablefish TAC in specific areas and combinations of areas. Sablefish CDQ fishing is not subject to the excessive share provisions. There are also limits on the use of hired skippers through a requirement that the holder of QS be on board when using CV QS and IFQ. There is also a revolving loan program implemented by the NPFMC and NOAA Fisheries to assist entry level and small vessel fishermen acquire funding. The loan program is capitalized through a portion of the cost recovery fees collected.

Catch and Landings Performance Metrics

The catch and landings performance metrics include the amount of IFQ allocated to the program, the landings of IFQ sablefish, and the percentage of the IFQ allocated that is landed (percent utilization). Annual metrics are compared with a "baseline" period prior to program implementation, which is the average of the three years prior to program implementation (1992-1994). Between the baseline and 2015, the IFQ allocation and landings have fallen by 51% and 57%, respectively, while the percent utilization fell from 98% during the baseline to 86% in 2015. The IFQ allocation and landings have followed a cyclical pattern since the baseline with IFQ allocation and landings falling initially after program implementation to 1999, followed by an increase from 2000 to 2004, another decline between 2005 and 2010, an increase in 2011 and 2012, followed by a decline from 2013-2015 (Figures 11.11 and 11.12).

Figure 11.12 displays the landings of sablefish as part of the program and also separates the landings by CVs and CPs for all years of the program. Overall program landings have declined by 57% in 2015 relative to the baseline, but CV landings have declined by 54% while CP catch has declined by 78%. CPs land on average 12% of the total landings, but the CP share has ranged from 9% in 1994 to 16% in 1999, after which point the CP share of the total landings has generally been declining to a low of 5.95% in 2015.

Utilization initially fell after program implementation, and appears to be slightly counter-cyclical with the IFQ and landings, always at a lower than baseline level and there was a large decrease

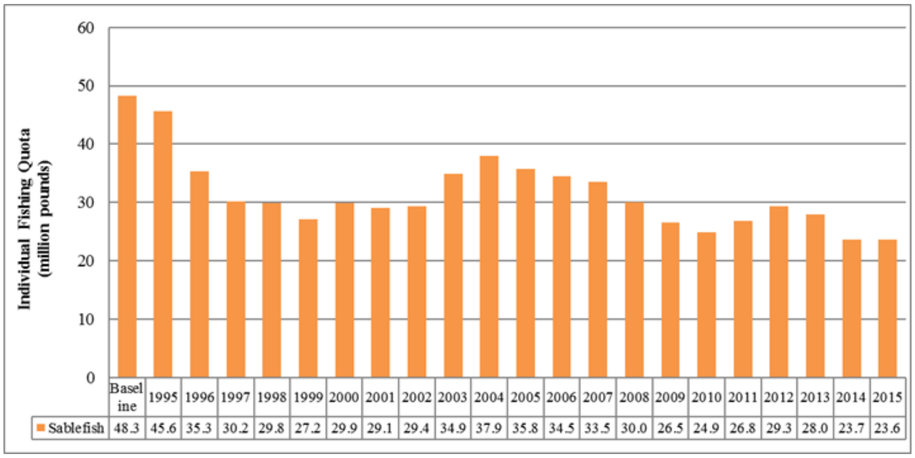


Figure 11.11: IFQ allocated to the sablefish IFQ program.

Figure 11.12: Landings of sablefish in the sablefish IFQ program.

in utilization in 2015 to a low of 86% (Figure 11.13). However, while the utilization is lower after program implementation compared with the baseline, the annual catch limit (ACL) has not been exceeded in any year since implementation. In the three years prior to implementation, the utilization rates were 85%, 111%, and 99% of the available ACL, respectively, which skews the utilization rate of the baseline closer to 100% because of the overage in 1993. Additionally, there were several area-allocations that were exceeded during the baseline period, 3 in 1992, 5 in 1993, and 1 in 1994, while only 3 area allocations have been exceeded since program implementation in 1995.

Effort Performance Metrics

The effort performance metrics include season length index, the number of active vessels, and the number of entities holding QS. The season length index is defined as the number of days in which at least one vessel was fishing divided by the number of days in the regulatory fishing season. This index is necessary to create a single unit-less metric of season length that can be aggregated over all 6 sablefish areas, in which levels of vessel participation vary throughout the season. This index measures the relative proportion of the legal fishing season during which one or more vessels actively fished sablefish IFQ. During the baseline, some areas were only open to fishing for sablefish for a few days (for the most demanded areas) while others were open for most of the year. To calculate an aggregate sablefish IFQ program season length index, we use the weighted harmonic mean number of

Figure 11.13: Percent of the IFQ allocation that is landed in the sablefish IFQ program.

days active by area using catch as weights and then divide by the regulatory season length. For the baseline period, we assume a 246 day regulatory season length which is the number of days allowed for the first 8 years post-IFQ and is the best hypothetical season length to use to compare pre-IFQ with post-IFQ. Using these definitions, the season length index in the baseline period is 0.07. Upon implementation of the IFQ Program, fishing was allowed for 246 days and the season length index for 1995 was 0.96. The number of active days increased from a baseline average of 17 days to 235 days in 1995. Over the course of the sablefish IFQ program, the average number of active days is 235 per year and the season length index has fluctuated between 0.93 – 0.98 (Figure 11.14).

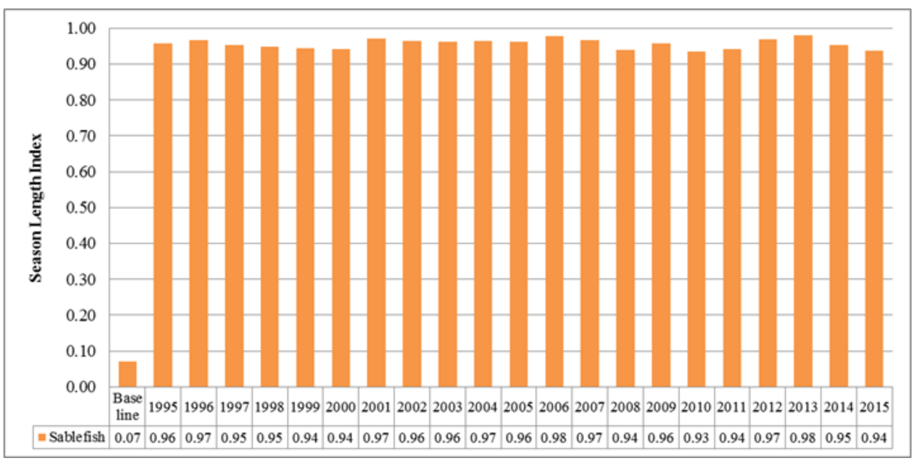


Figure 11.14: Sablefish IFQ program season length index.

The number of active vessels reflects the number of sablefish CVs and CPs with any commercial landings of IFQ Program sablefish in a given year. The baseline value represents the average number of unique vessels per year with commercial sablefish landings from 1992-1994. After program implementation, there was an initial 46% reduction in the number of active vessels overall, which decreased from 1,139 vessels in the baseline period to 610 vessels in 1995 (Figure 11.15). In the first year after program implementation, a larger share of CVs (47%) left the fishery than CPs (23%). In the following three years (1996-1998), the average annual decrease in the number of active vessels fishing sablefish was 8% (11% for CPs and 8% for CVs), but from 1999 to 2015 the decline has slowed to a 3% annual rate overall and for CPs and a 2% annual rate for CVs. This results in a 73% reduction in active vessels between the baseline and 2015.

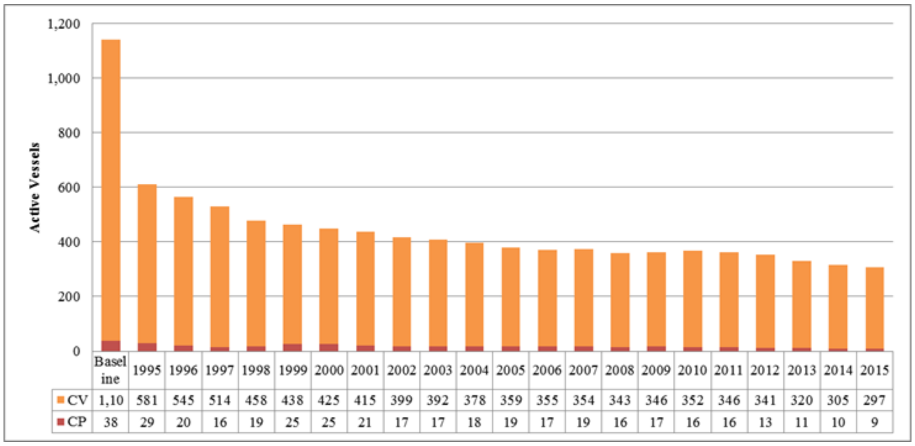


Figure 11.15: Number of active vessels in the sablefish IFQ program.

There were 1,054 entities holding Sablefish QS in 1995. The number of entities has declined over time to 819, or 22% fewer entities holding QS by 2015 (Figure 11.16).

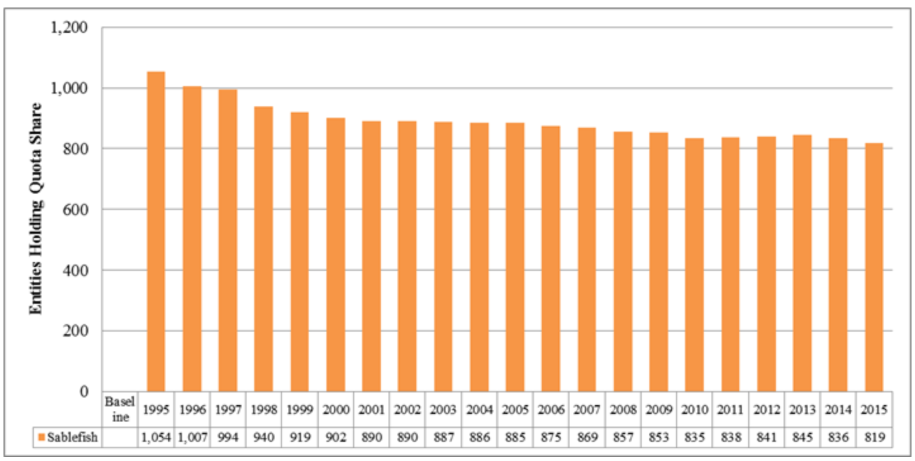
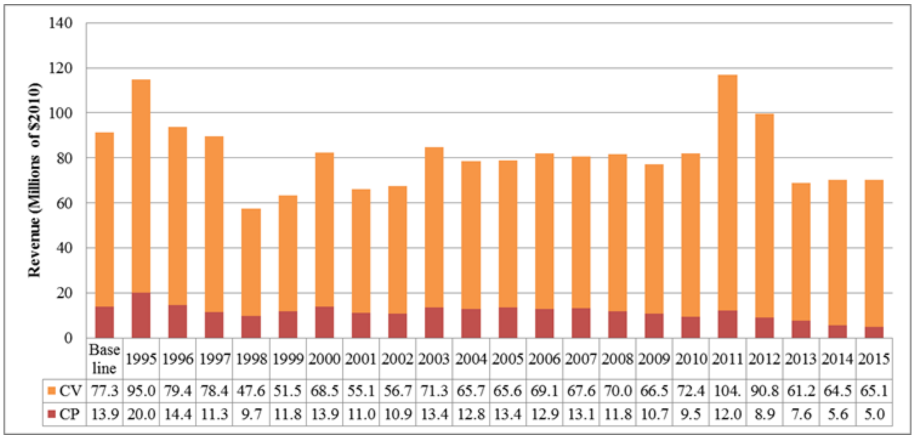


Figure 11.16: Number of entities holding QS in the sablefish IFQ program.

Revenue Performance Metrics

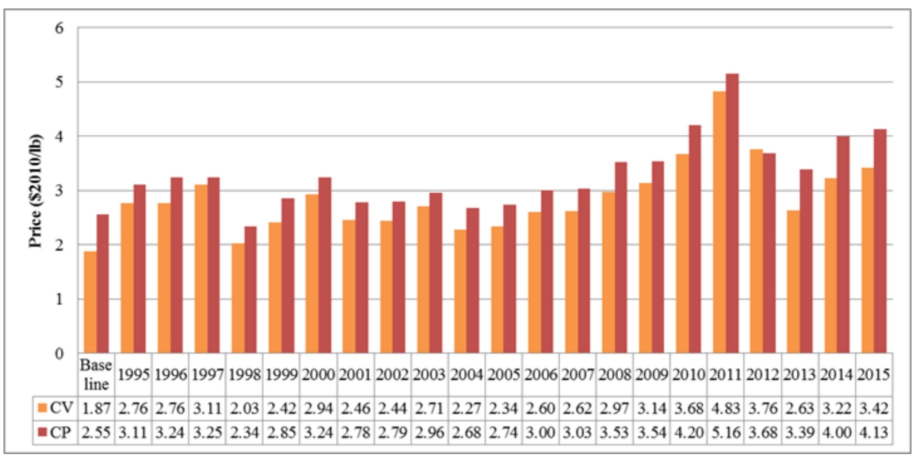
The revenue performance metrics are the aggregate revenue from sablefish IFQ, average prices of sablefish IFQ, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among the active vessels. Revenues are adjusted for inflation by using the Gross Domestic Product (GDP) price deflator and are reported in 2010 equivalent dollars. For the Sablefish IFQ Program, revenues are reported in their native format, such that the price received by CVs is the weighted annual ex-vessel price while the price received by CPs is the weighted annual first-wholesale price. This enables a comparison between the revenues that each type of vessel receives on offloading their catch from the vessel. In the first year of program implementation, sablefish IFQ revenue initially increased by 26% from $91 million during the baseline to $115 million in 1995 overall, which was the result of an increase of 45% for CPs and of 23% for CVs compared to the baseline (Figure 11.17). Sablefish IFQ revenue declined to a low in 1998 of $57 million and was below the peak in 1995 every year afterwards until 2011 which is a program level high of $117 million. However, sablefish IFQ revenue was back below the baseline level from 2013-2015 and averaged $70 million annually.



	Base line	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CV	77.3	95.0	79.4	78.4	47.6	51.5	68.5	55.1	56.7	71.3	65.7	65.6	69.1	67.6	70.0	66.5	72.4	104.	90.8	61.2	64.5	65.1
CP	13.9	20.0	14.4	11.3	9.7	11.8	13.9	11.0	10.9	13.4	12.8	13.4	12.9	13.1	11.8	10.7	9.5	12.0	8.9	7.6	5.6	5.0

Figure 11.17: Sablefish IFQ program revenue.

As the CV sector revenues are in ex-vessel value and CP sector revenues are in first wholesale value, the weighted average price per ton of sablefish varies by, and is reported separately for, each sector. The average price per pound of sablefish increased for both CVs and CPs since program implementation. Real average prices of sablefish increased by 77% from $1.95/lb during the baseline to $3.46/lb in 2015 with CVs benefiting more than the CPs with prices increasing by 82% and 62%, respectively (Figure 11.18). There is substantial volatility in average prices which have varied annually by -34% to 44% over the course of the sablefish IFQ program, with CPs receiving higher prices (real average price of $3.32) than CVs (real average price of $2.91). In addition CPs have a lower coefficient of variation in prices, indicating that CP prices are less variable than CV prices on an annual basis.



	Base line	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CV	1.87	2.76	2.76	3.11	2.03	2.42	2.94	2.46	2.44	2.71	2.27	2.34	2.60	2.62	2.97	3.14	3.68	4.83	3.76	2.63	3.22	3.42
CP	2.55	3.11	3.24	3.25	2.34	2.85	3.24	2.78	2.79	2.96	2.68	2.74	3.00	3.03	3.53	3.54	4.20	5.16	3.68	3.39	4.00	4.13

Figure 11.18: Sablefish IFQ program price per pound.

Sablefish IFQ revenue per vessel increased by 186% from a baseline of $80,000 to $229,000 in 2015, with the majority of revenues accruing to the CVs which increased by 213% (from $70,000 in the baseline to $219,000 in 2015) while CP revenues increased by 38% (from $401,000 in the baseline to $553,000 in 2015) (Figure 11.19).

The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the sablefish IFQ program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore, revenue becomes more concentrated on fewer

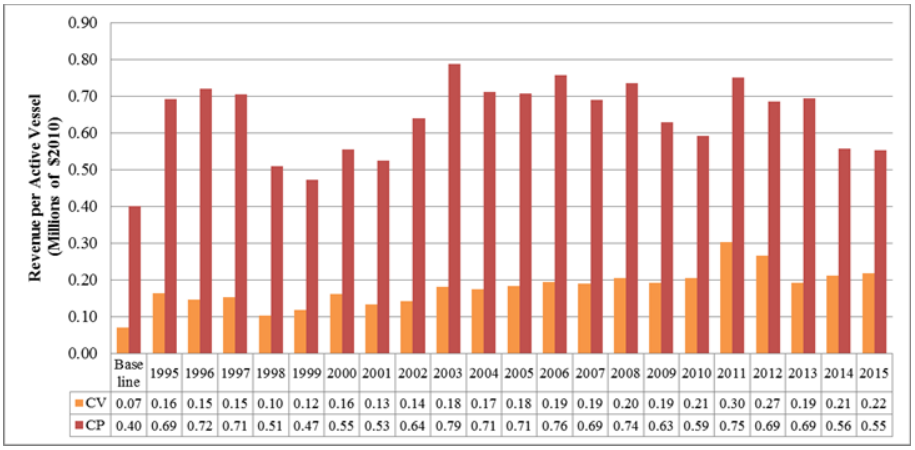


Figure 11.19: Sablefish IFQ program revenue per active vessel.

vessels as the Gini coefficient increases. This is demonstrated in the difference in Gini coefficient for the baseline period for all vessels (Gini = 0.64) which implies a less even distribution in vessel revenues compared with the Gini coefficient for either the CVs only (Gini = 0.62) or for the CPs only (Gini = 0.52) (Figure 11.20). This is because the revenue per vessel among CVs and CPs is very different (Figure 11.19) and when all vessels are combined together in the Gini coefficient, it implies a less even distribution of revenue than examining the within vessel-type revenue distribution. There has been a general movement toward a more even distribution of vessel revenue in the sablefish IFQ program overall and for CVs since program implementation, falling from 0.64 and 0.62 to 0.54 and 0.54 in 2015, respectively. The distribution of CP revenue has become more even since program inception from 0.52 in the baseline to 0.34 in 2015, and while it shows a lot more variation throughout the years, the Gini coefficient has always been below 0.52 meaning that the revenue accruing to CPs has become more equal among vessels compared with the baseline. The Gini coefficient reached its lowest level overall and for the CV sector in 2015, which could be a result of marginal vessels exiting the fishery as the number of active vessels is at their lowest level for both sectors since before the baseline period (Figure 11.15).

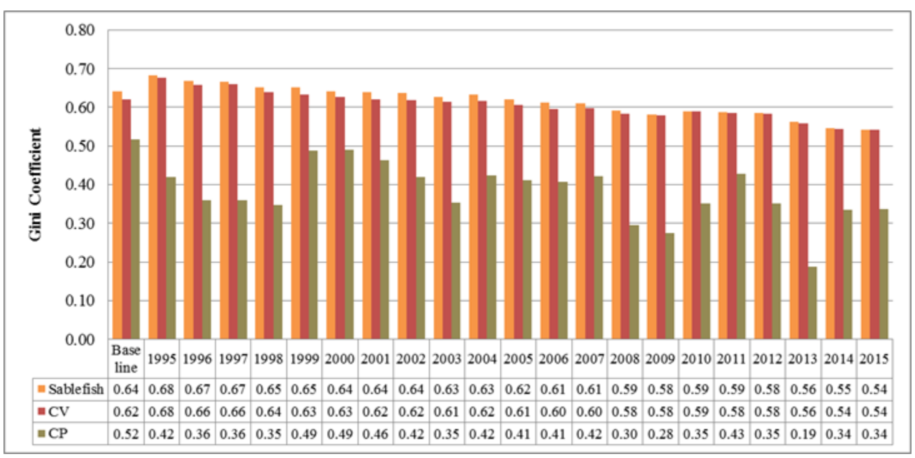


Figure 11.20: Sablefish IFQ program Gini Coefficient.

11.4. American Fisheries Act (AFA) Pollock Cooperatives Program

Management Context

There are three types of vessels that participate in the Bering Sea and Aleutian Islands (BSAI) walleye pollock fishery: catcher vessels (CVs) that deliver their catch onshore, catcher/processors (CPs) that catch and process their catch at sea, and motherships that are at-sea processors receiving codends from CVs but do not catch any of their own fish. Pollock in the BSAI management area are targeted only with pelagic (midwater) trawl gear. Landings average slightly above 1 million metric tons per year, which represents approximately 58% of Alaska groundfish production volume and make it the largest fishery in the United States by volume. Ten percent of the BSAI total allowable catch (TAC) is allocated to communities through the Community Development Quota (CDQ) Program. There is no recreational sector for pollock in the North Pacific.

The American Fisheries Act (AFA) Pollock Cooperatives Program was established by the U.S. Congress under the American Fisheries Act in 1998, and was implemented for the CP sector in 1999 and the CV and mothership sectors in 2000. The goals of the AFA were to resolve frequent allocation disputes between the inshore (CVs) and offshore (CPs and motherships) sectors and reduce externalities as a result of the race for fish. The AFA established minimum U.S. ownership requirements, vessel and processor participation requirements, defined the list of eligible vessels, finalized the TAC allocation among sectors, provided an allocation to the CDQ Program, and authorized the formation of cooperatives. The allocation of the Bering Sea TAC to the AFA (after the 10% allocation to the CDQ program and incidental catch allowance in other fisheries are deducted), is 50% to the CV sector, 40% to the CP sector, and 10% to the mothership sector. Additionally, nine vessels were decommissioned as part of the AFA for a total cost to the remaining participants of $90 million.

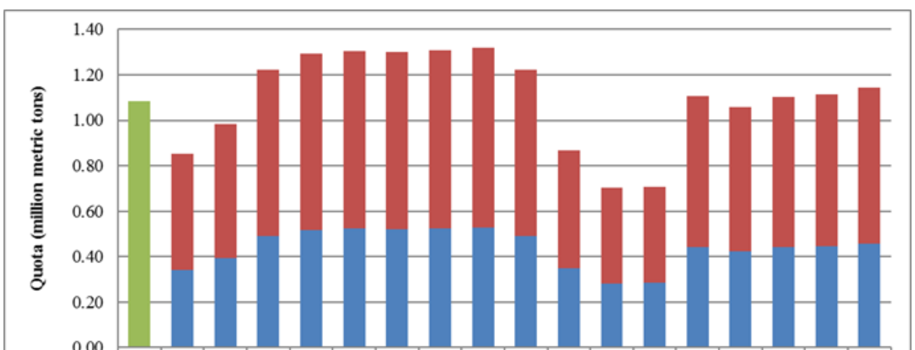
Catch Share Privilege Characteristics

Participation in the AFA pollock fishery is permitted only by the vessels listed in the American Fisheries Act, and those eligible vessels are authorized to form cooperatives which receive an allocation (exclusive harvest privilege) of a percentage of the Bering Sea pollock TAC from NOAA Fisheries. Seven inshore cooperatives have formed between CVs and eligible shoreside processors, and CVs are required to deliver 90% of their BSAI pollock to a cooperative member processor. The CV cooperatives are allocated a portion of the pollock TAC as a directed fishing allowance based on the catch history of its member vessels. The CP and mothership sectors have each formed a voluntary cooperative to receive and harvest the exclusive privilege allocated to the sector. Starting in 2011 with the passage of Amendment 91 to the BSAI Fishery Management Plan, incentive plan agreements (IPA) were put in place for AFA participants to self-regulate and reduce the number of incidentally caught salmon in the pollock fishery and allowed NOAA Fisheries to allocate transferable prohibited species catch (PSC) allowance for Chinook salmon to vessels in the pollock fishery.

Catch share privileges under the AFA are revocable, but were allocated in perpetuity. There is a single cooperative in the CP and mothership sectors, and contracts among members of the cooperative have been developed to allocate their catch across vessels. Catcher vessel cooperatives can exchange directed fishing allowance among their member vessels as they see fit, but since the CV cooperative allocations are based on the membership of their vessels, vessels have to change cooperatives to exchange CV directed fishing allowance across cooperatives. If a vessel owner decides to change cooperatives, the vessel is required fish for one year in the limited access fishery and is not allowed to participate in the cooperative system, unless the vessel owner's current cooperative approves delivery to another cooperative member processor. Catcher vessel cooperatives are also able to contract with non-member AFA eligible vessels to harvest a portion of their allocation. The contract must be approved by both the non-member vessel and that vessel's cooperative, which is similar to a quota lease. There are also excessive use caps in both the inshore harvesting and processing sectors which state that no entity can harvest more than 17.5% or process more than 30% of the directed fishing allowance of pollock allocated to the inshore sector.

Catch and Landings Performance Metrics

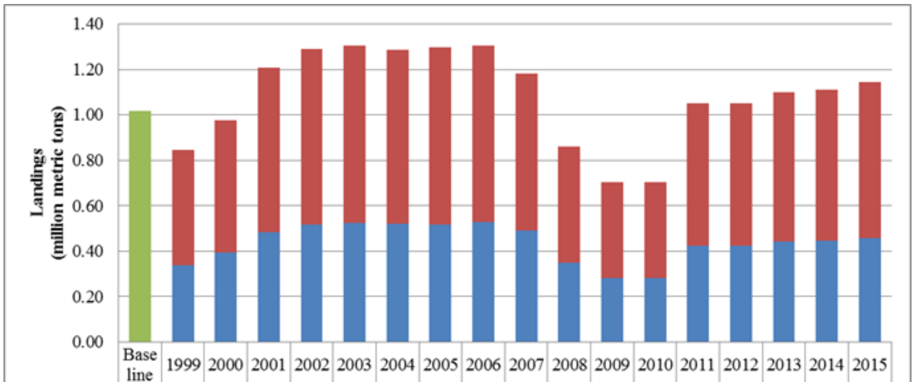
The catch and landings performance metrics include the amount of pollock TAC (quota) allocated to the program, the landings of AFA pollock, and the percentage of the quota allocated that is landed (percent utilization). These annual metrics are compared with a "baseline" period prior to program implementation, which is the average of the three years prior to any part of the program implementation (1996-1998). The baseline quota value represents the average total non-CDQ directed pollock allocation (inshore and offshore). For this report, the CV and mothership sectors are combined into a single CV sector which remains separate from the CP sector. Between the baseline and 2015, the overall quota has increased by 5.4%, while landings increased by 12.5%, and the percent utilization increased from 93.6% during the baseline to 99.8% in 2015 (Figures 11.21, 11.22, and 11.23). The quota and landings both fell the year after program implementation, but increased substantially thereafter and were relatively stable from 2001-2007. After a few small year classes of fish recruiting into the fishery, the quota was cut substantially in 2008 and remained low through 2010, leading to lower catches during those years. However, the quota increased in 2011 above the baseline level and remained near baseline levels for 2012-2015, which resulted in a slightly larger harvest and a larger share of the quota being utilized from 2012-2015 compared with the baseline.



	Base line	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Baseline	1.08																	
CV		0.51	0.59	0.73	0.78	0.78	0.78	0.78	0.79	0.73	0.52	0.42	0.42	0.66	0.63	0.66	0.67	0.69
CP		0.34	0.39	0.49	0.52	0.52	0.52	0.52	0.53	0.49	0.35	0.28	0.28	0.44	0.42	0.44	0.45	0.46

Figure 11.21: Quota allocated to the AFA Pollock Program.

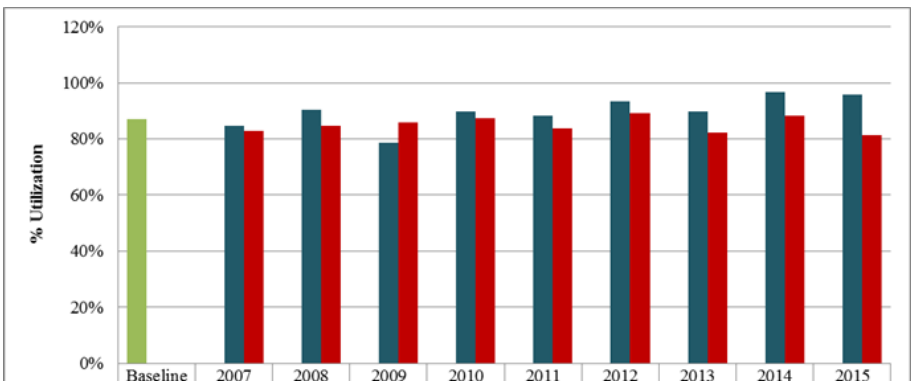
Figure 11.22 also separates the landings by catcher vessel and mothership sectors (CV) and catcher/processor sector (CP) for all years of the program. Overall program landings have increased by 12.5% in 2015 relative to the baseline, but the CP sector landings declined by 7.7% while the CV landings increased by 31.6%, which is largely a function of the reallocation of quota under the AFA. Prior to AFA, the offshore sector (motherships and CPs) were allocated 60% of the non-CDQ directed pollock TAC, leaving 40% for the inshore sector (CVs). The AFA changed the allocations to 40% for the catcher/processors (CP sector), 50% for the CV sector, and 10% for the mothership sector, and in this report the CV sector includes both CVs and mothership vessel landings.



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Baseline	1.01																	
CV		0.51	0.58	0.72	0.77	0.78	0.77	0.78	0.78	0.69	0.51	0.42	0.42	0.63	0.63	0.66	0.67	0.69
CP		0.34	0.39	0.48	0.52	0.52	0.52	0.52	0.53	0.49	0.35	0.28	0.28	0.42	0.42	0.44	0.44	0.46

Figure 11.22: Landings of AFA pollock.

As a result of ending the race for fish, utilization (% of the quota that is landed) increased substantially after the AFA. With the exception of the CV sector in 2007 and both sectors in 2011, utilization has always been above 98% since program implementation. With the exception of 1999 and 2005, the CP sector has always exceeded the utilization of the CV sector, which is interesting as 1999 was the year in which the CP sector had active cooperatives and the CV sector did not.

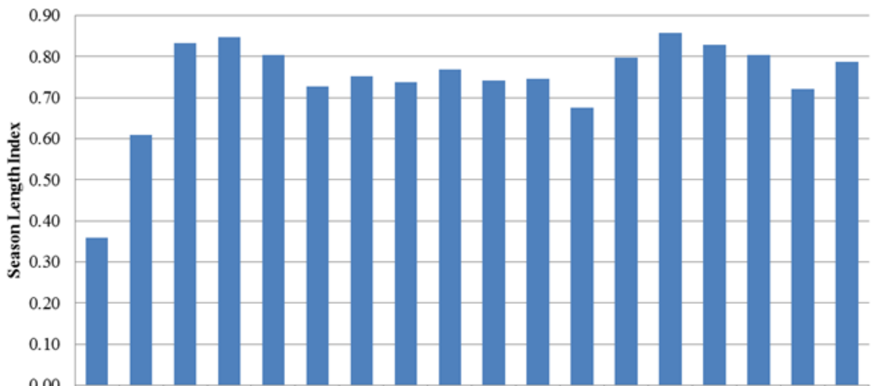


	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015
Baseline	87.1%									
CP		84.7%	90.5%	78.6%	89.9%	88.3%	93.5%	89.9%	96.9%	95.9%
CV		82.9%	84.6%	85.9%	87.3%	83.8%	89.1%	82.3%	88.2%	81.4%

Figure 11.23: Percent of the allocated quota that is landed in the AFA Pollock Program.

Effort Performance Metrics

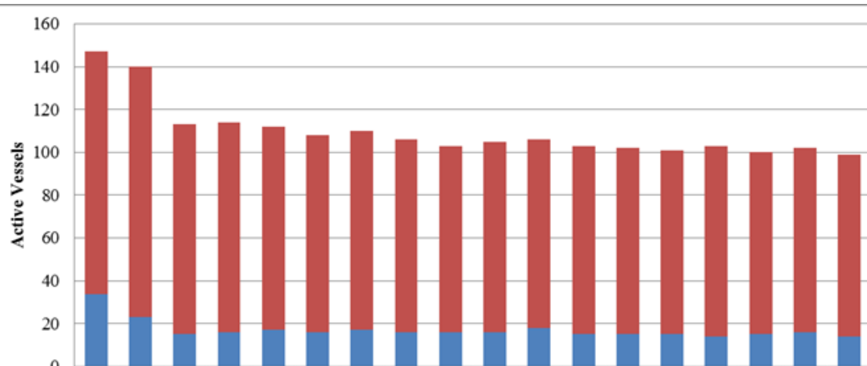
The effort performance metrics include the number of active vessels, the number of entities receiving an exclusive harvest privilege in the AFA pollock program (quota), and the season length index. The season length index is defined as the number of days in which at least one vessel was fishing divided by the maximum regulatory season length permissible for the fishery, equal to 286 days (opening on January 20th and closing on November 1st). This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished for pollock. For the baseline period, we assume the same 286 day regulatory open period which allows for a relative comparison of the season length pre-AFA with post-AFA. During the baseline, the average number of active days was 103, resulting in a season length index of 0.36. Upon implementation of the AFA, vessels increased the amount of time fishing and the number of active days increased to 174 days in 1999 and 239 days in 2000, which implies a season length index of 0.61 and 0.83, respectively. Since 2001, the number of active days has varied between 193 and 245 days, which implies that the season length index has fluctuated between 0.67 – 0.86 (Figure 11.24).



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
AFA	0.36	0.61	0.83	0.85	0.80	0.73	0.75	0.74	0.77	0.74	0.75	0.67	0.80	0.86	0.83	0.80	0.72	0.79

Figure 11.24: AFA Pollock Program season length index.

The number of active vessels reflects the number of AFA pollock CV and CP vessels with any commercial landings of AFA pollock in a given year. The baseline value represents the average number of unique vessels per year with commercial pollock landings from 1996-1998. After program implementation, the number of active vessels declined from 147 in the baseline to 140 in 1999 and down to 113 in 2000 which represents a decline of 23% between the baseline and 2000 (Figure 11.25). There was actually a small increase in the number of CVs in 1999 since AFA had not yet been implemented for that sector, but the number of CVs declined to 98 in 2000 and remained relatively stable in the low nineties and high eighties thereafter. The number of CPs declined from 34 during the baseline period to 23 in 1999 and then down to 15 in 2000, and remained between 14 and 18 in all years since.



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CV	114	117	98	98	95	92	93	90	87	89	88	88	87	86	89	85	86	85
CP	34	23	15	16	17	16	17	16	16	16	18	15	15	15	14	15	16	14

Figure 11.25: Number of active vessels in the AFA Pollock Program.

The number of entities receiving an exclusive harvest privilege in the AFA Pollock Program, defined as the number of unique AFA permits for CVs and CPs, remained nearly constant from 2000 through 2013 between 130-133 entities but declined to 126 in 2014 and 2015, respectively (Figure 11.26). This is likely due to the fairly restrictive provisions in the original AFA to restrict removing or replacing vessels, but may change in the near future as AFA vessel replacement provisions are enacted.

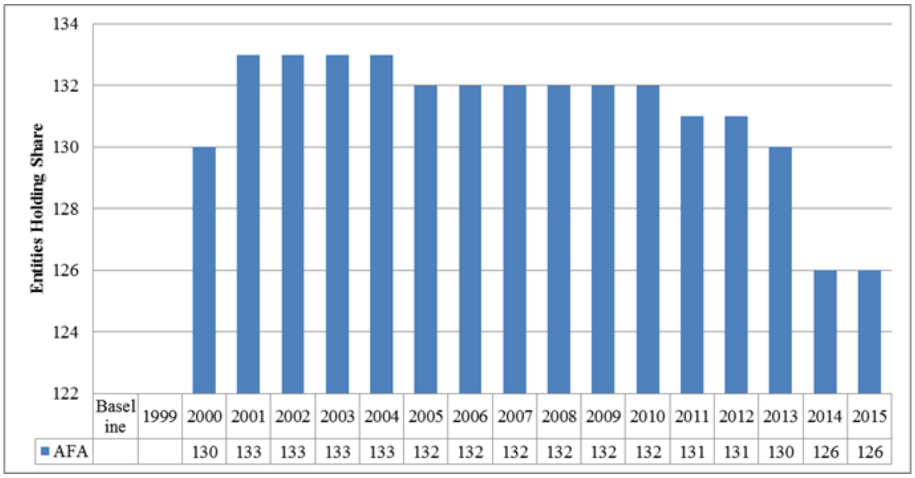


Figure 11.26: Number of entities receiving an exclusive harvest privilege in the AFA Pollock Program.

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from AFA pollock, average prices of AFA pollock, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among the active vessels. Revenues are adjusted for inflation by using the GDP price deflator and are reported in 2010 equivalent dollars. For the AFA Pollock Program, revenues are reported in their native format, such that the price received by CVs is the weighted annual ex-vessel price while the price received by CPs is the weighted annual first wholesale price. This enables a comparison between the revenues that each type of vessel receives on offloading their catch from the vessel. Total program revenue declined the first two years of the program from $367 million during the baseline to $341 million and $327 million in 1999 and 2000, respectively (Figure 11.27). Aggregate revenues were above the baseline levels for 13 of the 17 years since program implementation, from 2001-2008 and 2011-2015. The highest annual real pollock revenue occurred in 2006 at $490 million (in year 2010 dollars).

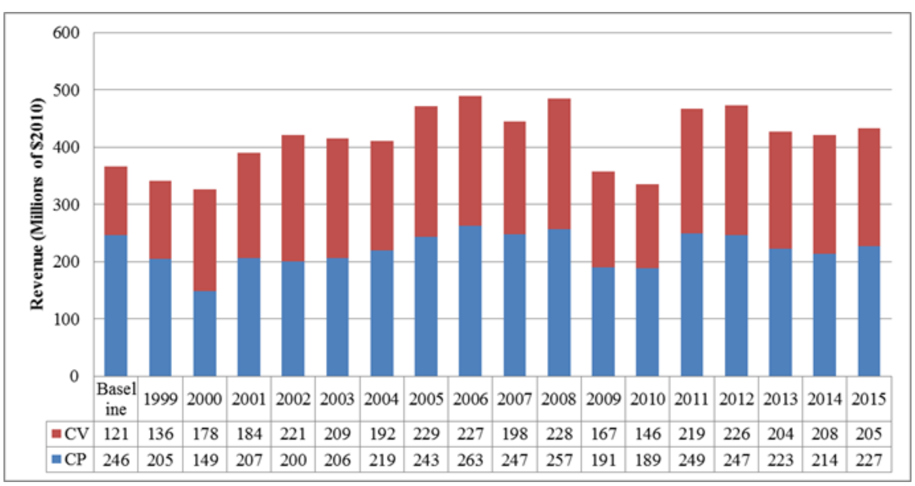
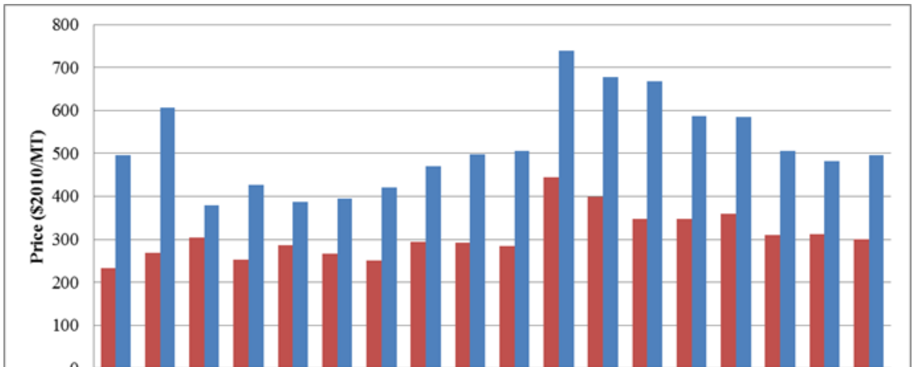


Figure 11.27: AFA Pollock Program revenue.

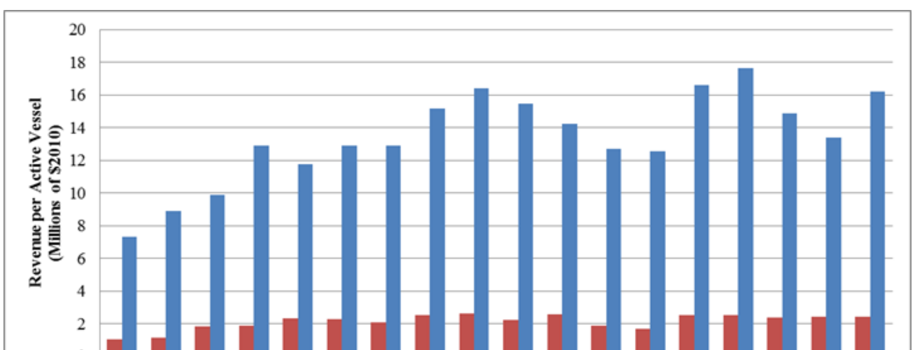
As the CV sector revenues are in ex-vessel value and CP sector revenues are in first wholesale value, the average price per ton of pollock varies by, and is reported separately for, each sector. Real average prices of pollock increased between the baseline and 2015 by 29% from $233/ton to $300/ton ex-vessel for CVs and returned to baseline levels of $496/ton for CPs (Figure 11.28). The CV sector experienced a larger increase in price compared with the CP sector since implementation of the AFA program, and prices for the CV sector have always been higher compared with the baseline while prices for the CP sector were below baseline prices for 7 of the 17 years. There is some variation in annual average prices, which varied annually from -38% to 46% for CPs and from -17% to 56% for CVs over the course of the AFA Pollock Program, and the CPs have a higher coefficient of variation in prices (0.20) than the CVs (0.17).



	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CV	233	268	305	254	286	267	251	294	292	285	444	398	347	348	359	310	311	300
CP	496	607	379	426	388	395	422	470	498	506	740	677	668	588	584	506	482	496

Figure 11.28: AFA Pollock Program price per metric ton.

Both the CV and CP sectors experienced a more than doubling in revenue per vessel over the course of the AFA Pollock Program, by 128% for CVs (from $1.06 million during the baseline to $2.42 million in 2015) while CP revenue per vessel increased by 122% (from $7.32 million in the baseline to $16.22 million in 2015) (Figure 11.29). Both sectors also experienced an increase in real revenue per vessel in all years compared with the baseline value.

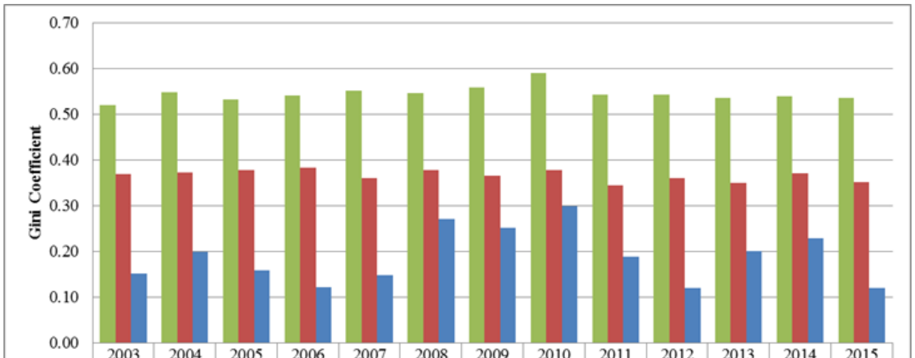


	Baseline	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CV	1.06	1.16	1.82	1.87	2.32	2.27	2.07	2.54	2.61	2.22	2.59	1.90	1.68	2.54	2.54	2.41	2.41	2.42
CP	7.32	8.91	9.91	12.91	11.78	12.90	12.88	15.20	16.43	15.46	14.26	12.70	12.58	16.59	17.63	14.87	13.40	16.22

Figure 11.29: AFA Pollock Program revenue per active vessel.

Due to a portion of the catch missing harvesting vessel identification prior to the implementation of the NOAA Fisheries Catch Accounting System (CAS) in 2003, the Gini coefficient for the AFA

Pollock Program is presented only for 2003 through 2013. The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the AFA Pollock Program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore, revenue becomes more concentrated on fewer vessels as the Gini coefficient increases. This is demonstrated in the difference in Gini coefficient for 2003 for all vessels (Gini = 0.52) which implies a less even distribution of vessel revenues compared with the Gini coefficient for either the CVs only (Gini = 0.37) or for the CPs only (Gini = 0.15) (Figure 11.30). This is because the revenue per vessel among CVs and CPs is very different (Figure 11.29) and when all vessels are combined together in the Gini coefficient, it implies a less even distribution of revenue than examining the within vessel-type revenue distribution. There has been a slight increase in vessel revenue concentration since 2003 in the AFA Pollock program overall. The Gini coefficient for the overall AFA program increased from 0.52 to 0.54 between 2003 and 2015, while both the CV sector and CP sector experienced declines in the Gini coefficient in 2015 relative to the baseline at 0.35 and 0.12, respectively.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
AFA	0.52	0.55	0.53	0.54	0.55	0.55	0.56	0.59	0.54	0.54	0.54	0.54	0.54
CV	0.37	0.37	0.38	0.38	0.36	0.38	0.37	0.38	0.34	0.36	0.35	0.37	0.35
CP	0.15	0.20	0.16	0.12	0.15	0.27	0.25	0.30	0.19	0.12	0.20	0.23	0.12

Figure 11.30: AFA Pollock Program Gini coefficient.

11.5. BSAI non-Pollock Trawl Catcher-Processor Groundfish Cooperatives (Amendment 80) Program

Management Context

The Bering Sea/Aleutian Islands non-Pollock Trawl Catcher-Processor Groundfish Cooperatives Program (also known as Amendment 80) was implemented in 2008 for those groundfish catcher/processors (CPs) fishing in the Bering Sea/Aleutian Islands (BSAI) region that were not specifically listed as eligible to participate in the American Fisheries Act (AFA) Pollock Cooperatives Program. NOAA Fisheries identified 28 CP vessels that are eligible to participate in the Amendment 80 Program (Amendment 80 sector) and has issued Amendment 80 quota share (QS) to 27 eligible persons. The program provides an allocation of six groundfish species including Atka mackerel, Aleutian Islands Pacific ocean perch, flathead sole, Pacific cod, rock sole, and yellowfin sole, a prohibited species catch (PSC) allowance for halibut and crab, as well as sideboard limits for five species in the Gulf of Alaska (GOA) to Amendment 80 vessels and authorizes them to form cooperatives. Amendment 80 vessels are typically smaller in size and processing capacity than the AFA CPs. Prior to the Amendment 80 program, these vessels primarily produced headed and gutted products, but as the race for fish has been eliminated and Amendment 80 initially implemented increased groundfish retention standards, they are increasingly producing other product forms[4].

The goal of the Amendment 80 program was to improve retention, utilization, and reduce bycatch for the Amendment 80 sector. The program also includes sideboard allowances in the GOA for pollock, Pacific cod, Pacific Ocean perch, northern rockfish, pelagic shelf rockfish (dusky rockfish) to limit these vessels' participation in other fisheries to their historic levels. One cooperative formed in 2008 that included 16 of 24 participating vessels while the other vessels participated in the Amendment 80 limited access sector until 2011 when those vessels formed a second cooperative.

Catch Share Privilege Characteristics

Amendment 80 QS are tied to the participating vessels and are allocated to their cooperative based on the vessel's catch history. Amendment 80 vessels that do not join a cooperative do not receive an exclusive harvest privilege and must fish in the Amendment 80 limited access sector. Amendment 80 QS can be transferred by selling the vessel, its permits, and accompanying catch history. It is also possible to sell Amendment 80 QS separate from an Amendment 80 vessel under specific circumstances, but sellers are required to include all allocated Amendment 80 QS species in the sale, and therefore would be precluded from participating in the Amendment 80 fishery. Amendment 80 cooperatives can transfer annual QS pounds, called cooperative quota (CQ), to other Amendment 80 vessels within and between cooperatives. Amendment 80 catch share privileges are revocable, but were allocated in perpetuity. The Amendment 80 Program has an excessive share provision that limits a person to holding 30% of the QS and CQ assigned to the Amendment 80 sector. Vessel use caps also limit an Amendment 80 vessel to harvesting 20% of the Amendment 80 species catch limits allocated to the Amendment 80 sector.

Catch and Landings Performance Metrics

The catch and landings performance metrics for the Amendment 80 Program include the amount of Amendment 80 species allocated to the program, the landings of Amendment 80 species in the Amendment 80 Program, and the percentage of Amendment 80 species allocated to the program that is landed (percent utilization). Annual metrics are compared with a "baseline" period prior to program implementation, which is the average of the three years prior to program implementation (2005-2007). Between the baseline and 2015, species allocations and landings have increased by 11% and 29%, respectively (Figures 11.31 and 11.32). Aggregate species allocations to the Amendment 80 program has increased relative to the baseline level every year since program implementation, and was substantially above the baseline level from 2008-2010. This is largely the result of the groundfish species allocation process in the BSAI management area. The aggregate catch of all federally managed groundfish species may not exceed 2 million metric tons, which is thought to be the maximum amount of catch that can be sustainably harvested from the BSAI ecosystem. As shown in the previous section, AFA pollock (plus CDQ and incidental catch of pollock) makes up a majority of the 2 million ton cap in most years because pollock is a highly valued target species. This means Amendment 80 species catch limits are not necessarily driven by the biology of those species, but are largely a function of the biomass of pollock. Most Amendment 80 species total allowable catches (TAC) are set well below their acceptable biological catch (ABC), and the TACs

[4]NOAA Fisheries removed the requirement for vessels to meet the Groundfish Retention Standards (78 FR 12627, February 25, 2013). Under the current rules, the Amendment 80 cooperatives annually report groundfish retention performance, but there is no longer a minimum retention standard.

of species allocated to the Amendment 80 Program cannot be increased without reducing the TAC of some other BSAI groundfish species.

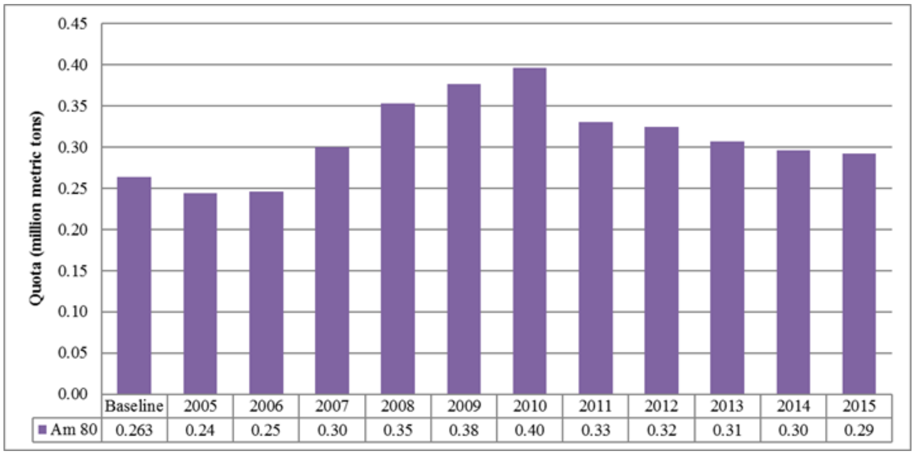


Figure 11.31: Aggregate quota allocated to the Amendment 80 Program.

As a result of the historically low AFA pollock TACs from 2008-2010, the allocations of Amendment 80 species to the Amendment 80 Program was much larger than during the baseline. Similarly, the landings in the Amendment 80 program were larger than their baseline levels in all years following implementation (Figure 11.32).

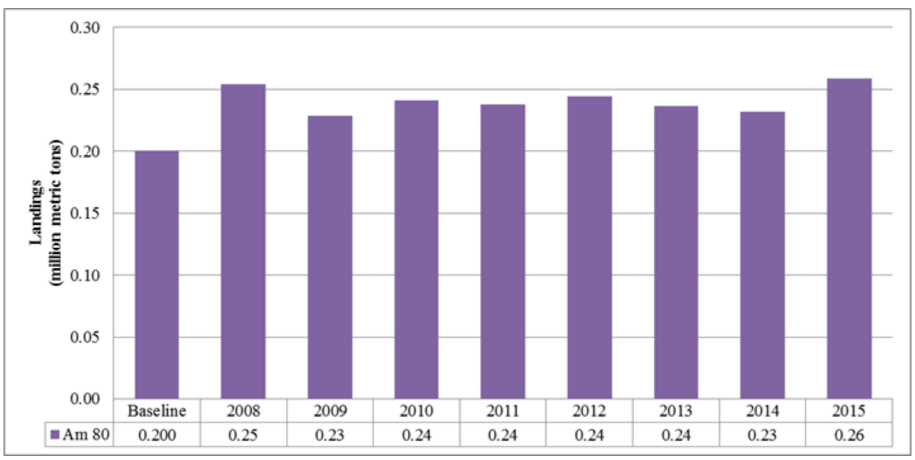


Figure 11.32: Aggregate landings of species allocated to the Amendment 80 Program.

Even as landings have increased in the Amendment 80 program, the percent utilization fell from 76.1% during the baseline to 60% in 2009 and 2010, but increased above the baseline level from 2013-2015 and reached a high of nearly 89% in 2015 (Figure 11.33). The lowest utilization rate occurred in 2009 at 60.81% in a year when the aggregate quota was 43% larger than the quota available during the baseline and aggregate landings were 14% larger than during the baseline. Target species landings are also limited by the vessels' allocation of halibut PSC, and also increasingly by the allocation of the Pacific cod TAC to the Amendment 80 Program, which is less than the sector's historical harvest levels. The inability of these vessels to catch the entire quota is also a function of the program having only between 18 and 22 vessels active in the fishery, all of which are operating near their maximum capacity.

Effort Performance Metrics

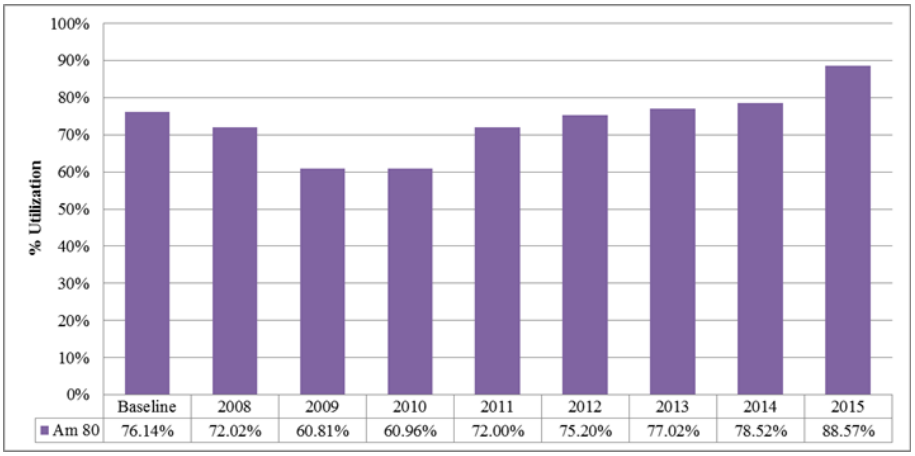


Figure 11.33: Percent of the allocated quota that is landed in the Amendment 80 Program.

The effort performance metrics include the number of active vessels, the number of entities holding Amendment 80 QS, and the season length index. The season length index is defined as the number of days in which at least one vessel was fishing divided by the maximum regulatory season length possible for the fishery, equal to 346 days, which is an opening on January 20th and closure on December 31st.[5] This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished Amendment 80 species allocations each year. For the baseline period, we assume the same 346 day regulatory open period which allows for a constant comparison of the season length before and after the implementation of Amendment 80. During the baseline, the average number of active days for these vessels was 258, the maximum regulatory season length was 346, and therefore the season length index in the baseline period was $258/346 = 0.75$. After implementation of Amendment 80, vessels were better able to manage their halibut PSC use when targeting Amendment 80 species and increased their number of active days to an average of 326 days from 2008-2015, which implies an average season length index of 0.94 over that same period (Figure 11.34).

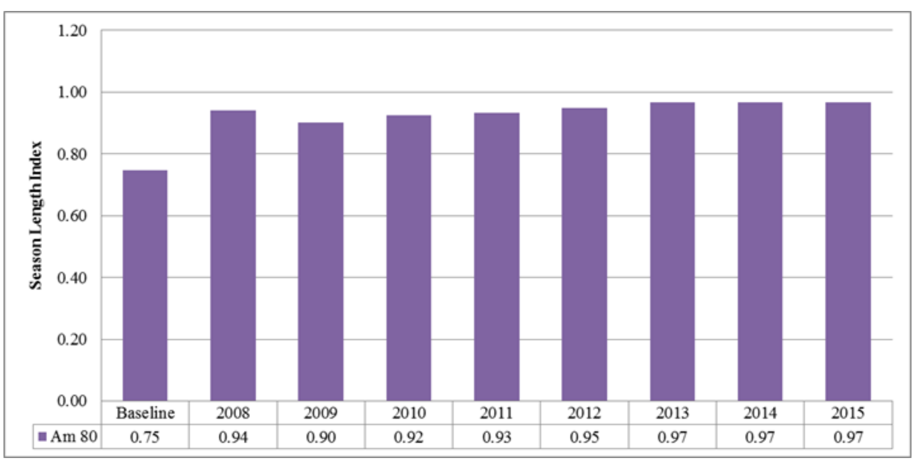


Figure 11.34: Amendment 80 Program season length index.

The number of active vessels reflects the number of Amendment 80 eligible CP vessels with any reported landings of Amendment 80 species in a given year. The baseline value of 22 vessels represents

[5]The maximum regulatory season length was 347 days in 2008 and 2012 due to the leap year.

the average number of unique vessels per year from 2005-2007. After program implementation there were still 22 vessels active in the fishery, which is not surprising given that overcapitalization is not a problem in this fishery and reducing capacity was not identified as an objective of the program (Figure 11.35). The number of active vessels declined from 2008 to 2009 from 22 to 21 active vessels as a result of the sinking of the *F/V Alaska Ranger*. There was also a decrease of one vessel in 2010, 2012, and 2013, which leaves the total number of active vessels in 2015 at 18.

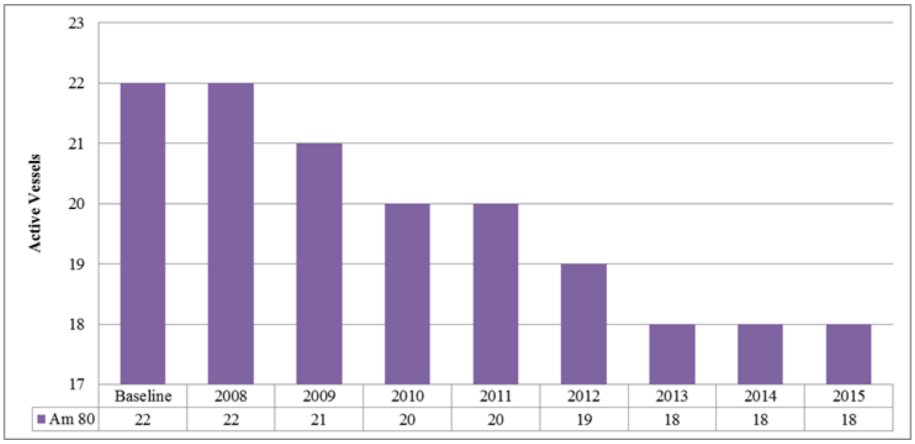


Figure 11.35: Number of active vessels in the Amendment 80 Program.

There were 28 entities (vessels) that were deemed eligible for the Amendment 80 program before implementation of the program. The owner of one eligible CP did not elect to apply for and receive Amendment 80 QS because the vessel fishes exclusively in the GOA, which accounts for the one less entity holding share since program implementation (Figure 11.36).[6]

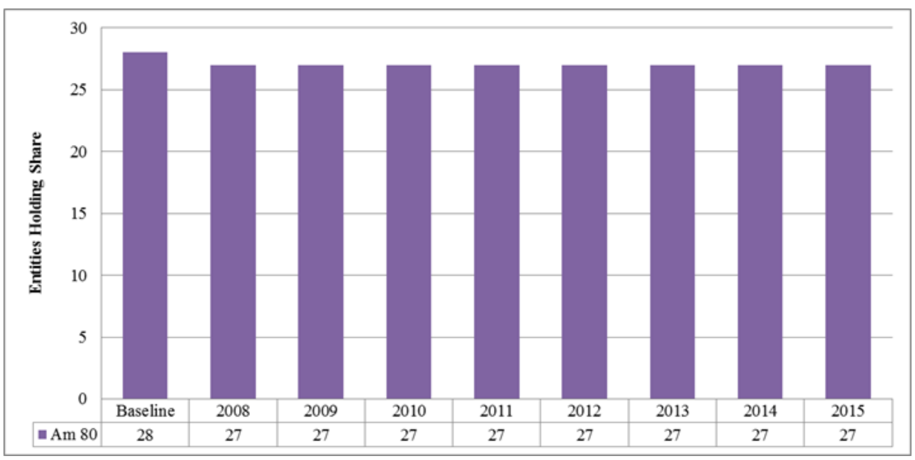


Figure 11.36: Number of entities holding quota share in the Amendment 80 Program.

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from Amendment 80 Program species, average prices of Amendment 80 species, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among active vessels. As all vessels in the Amendment 80 program are CPs, revenues are reported as first wholesale value of the processed fish products that are

[6]The baseline number of entities (vessels) was obtained from the regulations in Table 31 of the final rule implementing the program. Available online here: `http://www.alaskafisheries.noaa.gov/frules/72fr52668.pdf`.

offloaded from the vessels. First wholesale revenues are adjusted for inflation by using the GDP price deflator and are reported in 2010 equivalent dollars. In the first year of program implementation, Amendment 80 revenue initially increased by 5% in 2008 to $244 million overall (Figure 11.37). Amendment 80 revenue declined to $206 million in 2009 which is below the baseline revenue, but revenues were above the baseline levels for 2008 and 2010-2012 after program implementation, while dropping below baseline values in 2013 and to a low in 2014. In 2015, revenues again increased above baseline levels at $244 million.

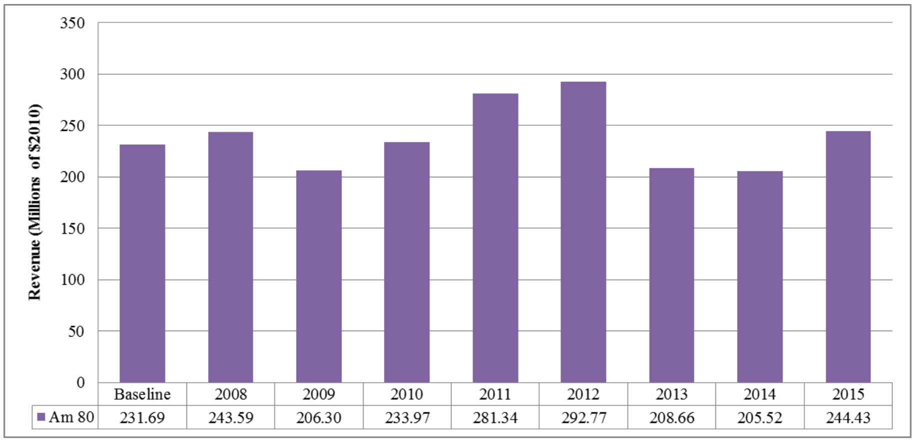


Figure 11.37: Amendment 80 Program first wholesale revenue.

The weighted average real price per metric ton of all Amendment 80 species declined below the baseline level for the first three years of the program, increased above baseline price levels during the following two years (2011-2012), but fell to their lowest level in 2013 and 2014 with a slight uptick in 2015. Real average prices of Amendment 80 species decreased by 18% from $1,156/ton during the baseline to $945/ton in 2015 (Figure 11.38). Real weighted average prices do not vary as much as in many of the other programs, possibly because reported Amendment 80 prices are aggregated over several species and vessels have the ability to change targets to species with higher prices, with annual changes that range between -26% and 22% over the course of the Amendment 80 Program.

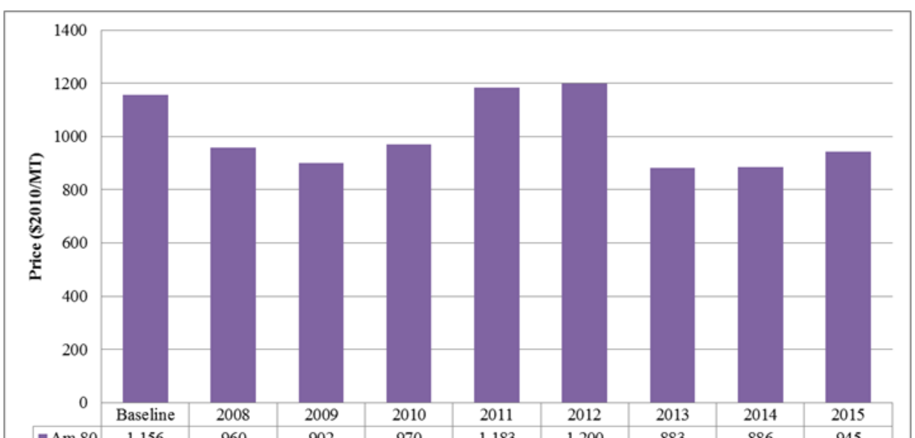


Figure 11.38: Amendment 80 Program weighted average price per metric ton across all species.

Amendment 80 first wholesale revenue per vessel increased by 28.9% from a baseline of $10.53 million to $13.58 in 2015 (Figure 11.39). Revenues per vessel were below their baseline level in 2009, but were above the baseline for all other years of the program.

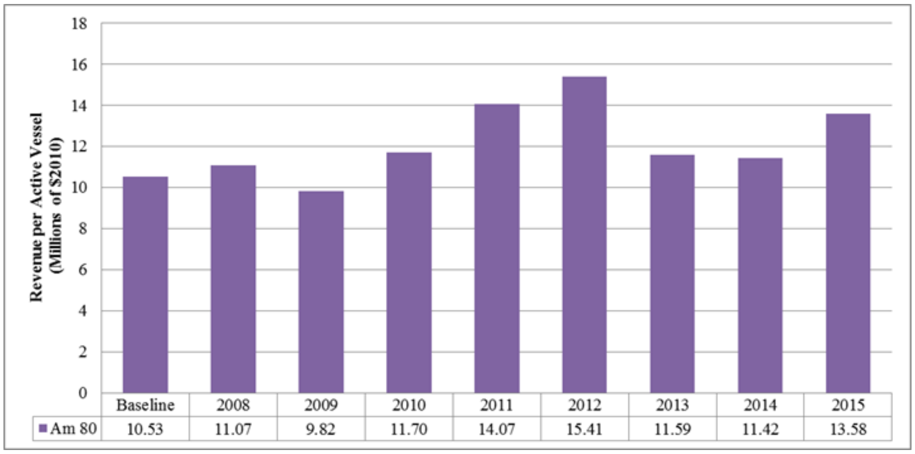


Figure 11.39: Amendment 80 Program revenue per active vessel.

The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the Amendment 80 program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore, revenue becomes more concentrated on fewer vessels as the Gini coefficient increases. There has been an overall movement toward a more even distribution of vessel revenues over the course of the Amendment 80 Program from a baseline level of 0.25 to a level of 0.21 in 2014, however the Gini coefficient was above baseline levels in 2009 and 2015 with a Gini coefficient of 0.28 (Figure 11.40). The low Gini coefficient for all years is a function of the relative similarity of the Amendment 80 vessels and the small number of active vessels, all of which operate at near-maximum capacity.

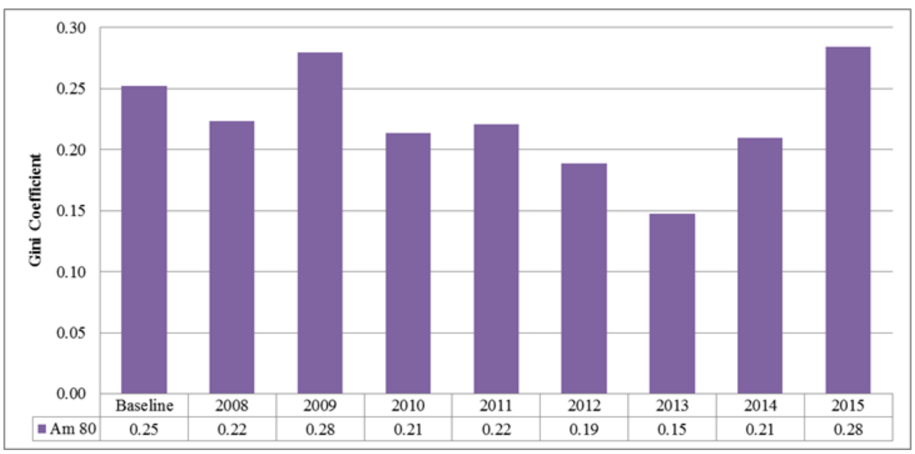


Figure 11.40: Amendment 80 Program Gini coefficient.

11.6. Bering Sea/Aleutian Islands Freezer Longline Catcher/Processors (Hook-and-Line Catcher/Processor Sector Targeting Pacific Cod)

Management Context

The Bering Sea/Aleutian Islands (BSAI) Freezer Longline Catcher/Processors (also known as the Freezer Longliners) are a group of catcher/processor (CP) vessels that are eligible to harvest the hook-and-line CP sector allocation for BSAI Pacific cod. Since 2003, Freezer Longliners are required to have hook-and-line Pacific cod CP endorsements on their federal groundfish License Limitation Program (LLP) license to target Pacific cod using hook-and-line gear and process the catch onboard. These Freezer Longliners are allocated a fixed percentage of the targeted BSAI Pacific cod allocation that is allocated to the hook-and-line CP sector. From 2000 to 2007, the hook-and-line CP sector was allocated 40.8% of the BSAI Pacific cod non-Community Development Quota (CDQ) total allowable catch (TAC). The passage of Amendment 85 increased their share of the BSAI targeted Pacific cod TAC to 48.7% from 2008 to the present. In 2007, the sector voted to obtain a $35 million NOAA Fisheries loan to purchase and retire 4 groundfish LLP licenses with hook-and-line CP endorsements. The Longline Catcher Processor Subsector Single Fishery Cooperative Act was passed by Congress in 2010 and allows Freezer Longliners participating in the BSAI directed Pacific cod fishery to form a single harvest cooperative. The Act also requires NOAA Fisheries to implement regulations to allow the establishment of a harvest cooperative within two years of receiving a request from at least 80% of the eligible hook-and-line CP LLP license holders. However, while the vessels participating in this fishery have formed a voluntary cooperative (the Freezer Longline Coalition or FLC), they have not taken steps that would require NOAA Fisheries to write regulations allowing the formation of a cooperative. The voluntary cooperative has been operating since the B season of 2010, and this report separates the 2010 A and B seasons to delineate the beginning of what is essentially a voluntary catch share program in the B season of 2010. While this sector is not currently recognized as a Limited Access Privilege Program (LAPP) or a catch share program by NOAA Fisheries, they are included in this report because since the second half of 2010, the sector effectively operates as a catch share program.

Catch Share Privilege Characteristics

Similar to the CP and mothership sectors in the AFA program, the FLC is a voluntary cooperative formed to coordinate harvests among its member vessels. The hook-and-line CP sector is currently allocated 48.7% of the BSAI non-CDQ Pacific cod TAC. As described in the previous section, NOAA Fisheries has not implemented regulations for a cooperative program, therefore NOAA Fisheries has not issued BSAI Pacific cod quota share to the Freezer Longliners. There are 8 other sectors fishing for Pacific cod in the BSAI which also receive a sector allocation, but only the Amendment 80 sector has formed a cooperative among of all of its member vessels to coordinate the harvest of Pacific cod under a catch share program. However, the formation of the FLC allows Freezer Longliners within the sector to arrange private contracts among vessel owners to specify the allocation of catch among member vessels to maximize the value of their allocation.

Catch and Landings Performance Metrics

The catch and landings performance metrics include the amount of the BSAI Pacific cod TAC allocated to hook-and-line CP sector (which can be caught only by the Freezer Longliners in the Federal Exclusive Economic Zone), the landings of Pacific cod by the Freezer Longliners, and the percentage of the hook-and-line CP Pacific cod sector allocation that is landed (percent utilization). Annual metrics are reported for the years 2003-2015 and do not include a “baseline” period because this sector is not yet formally defined as a catch share program by NOAA Fisheries. Between 2003 and 2015, the sector allocation and landings have increased by 27% and 20%, respectively, while the percent utilization fell from 99.7% in 2003 to 94.3% in 2015 (Figures 11.41, 11.42, and 11.43).

The sector allocation and landings have varied between 2003 and 2015, with the highest sector allocations occurring between 2012-2015 at over 110,000 metric tons and the highest landings

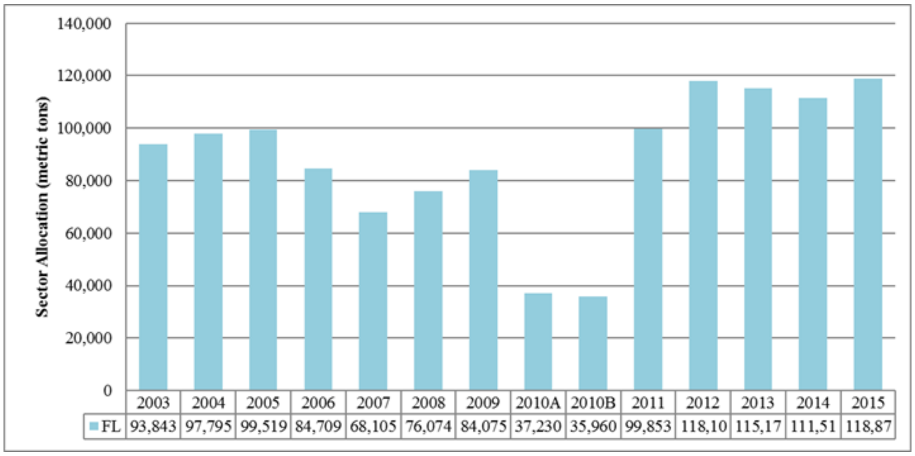


Figure 11.41: Freezer Longline sector allocation for BSAI Pacific cod.

occurring in 2012 followed by 2015. The sector allocation and landings varied from lows of 68,105 metric tons and 67,980 metric tons in 2007 to a high allocation level of 118,871 metric tons and 112,039 metric tons in 2015, respectively.

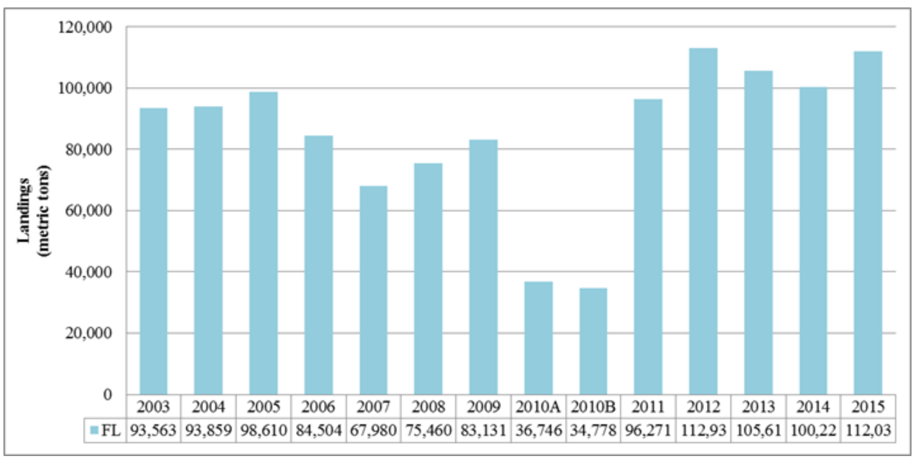


Figure 11.42: Landings of BSAI Pacific cod by Freezer Longline vessels.

Utilization was above 95% from 2003-2012, but fell to 91.7% in 2013 and 89.9% in 2014 before increasing to 94.3% in 2015. Sector allocation utilization was above 98% in 2003 and from 2005-2010 A season (Figure 11.43). However, since the formation of the voluntary cooperative in the 2010 B season, utilization has been generally declining, with the exception of 2015. The Pacific cod hook-and-line CP sector allocation was exceeded in 2003, from 2005-2009, and for the 2010 A season based on total catch (retained weight plus the estimated weight of discards), however the allocation has not been exceeded since the formation of the voluntary cooperative in the B season of 2010. As the Pacific cod hook-and-line CP sector is only 1 of 9 sectors harvesting Pacific cod, the aggregate federal BSAI Pacific cod TAC was only exceeded in 2003, 2007, and 2010. However, since 2006 the BSAI Pacific cod Federal TAC has been set to account for a State-managed fishery for Pacific cod inside State of Alaska waters, and the overall target catch (Federal TAC plus State guideline harvest level (GHL)) was not exceeded in 2007 and 2010. The acceptable biological catch (ABC) has not been exceeded in any year since 1994.

Effort Performance Metrics

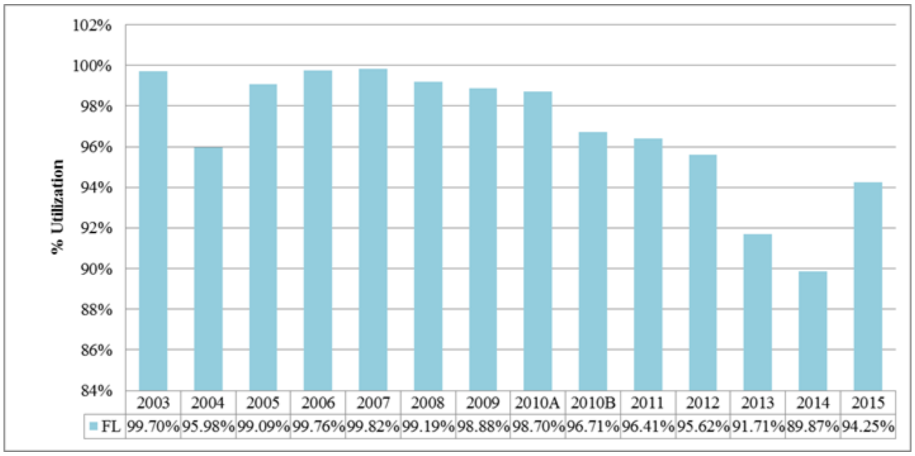


Figure 11.43: Percent of the BSAI Pacific cod sector allocation caught by eligible Freezer Longline vessels.

The effort performance metrics include the season length index, the number of active vessels, and the number of hook-and-line CP LLP licenses. The season length index is defined as the number of days in which at least one vessel was fishing divided by the maximum regulatory season length possible for the fishery, equal to 365 days in normal years and 366 days in leap years. This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished the hook-and-line CP sector allocation. Prior to the formation of the FLC (2003-2009), the average number of active days for these vessels was 145 days (season length index = 0.40) while in the first five full years after the formation of the FLC (2011-2015) they have used 365 and 366 days (season length index = 1.00) in an attempt to catch their entire allocation (Figure 11.44). This change in the amount of the season that is utilized is what would be expected with the ending of a race for fish that likely occurred prior to the formation of the FLC.

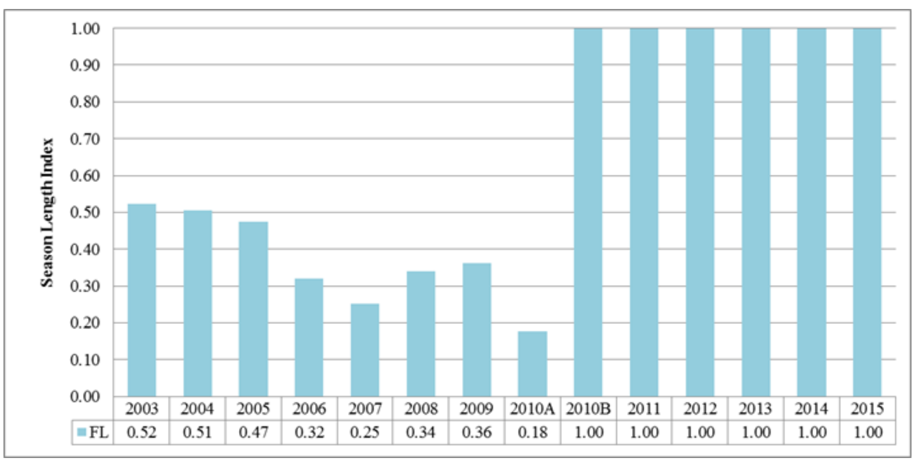


Figure 11.44: Freezer Longline sector season length index.

The number of active vessels reflects the number of Freezer Longline vessels with any commercial landings of BSAI Pacific cod in a given year. The number of active vessels was quite stable between 2003 and 2009 at an average of approximately 39 vessels, but after the formation of the FLC, only approximately 30 vessels continued to fish in 2011-2015 and declined to 29 in 2014-2015 for a decline of 26% since 2003.

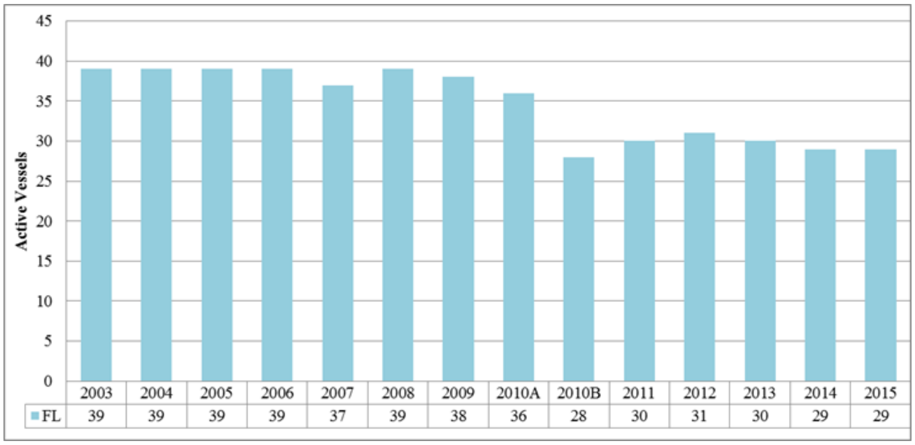


Figure 11.45: Number of active Freezer Longline vessels.

There were 46 license limitation program (LLP) licenses with endorsements to operate as a CP with hook-and-line gear in the Bering Sea or Aleutian Islands in 2003. The number of LLPs declined to 37 from 2008-2011, was reduced by 1 to 36 from 2012-2014, but experienced a large decreased to 29, or 37% less than the 2003 level in 2015 (Figure 11.46).

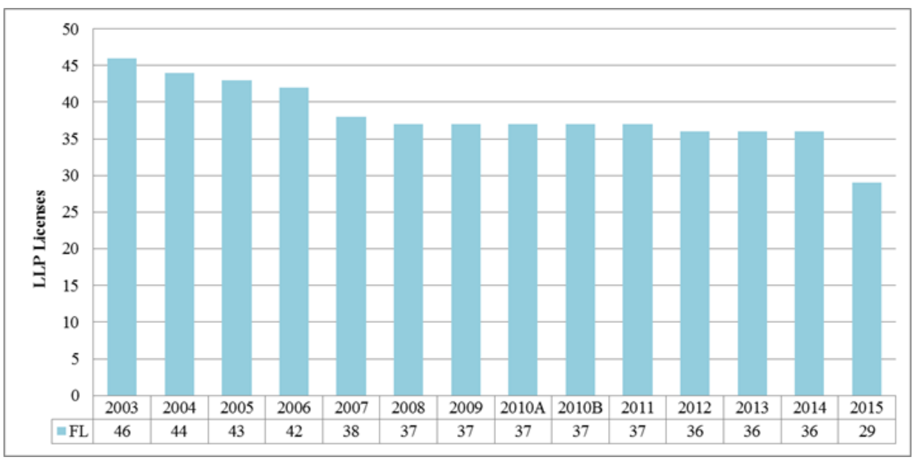


Figure 11.46: Number of LLP licenses with endorsements to operate as a CP with hook-and-line gear in the Bering Sea or Aleutian Islands.

Revenue Performance Metrics

The revenue performance metrics are the aggregate revenue from BSAI Pacific cod, average prices of Pacific cod, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among the active vessels. Revenues are adjusted for inflation by using the GDP price deflator and are reported in 2010 equivalent dollars. Real first wholesale revenue increased by 15.4% from $143 million in 2003 to $171 million in 2015, with an overall average of $152 million from 2003-2015 (Figure 11.47). Even with higher sector allocations and landings over the period 2011-2015, first wholesale revenues were higher in 2006 than in any year since which is a result of the substantial decline in Pacific cod prices from 2009-2015 (Figure 11.48).

The average price per ton of Pacific cod received by Freezer Longline vessels was on average $1,504/ton from 2003-2004, increased to a high of $2,324/ton in 2007, but experienced a dramatic decline to $1,400 in 2009. Prices rebounded somewhat from 2010-2012, averaging $1,637 from

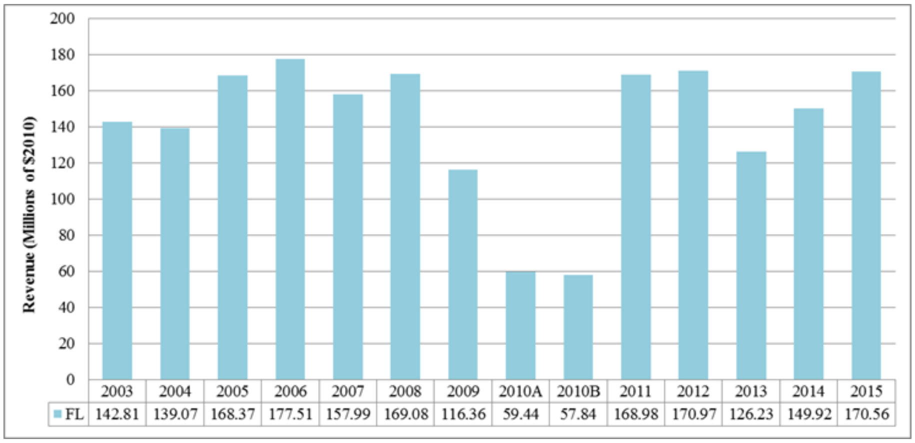


Figure 11.47: Freezer Longline sector BSAI Pacific cod first wholesale revenue.

2010-2012 (Figure 11.48), but then fell to a new low of $1,195/ton in 2013. Prices in 2014 and 2015 were back up near their 2009 levels around $1,500/ton. The price decline over the past six years is likely the result of increased supply of substitute products for Pacific cod including Atlantic cod and other whitefish species. Prices have decreased only 0.3% between 2003 and 2015, and the price in 2015 was 34% below the peak prices observed in 2007.

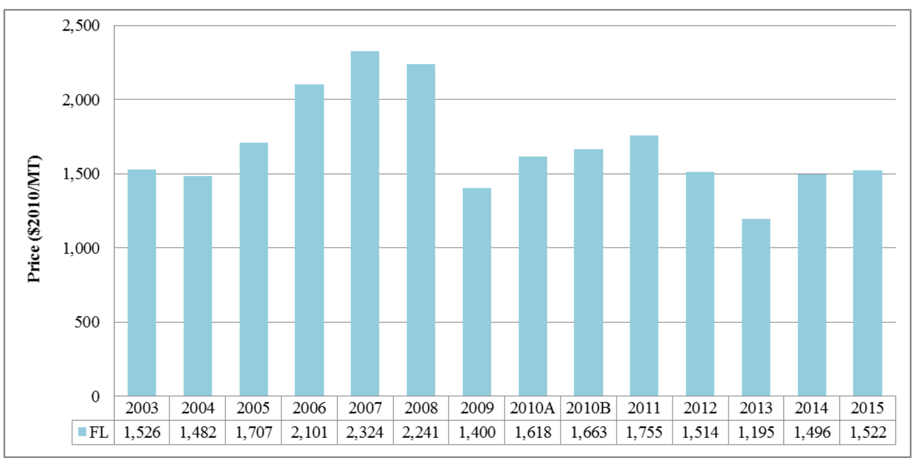


Figure 11.48: Freezer Longline sector BSAI Pacific cod price per metric ton.

Revenue per active vessel in the Freezer Longline sector increased by 61% or $3.7 million in 2003 to $5.9 million in 2015 (Figure 11.49). As a result of the FLC, there were fewer active vessels in the 2010 B season and in 2011-2015 compared with previous time periods, which has resulted in an increase in revenue per active vessel for this sector.

The Gini coefficient measures the evenness of the distribution of revenue among vessels in the hook-and-line CP sector in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore, revenue becomes more concentrated on fewer vessels as the Gini coefficient increases. Between 2003 and 2006, there was a decline in the Gini coefficient (movement toward a more even distribution) from 0.22 in 2003 to 0.13 in 2006 (Figure 11.50). However, vessel revenues became more concentrated from 2007-2012, with a 2012 Gini coefficient of 0.27, but fell to an average of 0.23 from 2013-2015. The formation of the voluntary cooperative in

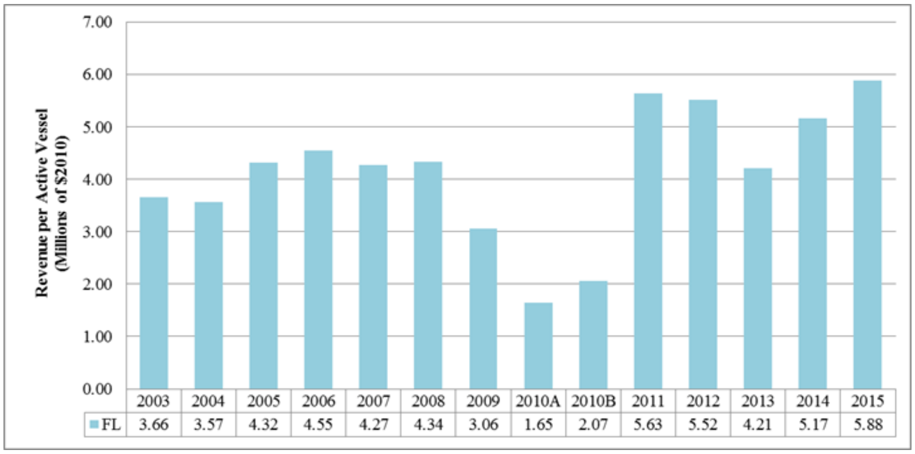


Figure 11.49: Freezer Longline sector revenue per active vessel.

the 2010 B season allowed a number of vessels to exit the fishery which concentrated the revenues on a smaller number of vessels which lead to a relatively large 23% increase in the Gini coefficient between the 2010 A and 2010 B seasons.

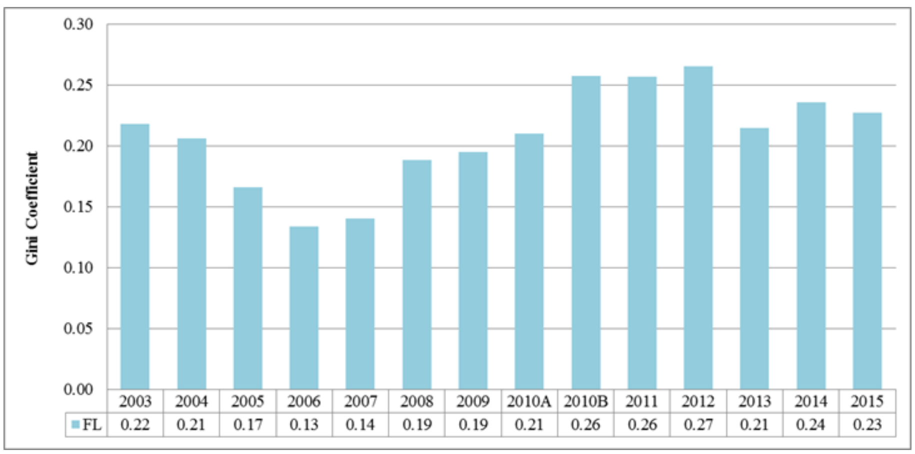


Figure 11.50: Freezer Longline sector BSAI Pacific cod Gini coefficient.

11.7. Central Gulf of Alaska Rockfish Program

Management Context

The Central Gulf of Alaska Rockfish Program (Rockfish Program) that was implemented in 2012 is a ten year extension of a pilot program that ran from 2007-2011 under similar regulations. Prior to 2007, the fishery operated under the License Limitation Program (LLP). The Rockfish Program is a cooperative program that allocates exclusive harvesting privileges to catcher vessel (CV) and catcher/processor (CP) vessel cooperatives using trawl gear for rockfish primary and secondary species as well as an allocation for halibut prohibited species catch (PSC). The rockfish primary species are northern rockfish, Pacific Ocean perch, and pelagic shelf (dusky) rockfish. The rockfish secondary species are Pacific cod, rougheye rockfish, shortraker rockfish, sablefish, and thornyhead rockfish. The rockfish program also includes a small entry level longline fishery, but vessels participating in the entry level longline fishery are not eligible to join cooperatives, are not allocated exclusive harvest privileges, and therefore do not hold quota share.

The Rockfish Program was designed to improve resource conservation and improve economic efficiency by establishing cooperatives that receive exclusive harvest privileges. The four goals of the program are to 1) reduce bycatch and discards; 2) encourage conservation-minded practices; 3) improve product quality and value; and 4) provide stability to the processing labor force. The Rockfish Program allows CPs to form cooperatives and allows CVs to form cooperatives in association with shoreside processors in Kodiak, AK, but these CVs are not required to deliver to the processor with which their cooperative has formed an association. This allows shoreside processors in Kodiak to better time deliveries of rockfish and salmon in the summer months.

The Rockfish Program includes a cost recovery provision whereby the fishermen are assessed a fee based on the cost to the government to manage the program. The costs that can be recovered include the costs related to management, data collection, and enforcement of a Limited Access Privilege Program (LAPP) or Community Development Quota Program, and cannot exceed 3% of the total ex-vessel value of the fishery. Cost recovery was not part of the Rockfish Pilot Program (2007-2011), but it was implemented in 2012 with the implementation of the Rockfish Program. Cost recovery fees are assessed for harvests of Rockfish Program primary and secondary species by participants using trawl gear. Cost recovery fees are not assessed for harvests of Rockfish Program species by participants in the limited entry longline fishery because they do not receive an exclusive harvest privilege. In 2014, the Rockfish Program fee was approximately 2.9% of the ex-vessel revenue in the fishery.

Catch Share Privilege Characteristics

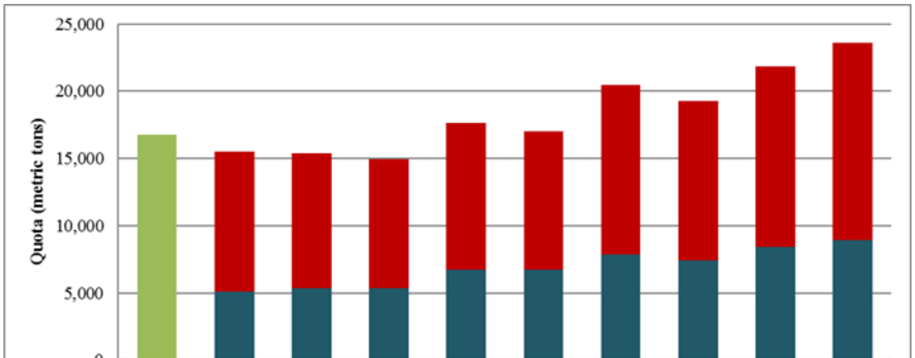
Rockfish Program quota share (QS) are allocated to eligible LLP license holders, but that LLP license must be assigned to a Rockfish Program cooperative in order to participate in the Rockfish Program. Cooperative quota (CQ) for Rockfish Program primary species, secondary species, and halibut PSC is allocated annually to each cooperative based on the QS holdings of its membership. Quota share for Rockfish Program primary species were allocated to eligible LLP license holders based on their catch history of those species, so the LLP owners have a limited ability to sell their QS, which can be transferred only by selling their LLP license on which the Rockfish Program QS is designated. Cooperatives within a sector can transfer CQ within and between cooperatives, subject to excessive share limits. Catcher vessel cooperatives cannot transfer CQ to CP cooperatives, but CP cooperatives are allowed to transfer CQ to cooperatives in either sector (with the exception of rougheye or shortraker rockfish CQ).

The Rockfish Program allocated revocable shares and the Rockfish Program is only authorized until December 31st, 2021 (10 years from the start of the program). The Rockfish Program includes excessive share provisions. No person may hold or use more than 4% of the CV QS and resulting CQ, or 40% of the CP QS and resulting CQ. No CV co-op may hold or use more than 30% of the CV QS issued under the program. No vessel may harvest more than 8% of the CV CQ or 60% of the CP CQ. No processor may receive or process more than 30% of the CV CQ.

Catch and Landings Performance Metrics

The catch and landings performance metrics include the amount of Rockfish Program species total allowable catches (TACs) allocated to the program, the landings of Rockfish Program species in the Rockfish Program, and the percentage of allocated species that are landed (percent utilization).

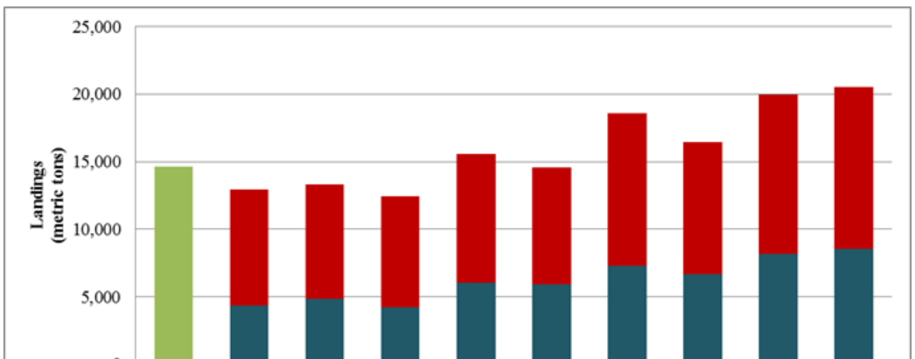
Annual metrics are compared with a "baseline" period prior to the implementation of the Rockfish Pilot Program in 2007, which is the average of the three years prior to Rockfish Pilot Program implementation (2004-2006). Compared with the baseline, the species TAC allocations and landings in 2015 increased by 41% and 40%, respectively, while the percent utilization increased from 87.1% during the baseline to 86.9% in 2015 (Figures 11.51, 11.52, and 11.53). The species TAC allocations and landings have been relatively stable between the baseline and 2011, with a large increase in allocations and landings occurring in the first year of the Rockfish Program (2012) and subsequently in 2014 and 2015 as well.



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015
Baseline	16,774									
CV		10,411	10,010	9,577	10,876	10,330	12,646	11,841	13,405	14,649
CP		5,098	5,358	5,380	6,737	6,708	7,830	7,441	8,418	8,945

Figure 11.51: Rockfish Program species allocated to the Rockfish Program.

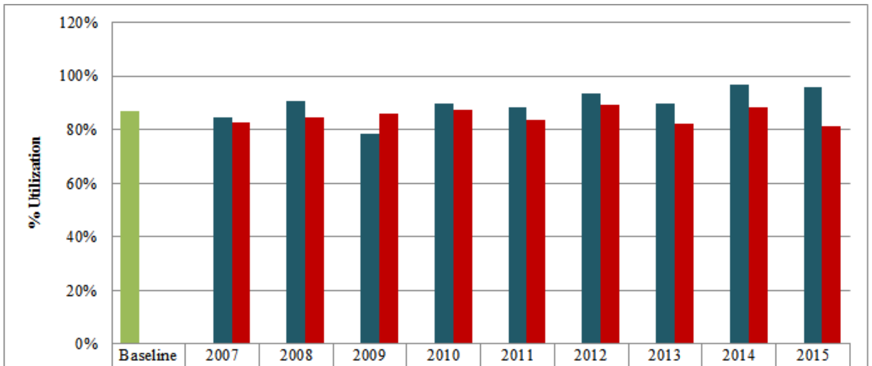
Figure 11.52 also separates the landings by CVs and CPs for all years of the program. Overall program landings have increased by 40% in 2015 relative to the baseline, with CV landings increasing by 40% and CP landings increasing by 41%. CPs land on average 39% of the total Rockfish Program landings, but the CP share decreased from 42% during the baseline to 37% during the Rockfish Pilot Program (2007-2011), and increased to 41% in the first four years of the Rockfish Program (2012-2015).



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015
Baseline	14,617									
CV		8,628	8,469	8,229	9,498	8,659	11,262	9,745	11,823	11,919
CP		4,320	4,851	4,226	6,058	5,924	7,319	6,691	8,154	8,577

Figure 11.52: Aggregate landings of all Rockfish Program species in the Rockfish Program.

Utilization of the allocated species by sector is reported in Figure 11.53. The percent utilization of the CV sector has varied throughout the period, ranging from a high of 89% in 2012 to a low of 81% in 2015. Utilization by the CP sector is higher than the utilization by the CV sector in all years except 2009, but it is much more variable than the CV sector, experiencing a low of 79% in 2009 and a high of 97% in 2014.

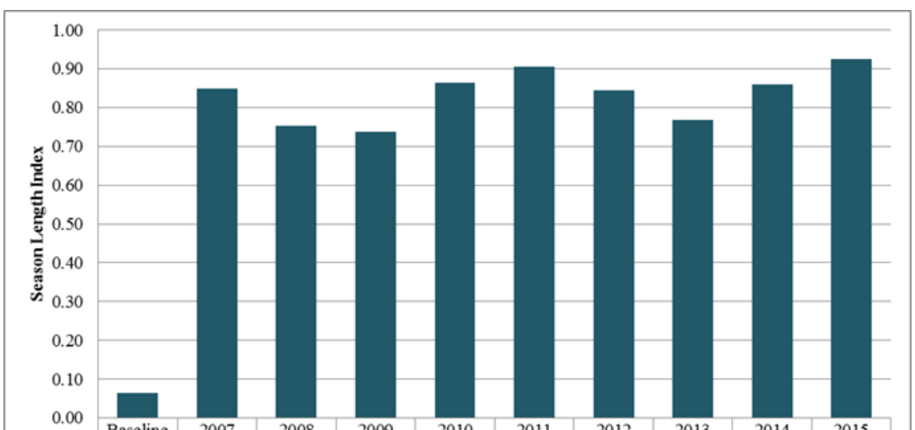


	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015
Baseline	87.1%									
CP		84.7%	90.5%	78.6%	89.9%	88.3%	93.5%	89.9%	96.9%	95.9%
CV		82.9%	84.6%	85.9%	87.3%	83.8%	89.1%	82.3%	88.2%	81.4%

Figure 11.53: Percent of the allocated species that are landed in the Rockfish Program.

Effort Performance Metrics

The effort performance metrics include the season length index, the number of active vessels, and the number of entities holding Rockfish Program QS. The season length index is defined as the number of days in which at least one vessel was fishing divided by the maximum regulatory season length possible for the fishery, equal to 199 days in all years (opening on May 1st and closing on November 15th). This index measures the relative proportion of the legal fishing season during which some or all vessels actively fished Rockfish Program species allocations. The number of active days for these vessels increased significantly from 12 days during the baseline to an average of 166 days per year from 2007-2015, which corresponds to a season length index of 12/199 = 0.06 during the baseline and averaged 166/199=0.83 from 2007-2015 (Figure 11.54).



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015
RP	0.06	0.85	0.75	0.74	0.86	0.90	0.84	0.77	0.86	0.92

Figure 11.54: Rockfish Program season length index.

The number of active vessels reflects the number of Rockfish Program CVs and CPs with any commercial landings of Rockfish Program species in a given year, and includes the entry-level longline CVs as active vessels in the program. The total number of active vessels has increased from 42 vessels during the baseline to 51 vessels participating in the fishery in 2015. The number of CVs has varied from 33 and 52 vessels, while the number of CPs varied between 4 and 9 vessels, but remained at 5 from 2011-2014 and fell to 4 in 2015 (Figure 11.55). It is interesting to note that 4 CPs landed 42% of the total program landings in 2015 while 47 CVs landed the remaining 58% of the Rockfish Program species allocations.

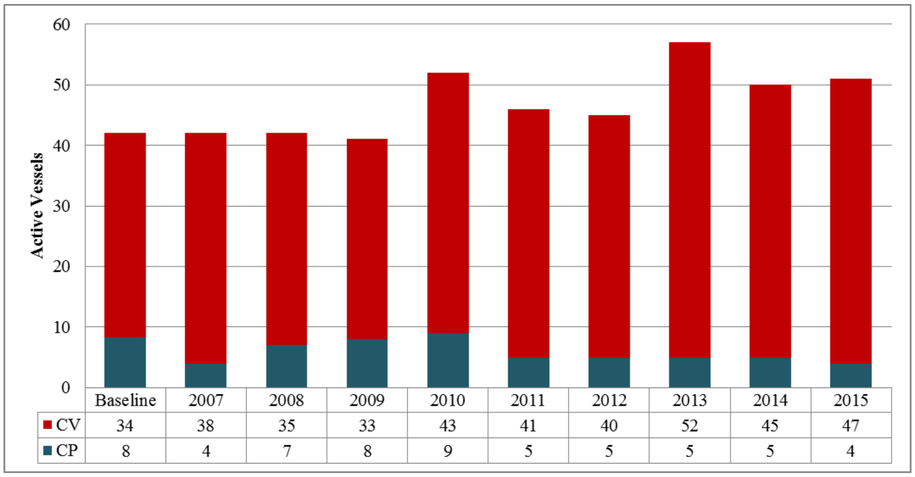


Figure 11.55: Number of active vessels in the Rockfish Program.

The number of entities holding QS (LLP licenses) in the Rockfish Program has been increasing throughout the Rockfish Pilot Program (2007-2011) and has remained stable at 57 LLP licenses for the duration of the Rockfish Program (2012 to 2015) (Figure 11.56).

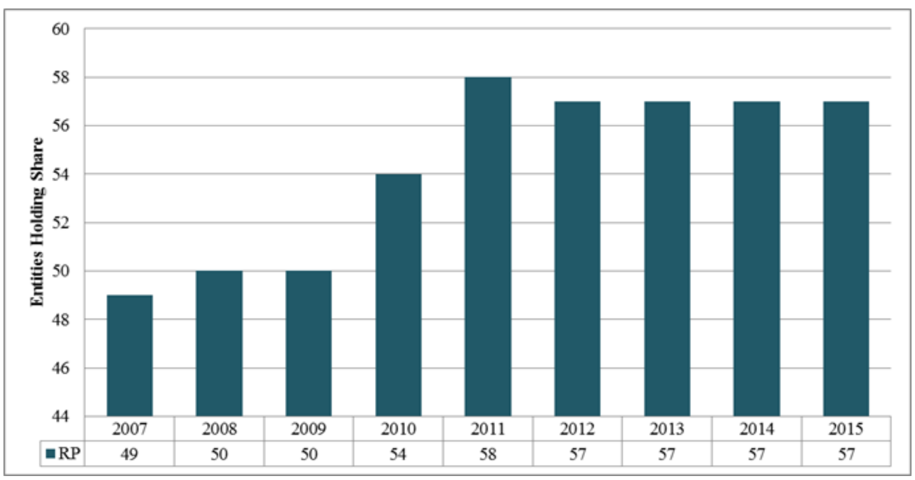
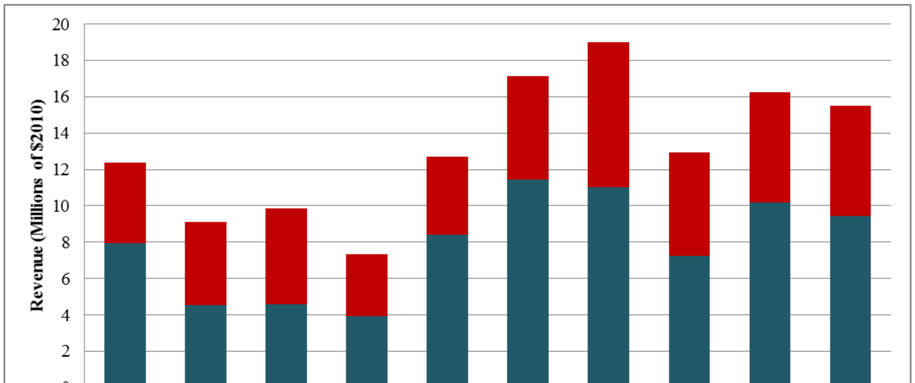


Figure 11.56: Number of entities holding QS in the Rockfish Program.

Revenue Performance Metrics

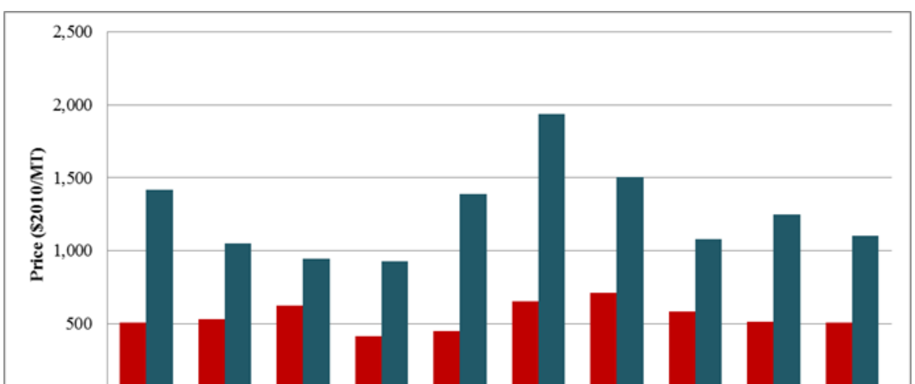
The revenue performance metrics are the aggregate revenue from Rockfish Program species, average prices of Rockfish Program species, the revenue per active vessel, and the Gini coefficient which is a measure of revenue concentration among the active vessels. Revenues are adjusted for inflation by using the GDP price deflator and are reported in 2010 equivalent dollars. For the Rockfish Program, revenues are reported in their native format, such that the price received by CVs is the weighted annual ex-vessel price while the price received by CPs is the weighted annual first-wholesale price. This enables a comparison between the revenues that each type of vessel receives on offloading their catch from the vessel. Rockfish Program revenue has increased by 25% between the baseline and 2015, from $12.4 million during the baseline to $15.5 million in 2015 (Figure 11.57). The CP sector experienced a 19% increase in revenues while the CV sector experienced a 36% increase in average revenues in 2015 compared with the baseline. While landings have increased for both sectors in 2015 relative to the baseline, as shown below, overall prices have decreased by 12%, with the CP sector experiencing a 22% decline and the CV sector experiencing a 0.3% increase.



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015
CV	4.45	4.58	5.28	3.41	4.27	5.67	7.99	5.70	6.05	6.05
CP	7.93	4.53	4.58	3.92	8.42	11.46	11.02	7.23	10.20	9.44

Figure 11.57: Rockfish Program revenue.

As the CV sector revenues are in ex-vessel value and CP sector revenues are in first wholesale value, the weighted average price per ton of Rockfish Program species varies by, and is reported separately for, each sector. Real weighted average prices of Rockfish Program species increased between the baseline and 2015 by 0.3% from $506/ton to $508/ton for CVs, but declined 22% from $1,417/ton to $1,101 for CPs (Figure 11.58). There is substantial variation in the average prices for each sector which varied annually from -28% to 50% for CPs and from -33% to 46% for CVs between 2007 and 2015, and the CPs have a higher coefficient of variation in prices at 0.25 than the CVs at 0.17.



	Baseline	2007	2008	2009	2010	2011	2012	2013	2014	2015
CV	506	531	623	415	450	655	710	585	512	508
CP	1,417	1,048	944	928	1,390	1,934	1,506	1,081	1,251	1,101

Figure 11.58: Weighted average of all Rockfish Program species price per metric ton.

Rockfish Program revenue per vessel overall increased by 15% from $265,089 during the baseline to $303,842 in 2015. The CV revenue per vessel increased by 13% from $113,681 during the baseline to $128,787 during 2015, while revenue per CP increased by 91% (from $1.24 million during the baseline to $2.36 million in 2015) (Figure 11.59). The decrease in CV revenue per vessel from 2012 to 2013 is partly a function of a number of new entry-level longline vessels participating in the fishery in 2013, with relatively low revenues compared with the trawl vessels.

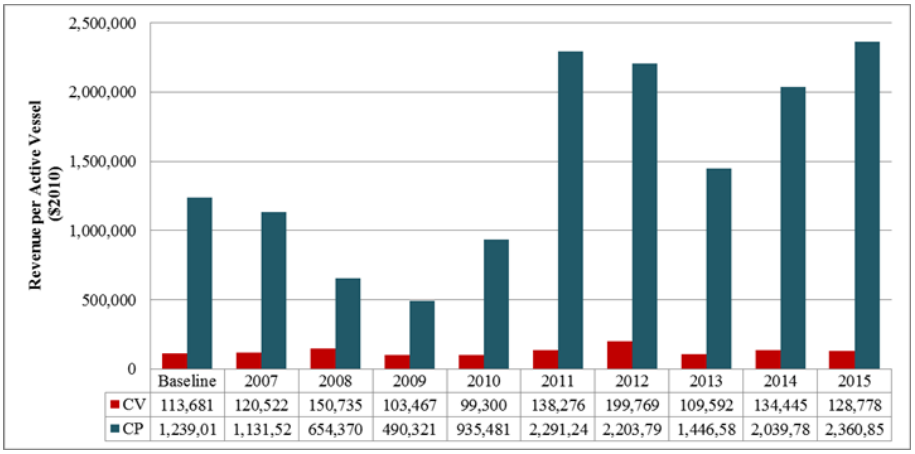


Figure 11.59: Rockfish Program revenue per active vessel.

The Gini coefficient measures the evenness of the distribution of revenue among vessels participating in the Rockfish Program in a given year. The Gini coefficient varies between 0 and 1, where a value of 0 indicates that all vessels earn exactly the same revenue, while a value of 1 indicates that a single vessel had 100% of the revenues. Therefore, revenue becomes more concentrated on fewer vessels as the Gini coefficient increases. This is demonstrated in the difference in Gini coefficient for the baseline for all Rockfish Program (RP) vessels (Gini = 0.69) which implies a less even distribution of vessel revenues compared with the Gini coefficient for either the CVs only (Gini = 0.45) or for the CPs only (Gini = 0.44) (Figure 11.60). This is because the revenue per vessel among CVs and CPs is very different (Figure 11.59) and when all vessels are combined together in the Gini coefficient, it implies a less even distribution of revenue than examining the within vessel-type revenue distribution. The Gini coefficient of Rockfish Program vessel revenue for all vessels increased from 0.69 during the baseline to 0.77 in 2015, which suggests an increase in concentration in vessel revenues among all vessels. The CV sector experienced an increase in the Gini coefficient from 0.45 during the baseline to 0.62 in 2015. The CP sector experienced a substantial decline in the Gini coefficient (movement toward a more even distribution), from 0.44 during the baseline to an average of 0.19 from 2011-2015, which suggests the 4 or 5 remaining CP vessels participating in the Rockfish Program from 2011-2015 have a more equal split of revenues than the 8 vessels that participated in the baseline.

11.8. Discussion and Conclusion

This report summarizes economic performance metrics from 5 catch share programs and the Bering Sea Freezer Longline Catcher/Processors fishery in the North Pacific for a period prior to program implementation through 2015. Table 11.2 reports the percentage changes between 2015 and 2014 for each of the 10 performance metrics listed in Table 11.1 for all programs in this report. This table reflects short term changes in the economic conditions of the program for 2015 relative to 2014.

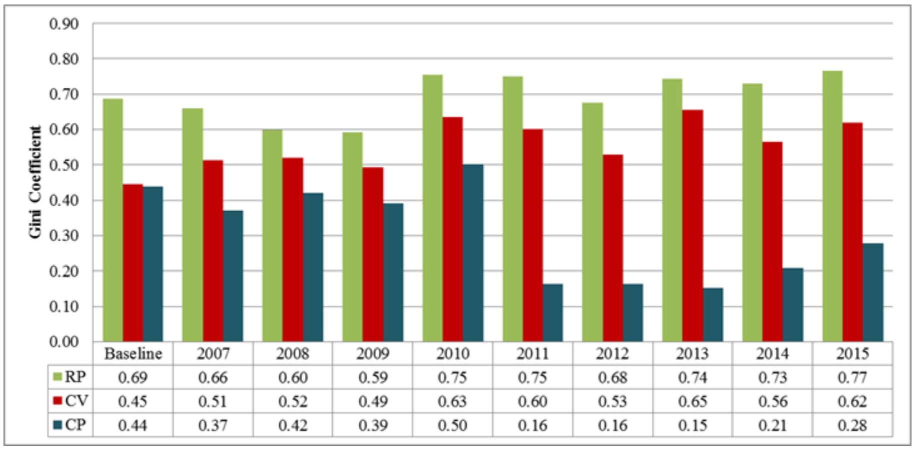


Figure 11.60: Rockfish Program Gini coefficient.

Table 11.2: Percentage change in Catch Share Performance Metrics for 2014 to 2015.

Catch Share Program	Quota	Landings	% Utilization	Season Length	Active Vessels	Entities	Revenue	Price	Revenue per vessel	Gini*
Halibut	7%	6%	-1%	-4%	-5%	-2%	5%	-1%	11%	-2%
Sablefish	0%	-5%	-5%	-2%	-3%	-2%	0%	6%	3%	-1%
AFA	3%	3%	0%	9%	-3%	0%	3%	0%	6%	-1%
Amendment 80	-1%	12%	13%	0%	0%	0%	19%	7%	19%	36%
Freezer Longline	7%	12%	5%	5%	0%	-19%	14%	2%	14%	-4%
GOA Rockfish	8%	3%	-5%	8%	2%	0%	-5%	-7%	-7%	5%

Notes: * Color scheme is reversed to indicate that increases in the Gini reflect increases in inequality of revenues across vessels.

Quota or landings declined in 2 of the 6 programs, with landings increasing in the Amendment 80 fishery increased by 12% even with a 1% decline in quota. The percent utilization fell in three programs but remained constant in one and increased in two others including a 13% increase in the utilization of the Amendment 80 Program. The season length index declined in 2 of 6 programs. Active vessels only increased in one program and fell in three others. While there was little change in the number of entities holding share for most programs, the freezer longline fishery experienced a decline of 19%. Revenue declined in 1 program, increased mildly in two others, and increased by 19% and 14% in the Amendment 80 Program and Freezer Longline fishery, respectively. Prices increased in 3 programs while two experienced decreases and one remained stable. Revenue per vessel declined in one program while increasing moderately in two and increasing by 11%, 19%, and 14% in the Halibut IFQ Program, Amendment 80 Program, and Freezer Longline fishery, respectively. The Gini coefficient decreased (more equal distribution) in four programs but increased (less equal distribution) in two with the Rockfish Program and Amendment 80 increasing by 7% and 56%, respectively.

It is also useful to compare the economic performance of our catch share programs in 2015 to a longer term average of performance to provide additional context for these metrics. Table 11.3 reports the percentage changes between 2015 and the mean values from the previous 5 year period (2010-2014) for each of the 10 performance metrics listed in Table 11.1.

Table 11.3: Catch Share Performance Metrics 2015 values compared with the average of 2010-2014.

Catch Share Program	Quota	Landings	% Utilization	Season Length	Active Vessels	Entities	Revenue	Price	Revenue per vessel	Gini*
Halibut	-35%	-36%	0%	-8%	-13%	-8%	-30%	7%	-19%	-8%
Sablefish	-11%	-15%	-5%	-2%	-12%	-2%	-20%	-5%	-9%	-5%
AFA	13%	14%	1%	-2%	-3%	-3%	2%	-11%	4%	-3%
Amendment 80	-12%	9%	22%	2%	-5%	0%	0%	-8%	6%	45%
Freezer Longline	8%	3%	-5%	9%	-5%	-1%	2%	-2%	7%	-2%
GOA Rockfish	23%	20%	-2%	9%	2%	1%	-1%	-18%	-4%	5%

Notes: * Color scheme is reversed to indicate that increases in the Gini reflect increases in inequality of revenues across vessels.

Trends in quota were very different across programs. The AFA Pollock program, Freezer Longline fishery, and Rockfish Program experienced an increase in quota of 13%, 8%, and 23%, while the Halibut IFQ Program, Sablefish IFQ Program, and Amendment 80 Program experienced declines of 35%, 11%, and 12%, respectively. Landings trends were similar to trends in quota with the exception of the Amendment 80 Program where quota declined by 12% but the landings increased by 9%. The percent utilization fell only in three programs, remained constant in one, had a small increase in one, and a large increase of 22% in the Amendment 80 Program. The season length index declined in three and increased in three. Active vessels fell in 5 of 6 programs with the Halibut IFQ program and Sablefish IFQ program decreasing by 13% and 12%, respectively. There has been a slight decrease in the number of entities holding share in all programs with the exception of Amendment 80 which was flat and the Rockfish Program which experienced a 1% increase. Revenue declined substantially in 2 programs (Halibut and Sablefish IFQ Programs while other programs did not change by more than 2% up or down. Prices decreased in 5 programs with prices for the Halibut IFQ program going up by 7% and revenue declining by 11% and 18% for the AFA Program and Rockfish Program, respectively. Revenue per vessel declined in three programs and increased in three but revenue per vessel declined by 19% for the Halibut IFQ Program. The Gini coefficient decreased (more equal distribution) in four programs but increased in two with the Amendment 80 Program experiencing a 45% increase.

Comparing 2015 with the previous 5 years, the Halibut IFQ program experienced declines in 7 of the 10 economic performance metrics with quota, landings, active vessels, revenue, and revenue per vessel declining by 35%, 36%, 13%, 30%, and 19%, respectively. The sablefish IFQ program experienced declines in 9 of the 10 performance metrics but its declines were less substantial than in the Halibut IFQ program with declines in quota, landings, active vessels, and revenue of 11%, 15%, 12%, and 20%, respectively. The AFA Pollock program had increases in 6 metrics and declines in 4, with quota and landings increasing by 13% and 14%, respectively while price fell 11%. Four performance metrics declined for the Amendment 80 program with quota and the Gini coefficient declining by 12% and 45%, respectively. The Freezer Longline fishery had increases in six metrics and declines in four, but no metric changed by more than 9%. The Rockfish Program had five metrics increase over this period with quota and landings increasing by 23% and 20%, respectively, while prices fell 18%, leading to a decline in revenue of 1% and revenue per vessel of 4%.

11.9. References

Brinson, A.A., and E. Thunberg. 2013. The Economic Performance of U.S. Catch Share Programs. U.S. Dept. of Commer., NOAA Technical Memorandum NMFS-F/SPO-133a, 159p.

A. ADDITIONAL ECONOMIC DATA TABLES

A.1. Expanded Economic Data Tables for Flatfish and Rockfish Fisheries

Table F1: Flatfish retained catch off Alaska by area, gear, and species, 2006-2015 (100 metric tons, round weight).

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	FIX	Flathead Sole	0.00	*	0.01	0.00	0.01	*	0.00	*	*	*
		Arrowtooth	0.96	0.62	0.55	0.32	0.26	0.26	0.28	0.17	0.13	0.22
		Rex Sole (GOA)	*	*	-	*	-	-	*	*	*	*
		Shallow-water Flatfish (GOA)	*	0.01	0.00	0.01	0.00	0.00	0.00	0.00	*	*
		Deep-water Flatfish (GOA)	0.00	0.01	0.00	*	*	*	0.00	0.01	*	*
	TWL	Flathead Sole	28.04	28.34	30.82	35.45	36.62	26.33	20.01	24.83	23.98	18.59
		Arrowtooth	159.35	150.44	204.60	128.08	142.87	237.46	153.45	160.58	328.17	170.76
		Rex Sole (GOA)	31.42	27.84	26.15	47.09	35.57	27.83	23.46	36.39	35.31	19.25
		Shallow-water Flatfish (GOA)	71.66	80.89	85.41	83.40	52.55	37.82	37.91	52.79	43.08	29.70
		Deep-water Flatfish (GOA)	1.62	1.13	2.10	1.05	3.40	2.32	0.74	1.40	2.37	1.10

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Table F1: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	FIX	Yellowfin (BSAI)	0.47	0.17	0.13	0.09	*	0.04	-	-	-	0.18
		Rock Sole (BSAI)	0.01	0.01	0.00	*	0.01	0.00	-	-	-	*
		Flathead Sole	0.42	0.46	0.13	0.02	0.14	0.01	-	-	-	0.05
		Arrowtooth	12.58	5.73	4.54	3.84	6.12	3.51	-	-	-	0.91
		Kamchatka Flounder (BSAI)	-	-	-	-	-	0.25	-	-	-	0.13
		Turbot (BSAI)	15.03	13.89	8.15	13.18	20.26	19.95	-	-	-	10.54
		Flat Other (BSAI)	0.09	0.03	0.16	*	0.01	0.21	-	-	-	*
	TWL	Yellowfin (BSAI)	905.45	1,089.87	1,412.22	1,006.33	1,132.27	1,464.14	1,421.32	1,587.80	1,521.16	1,230.47
		Rock Sole (BSAI)	286.09	279.98	459.47	435.37	501.59	560.50	708.96	565.76	497.71	443.30
		Flathead Sole	135.58	136.74	221.95	175.22	183.04	117.40	96.19	157.88	151.12	100.72
		Arrowtooth	48.45	45.57	154.59	237.48	313.21	160.98	190.76	168.25	166.59	93.47
		Kamchatka Flounder (BSAI)	-	-	-	-	-	95.83	87.10	69.77	59.07	46.10
		Turbot (BSAI)	2.75	3.16	13.92	27.35	18.80	15.84	25.69	7.79	7.61	10.30
		Flat Other (BSAI)	38.13	55.32	94.69	101.61	110.61	175.16	140.92	151.81	166.82	141.23

Notes: These estimates include only catch counted against federal TACs. TWL is the trawl gear type and FIX is the fixed gear type. "*" 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 F2: Real ex-vessel value of the catch flatfish off Alaska by area, gear, and species, 2006-2015; calculations based on COAR ($1,000, base year = 2015).

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	FIX	Flathead Sole	0.4	*	0.7	0.0	1.3	*	0.0	*	*	*
		Arrowtooth	94.1	91.6	32.7	12.0	46.0	27.0	14.0	0.7	7.0	16.1
		Rex Sole (GOA)	*	*	-	*	-	-	*	*	*	*
		Shallow-water Flatfish (GOA)	*	1.3	0.3	0.2	0.5	0.3	0.1	0.0	*	*
		Deep-water Flatfish (GOA)	0.4	0.9	0.3	*	*	*	0.0	0.0	*	*
	TWL	Flathead Sole	886.5	867.6	904.6	958.8	946.2	745.1	637.1	819.6	828.3	601.3
		Arrowtooth	3,111.8	3,051.9	4,045.8	1,909.4	1,924.9	4,046.3	3,298.5	2,979.7	8,350.1	4,240.2
		Rex Sole (GOA)	1,090.4	1,151.9	1,049.1	1,802.0	1,206.2	1,067.8	997.1	1,706.8	1,948.7	928.7
		Shallow-water Flatfish (GOA)	3,386.7	4,205.0	4,515.9	3,377.9	1,830.9	1,821.1	1,826.2	2,409.5	1,980.8	1,296.5
		Deep-water Flatfish (GOA)	88.0	28.7	47.0	21.8	80.4	49.0	17.6	32.1	59.1	24.6

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Table F2: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	FIX	Yellowfin (BSAI)	10.7	1.7	1.2	0.5	*	1.4	-	-	-	0.1
		Rock Sole (BSAI)	0.2	0.1	0.0	*	0.0	0.1	-	-	-	*
		Flathead Sole	9.8	4.6	1.3	0.1	0.5	0.3	-	-	-	0.0
		Arrowtooth	291.2	58.0	45.4	19.2	20.2	134.6	-	-	-	0.6
		Kamchatka Flounder (BSAI)	-	-	-	-	-	9.4	-	-	-	0.1
		Turbot (BSAI)	351.3	141.4	81.8	66.1	67.0	764.6	-	-	-	7.3
		Flat Other (BSAI)	2.2	0.3	1.6	*	0.0	8.0	-	-	-	*
	TWL	Yellowfin (BSAI)	35,033.7	43,340.9	48,448.0	29,434.1	35,251.1	56,041.4	54,428.7	54,596.7	42,138.5	35,098.2
		Rock Sole (BSAI)	16,455.8	14,399.6	21,201.6	15,744.4	18,785.8	24,963.5	38,832.9	18,717.8	16,762.8	14,236.9
		Flathead Sole	7,766.4	6,593.6	9,588.8	5,748.7	6,812.1	5,228.0	4,372.7	7,700.7	5,868.5	3,276.3
		Arrowtooth	1,502.4	1,066.0	5,278.6	6,105.0	8,238.8	6,090.2	8,825.4	5,696.8	7,399.2	3,760.4
		Kamchatka Flounder (BSAI)	-	-	-	-	-	3,685.9	4,764.6	2,108.8	2,385.8	1,679.1
		Turbot (BSAI)	194.4	138.6	1,380.9	2,782.1	2,202.5	2,484.1	3,404.0	753.2	795.7	1,140.2
		Flat Other (BSAI)	1,364.0	2,417.5	3,049.6	3,348.7	3,134.6	5,767.1	5,492.8	4,921.9	5,261.8	4,261.5

Notes: These estimates include the value of catch from both federal and state of Alaska fisheries. The data have been adjusted to 2015 dollars by applying the GDP deflator from the Bureau of Labor Statistics. TWL is the trawl gear type and FIX is the fixed gear type.

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 F3: Ex-vessel prices of flatfish off Alaska by area, gear, and species, 2006-2015; calculations based on COAR ($/lb, round weight).

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	FIX	Flathead Sole	0.45	*	0.28	0.17	0.79	*	0.16	*	*	*
		Arrowtooth	0.45	0.67	0.27	0.17	0.79	0.48	0.23	0.02	0.24	0.34
		Rex Sole (GOA)	*	*	-	*	-	-	*	*	*	*
		Shallow-water Flatfish (GOA)	*	0.60	0.29	0.17	0.80	0.57	0.24	0.05	*	*
		Deep-water Flatfish (GOA)	0.45	0.70	0.28	*	*	*	0.22	0.02	*	*
	TWL	Flathead Sole	0.14	0.14	0.13	0.12	0.12	0.13	0.14	0.15	0.16	0.15
		Arrowtooth	0.09	0.09	0.09	0.07	0.06	0.08	0.10	0.08	0.12	0.11
		Rex Sole (GOA)	0.16	0.19	0.18	0.17	0.15	0.17	0.19	0.21	0.25	0.22
		Shallow-water Flatfish (GOA)	0.21	0.24	0.24	0.18	0.16	0.22	0.22	0.21	0.21	0.20
		Deep-water Flatfish (GOA)	0.25	0.12	0.10	0.09	0.11	0.10	0.11	0.10	0.11	0.10

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Table F3: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	FIX	Yellowfin (BSAI)	0.10	0.04	0.04	0.02	*	0.15	-	-	-	0.00
		Rock Sole (BSAI)	0.10	0.05	0.04	*	0.02	0.17	-	-	-	*
		Flathead Sole	0.10	0.05	0.04	0.02	0.02	0.17	-	-	-	0.00
		Arrowtooth	0.10	0.05	0.04	0.02	0.02	0.17	-	-	-	0.00
		Kamchatka Flounder (BSAI)	-	-	-	-	-	0.17	-	-	-	0.00
		Turbot (BSAI)	0.11	0.05	0.05	0.02	0.02	0.17	-	-	-	0.00
		Flat Other (BSAI)	0.11	0.05	0.04	*	0.02	0.17	-	-	-	*
	TWL	Yellowfin (BSAI)	0.18	0.18	0.16	0.13	0.14	0.17	0.17	0.16	0.13	0.13
		Rock Sole (BSAI)	0.26	0.23	0.21	0.16	0.17	0.20	0.25	0.15	0.15	0.15
		Flathead Sole	0.26	0.22	0.20	0.15	0.17	0.20	0.21	0.22	0.18	0.15
		Arrowtooth	0.14	0.11	0.16	0.12	0.12	0.17	0.21	0.15	0.20	0.18
		Kamchatka Flounder (BSAI)	-	-	-	-	-	0.17	0.25	0.14	0.18	0.16
		Turbot (BSAI)	0.32	0.20	0.45	0.46	0.53	0.71	0.60	0.44	0.47	0.50
		Flat Other (BSAI)	0.16	0.20	0.15	0.15	0.13	0.15	0.18	0.15	0.14	0.14

Notes: 1) Prices are for catch from both federal and state of Alaska fisheries.
3) Trawl-caught flatfish in the BSAI and trawl-caught are not well represented by on-shore landings. A price was calculated for these categories from product-report prices; the price in this case is the value of the product divided by the calculated round weight and multiplied by a constant 0.4 to correct for value added by processing.
4) The "All Alaska/All gear" column is the weighted average of the other columns.
TWL is the trawl gear type and FIX is the fixed gear type. "*" 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 F4: Number of vessels that caught flatfish off Alaska by area, gear, and species, 2006-2015.

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	FIX	Flathead Sole	4	1	5	4	4	3	4	3	2	2
		Arrowtooth	22	19	21	18	14	15	16	9	9	8
		Rex Sole (GOA)	1	1	-	1	-	-	1	1	1	1
		Shallow-water Flatfish (GOA)	2	4	6	8	4	4	7	5	3	3
		Deep-water Flatfish (GOA)	5	5	6	3	2	1	4	4	3	3
	TWL	Flathead Sole	21	24	24	25	21	26	24	24	21	17
		Arrowtooth	26	25	23	26	23	26	28	25	21	19
		Rex Sole (GOA)	23	27	24	26	28	28	27	22	21	16
		Shallow-water Flatfish (GOA)	23	24	24	24	25	27	25	23	19	14
		Deep-water Flatfish (GOA)	14	18	16	12	16	16	16	15	17	14

Continued on next page.

Table F4: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	FIX	Yellowfin (BSAI)	11	6	7	4	1	5	-	-	-	6
		Rock Sole (BSAI)	10	7	6	3	5	6	-	-	-	2
		Flathead Sole	19	15	8	10	12	8	-	-	-	6
		Arrowtooth	32	24	25	22	19	17	-	-	-	15
		Kamchatka Flounder (BSAI)	-	-	-	-	-	8	-	-	-	12
		Turbot (BSAI)	33	26	23	26	30	21	-	-	-	11
		Flat Other (BSAI)	10	4	7	3	4	8	-	-	-	3
	TWL	Yellowfin (BSAI)	43	42	43	38	37	41	39	37	39	37
		Rock Sole (BSAI)	43	44	46	42	41	41	41	38	42	40
		Flathead Sole	44	46	44	41	41	43	44	40	41	42
		Arrowtooth	40	43	39	39	38	41	40	39	38	40
		Kamchatka Flounder (BSAI)	-	-	-	-	-	31	34	31	31	32
		Turbot (BSAI)	35	43	37	39	36	39	37	34	36	37
		Flat Other (BSAI)	42	46	44	42	40	41	43	41	40	42

Notes: These estimates include only vessels fishing federal TACs. Based on federal permit files. TWL is the trawl gear type and FIX is the fixed gear type.

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 F5: Flatfish first-wholesale production off Alaska by area, product, and species, 2006-2015 (100 metric tons, product weight).

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Head And Gut	Flathead Sole	1,626.5	2,139.4	1,963.4	2,319.9	2,340.9	1,975.5	1,297.0	1,805.0	1,002.1	888.4
		Arrowtooth	13,126.5	11,405.0	15,958.0	9,788.5	9,043.3	22,961.2	15,857.6	14,200.6	34,263.7	16,735.6
		Deep-water Flatfish (GOA)	138.3	119.3	157.1	*	*	*	35.9	40.9	134.5	9.8
		Rex Sole (GOA)	*	*	4.7	*	*	148.1	*	188.2	203.5	170.7
		Shallow-water Flatfish (GOA)	2,381.5	1,829.2	2,546.2	1,734.7	1,417.7	1,500.4	1,434.6	2,933.3	1,925.8	1,330.0
	Whole Fish	Flathead Sole	1,482.3	837.7	877.5	1,181.6	1,162.9	771.9	1,066.2	1,116.0	1,781.7	749.0
		Arrowtooth	254.3	117.8	*	277.6	153.6	803.8	*	108.2	358.1	384.8
		Deep-water Flatfish (GOA)	85.7	33.0	*	37.0	32.4	222.9	*	*	*	*
		Rex Sole (GOA)	6,530.8	5,743.1	5,470.3	9,238.6	7,066.9	5,197.9	4,449.6	7,275.0	7,013.0	3,820.2
		Shallow-water Flatfish (GOA)	2,622.9	4,507.8	3,548.3	4,347.9	2,228.7	2,127.4	2,118.9	2,905.1	3,194.0	824.9
	Fillets	Flathead Sole	92.3	41.4	179.4	86.8	*	*	*	*	*	*
		Arrowtooth	*	*	*	*	*	*	*	70.7	*	*
		Deep-water Flatfish (GOA)	*	*	*	*	*	*	*	14.1	38.9	*
		Rex Sole (GOA)	*	*	78.6	*	*	*	*	*	*	*
		Shallow-water Flatfish (GOA)	1,476.3	1,789.0	1,867.5	1,640.1	464.3	332.6	378.4	354.6	219.3	85.8

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Table F5: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Kirimi	Flathead Sole	*	*	*	*	*	*	*	*	*	*
		Arrowtooth	*	*	*	*	*	*	*	*	*	*
		Deep-water Flatfish (GOA)	-	-	-	-	-	*	-	-	-	-
		Rex Sole (GOA)	-	-	-	-	-	-	*	*	-	-
		Shallow-water Flatfish (GOA)	*	*	*	*	*	*	*	*	*	1,123.8
	Other Products	Flathead Sole	*	*	*	*	*	44.8	*	*	*	-
		Arrowtooth	565.9	316.5	*	*	1,889.2	664.1	115.2	89.7	*	*
		Deep-water Flatfish (GOA)	*	*	-	*	-	*	-	-	-	-
		Rex Sole (GOA)	*	*	*	*	*	*	*	*	*	-
		Shallow-water Flatfish (GOA)	3.3	*	*	*	59.2	*	*	*	*	-

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Table F5: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	Head And Gut	Yellowfin (BSAI)	87,574.1	95,631.5	143,029.7	110,265.8	122,477.4	161,218.0	155,032.8	189,064.5	169,065.8	147,107.4
		Rock Sole (BSAI)	20,476.6	21,638.6	33,871.8	28,500.4	42,513.7	47,598.1	58,308.9	58,680.4	42,326.6	46,880.4
		Flathead Sole	15,262.4	15,281.6	23,304.3	17,357.8	18,789.8	9,960.0	7,405.1	15,694.2	15,348.3	9,815.2
		Arrowtooth	5,365.8	3,051.8	16,239.6	26,654.5	39,167.7	23,389.0	25,801.3	15,725.4	15,198.2	10,419.9
		Kamchatka Flounder (BSAI)	-	-	-	-	-	7,094.7	8,188.8	13,412.2	11,755.6	6,159.4
		Turbot (BSAI)	2,253.0	1,890.6	2,700.4	5,322.4	5,020.5	4,979.9	6,436.3	1,716.8	1,663.5	2,634.4
		Flat Other (BSAI)	435.5	933.0	7,553.8	9,534.2	9,398.6	17,826.2	12,362.8	13,704.0	14,704.2	12,636.9
	H&G w/ Roe	Rock Sole (BSAI)	9,995.7	7,849.2	13,576.5	13,216.4	14,446.8	14,652.7	21,385.1	6,345.4	14,705.1	7,098.9
	Whole Fish	Yellowfin (BSAI)	44,425.6	43,310.0	27,620.1	20,570.4	26,612.3	33,965.1	38,637.8	18,594.2	36,868.7	15,819.2
		Rock Sole (BSAI)	1,434.3	704.5	3,031.2	3,696.4	4,705.1	2,389.0	6,839.2	1,304.5	5,595.1	1,027.9
		Flathead Sole	735.1	1,184.7	845.7	966.4	565.1	407.0	493.1	1,192.6	1,516.0	581.2
		Arrowtooth	*	*	*	*	*	*	*	*	538.3	338.5
		Kamchatka Flounder (BSAI)	-	-	-	-	-	-	-	*	-	-
		Turbot (BSAI)	-	-	*	*	-	-	-	-	*	*
		Flat Other (BSAI)	2,499.5	3,737.1	1,957.0	2,349.0	1,214.0	2,085.3	4,346.2	2,373.9	3,618.0	5,317.3

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Table F5: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	Fillets	Yellowfin (BSAI)	-	-	-	-	-	-	*	-	-	-
		Rock Sole (BSAI)	*	*	-	-	-	*	-	*	*	*
		Flathead Sole	-	*	*	-	-	*	*	-	*	*
		Arrowtooth	*	*	-	-	-	*	-	*	-	-
		Flat Other (BSAI)	-	-	*	-	-	*	-	-	-	-
	Kirimi	Yellowfin (BSAI)	*	*	*	*	*	*	-	-	-	-
		Arrowtooth	-	-	*	-	-	-	-	-	-	-
	Fishmeal	Kamchatka Flounder (BSAI)	-	-	-	-	-	4.1	5.6	14.7	18.6	11.8
	Other Products	Yellowfin (BSAI)	1,330.7	1,709.4	1,106.0	972.3	1,957.2	941.9	844.1	872.9	847.0	199.9
		Rock Sole (BSAI)	490.1	224.9	828.9	2,805.5	770.9	2,215.3	1,502.2	1,252.5	847.1	389.7
		Flathead Sole	825.1	987.9	1,039.0	1,209.9	1,143.5	1,057.0	1,109.7	912.2	747.7	824.2
		Arrowtooth	792.9	1,641.2	844.5	1,398.9	926.3	547.0	667.6	397.7	304.4	132.2
		Turbot (BSAI)	855.6	774.5	978.4	2,263.7	2,102.4	1,775.3	2,218.5	525.5	519.3	958.1
		Flat Other (BSAI)	632.1	764.0	303.7	160.9	646.0	381.7	433.8	403.3	231.9	54.4

Notes: These estimates include production from catch of 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 F6: Real first-wholesale value of the processed flatfish off Alaska by area, product, and species, 2006-2015($1,000, base year = 2015).

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Head And Gut	Flathead Sole	1,386.1	1,612.4	1,412.0	1,472.5	1,660.5	1,524.0	1,110.0	1,371.9	691.5	563.6
		Arrowtooth	6,902.3	5,788.8	8,023.6	4,337.7	3,274.1	13,459.7	10,058.3	5,771.2	22,072.6	9,945.4
		Deep-water Flatfish (GOA)	85.6	65.1	92.0	*	*	*	23.2	31.9	94.2	10.7
		Rex Sole (GOA)	*	*	3.0	*	*	191.7	*	261.5	336.8	689.1
		Shallow-water Flatfish (GOA)	1,656.5	1,286.0	1,539.9	1,274.8	822.1	1,002.0	1,040.2	1,818.2	1,070.1	998.6
	Whole Fish	Flathead Sole	466.6	370.7	426.5	474.0	554.3	408.8	662.0	1,220.7	956.7	534.0
		Arrowtooth	74.7	43.8	*	225.8	62.2	523.0	*	68.5	189.3	105.4
		Deep-water Flatfish (GOA)	39.4	7.5	*	17.3	13.0	94.4	*	*	*	*
		Rex Sole (GOA)	6,883.8	5,573.5	5,395.0	8,031.2	6,414.5	5,626.7	4,975.4	7,920.4	6,841.6	3,221.8
		Shallow-water Flatfish (GOA)	1,554.6	2,130.7	2,024.8	1,713.7	1,137.5	1,328.8	1,342.6	3,124.1	1,862.4	885.7
	Fillets	Flathead Sole	179.1	88.3	370.7	212.4	*	*	*	*	*	*
		Arrowtooth	*	*	*	*	*	*	*	123.2	*	*
		Deep-water Flatfish (GOA)	*	*	*	*	*	*	*	24.9	79.5	*
		Rex Sole (GOA)	*	*	138.3	*	*	*	*	*	*	*
		Shallow-water Flatfish (GOA)	3,247.1	4,613.5	4,735.1	4,456.4	735.6	684.0	815.2	573.7	304.9	203.6

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Table F6: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Kirimi	Flathead Sole	*	*	*	*	*	*	*	*	*	*
		Arrowtooth	*	*	*	*	*	*	*	*	*	*
		Deep-water Flatfish (GOA)	-	-	-	-	-	*	-	-	-	-
		Rex Sole (GOA)	-	-	-	-	-	-	*	*	-	-
		Shallow-water Flatfish (GOA)	*	*	*	*	*	*	*	*	*	1,174.1
	Other Products	Flathead Sole	*	*	*	*	*	31.7	*	*	*	-
		Arrowtooth	313.7	250.7	*	*	1,468.3	578.1	108.4	152.1	*	*
		Deep-water Flatfish (GOA)	*	*	-	*	-	*	-	-	-	-
		Rex Sole (GOA)	*	*	*	*	*	*	*	*	*	-
		Shallow-water Flatfish (GOA)	1.3	*	*	*	48.2	*	*	*	*	-

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Table F6: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	Head And Gut	Yellowfin (BSAI)	58,201.9	64,949.4	86,669.2	54,820.9	66,122.6	104,941.4	97,435.9	95,725.3	76,871.5	71,193.5
		Rock Sole (BSAI)	14,551.7	15,817.6	21,096.3	14,597.0	23,901.9	33,013.9	46,881.7	31,717.0	18,855.0	23,099.1
		Flathead Sole	15,503.5	13,738.1	18,410.6	10,480.1	12,921.6	8,974.1	6,906.3	13,367.3	10,788.9	6,188.6
		Arrowtooth	3,275.0	1,655.5	10,322.6	12,752.4	18,912.2	17,014.6	21,983.7	9,883.7	12,514.3	7,707.6
		Kamchatka Flounder (BSAI)	-	-	-	-	-	4,997.1	8,206.0	7,413.7	8,697.5	4,111.1
		Turbot (BSAI)	3,920.2	2,469.2	3,884.7	7,450.1	9,033.3	13,183.4	13,474.3	3,348.7	3,636.2	5,661.9
		Flat Other (BSAI)	215.3	740.4	3,260.5	4,205.6	4,316.1	9,007.7	7,137.8	6,765.7	7,217.2	5,750.2
	H&G w/ Roe	Rock Sole (BSAI)	15,383.7	9,695.7	16,702.0	11,750.2	12,181.1	15,358.5	27,337.3	5,422.7	12,557.5	6,322.7
	Whole Fish	Yellowfin (BSAI)	22,532.8	21,925.0	13,521.6	9,970.1	10,970.8	18,740.9	24,188.7	24,872.6	17,083.3	7,039.6
		Rock Sole (BSAI)	786.4	310.8	1,256.9	1,401.8	1,674.3	1,487.4	4,488.3	657.8	2,956.4	516.5
		Flathead Sole	322.5	437.9	323.6	373.3	244.6	457.7	373.6	1,591.2	868.9	260.3
		Arrowtooth	*	*	*	*	*	*	*	*	239.9	100.4
		Kamchatka Flounder (BSAI)	-	-	-	-	-	-	-	*	-	-
		Turbot (BSAI)	-	-	*	*	-	-	-	-	*	*
		Flat Other (BSAI)	2,372.0	3,711.6	2,047.9	2,307.6	1,046.7	2,279.5	3,867.6	2,163.6	2,464.3	2,684.4

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Table F6: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	Fillets	Yellowfin (BSAI)	-	-	-	-	-	-	*	-	-	-
		Rock Sole (BSAI)	*	*	-	-	-	*	-	*	*	*
		Flathead Sole	-	*	*	-	-	*	*	-	*	*
		Arrowtooth	*	*	-	-	-	*	-	*	-	-
		Flat Other (BSAI)	-	-	*	-	-	*	-	-	-	-
	Kirimi	Yellowfin (BSAI)	*	*	*	*	*	*	-	-	-	-
		Arrowtooth	-	-	*	-	-	-	-	-	-	-
	Fishmeal	Kamchatka Flounder (BSAI)	-	-	-	-	-	3.1	3.7	19.1	17.2	11.1
	Other Products	Yellowfin (BSAI)	630.4	948.4	771.5	665.1	1,878.6	801.6	737.4	1,131.4	767.1	201.3
		Rock Sole (BSAI)	142.9	104.1	425.8	1,190.5	505.2	1,747.7	848.1	1,587.0	780.0	339.4
		Flathead Sole	241.8	432.9	424.0	509.7	824.8	836.7	647.4	1,215.6	695.1	718.1
		Arrowtooth	230.2	645.2	123.0	539.9	535.9	417.6	264.5	511.5	280.6	115.0
		Turbot (BSAI)	1,134.0	977.8	1,481.1	3,383.4	3,356.7	3,366.4	3,507.6	821.7	978.3	1,722.8
		Flat Other (BSAI)	192.1	414.8	174.3	88.8	606.5	316.4	329.3	510.4	210.9	47.5

Notes: These estimates include the value of products from catch of both federal and state of Alaska fisheries. The data have been adjusted to 2015 dollars by applying the GDP deflator from the Bureau of Labor Statistics.

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 F7: First-wholesale prices of processed flatfish off Alaska by area, product, and species, 2006-2015 ($/lb, product weight).

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Head And Gut	Flathead Sole	0.85	0.75	0.72	0.64	0.71	0.77	0.86	0.76	0.69	0.63
		Arrowtooth	0.53	0.51	0.50	0.44	0.36	0.59	0.63	0.41	0.64	0.59
		Deep-water Flatfish (GOA)	0.62	0.55	0.59	*	*	*	0.65	0.78	0.70	1.09
		Rex Sole (GOA)	*	*	0.63	*	*	1.29	*	1.39	1.66	4.04
		Shallow-water Flatfish (GOA)	0.70	0.70	0.60	0.74	0.58	0.67	0.72	0.62	0.56	0.75
	Whole Fish	Flathead Sole	0.32	0.44	0.49	0.40	0.48	0.53	0.62	1.09	0.54	0.71
		Arrowtooth	0.29	0.37	*	0.81	0.40	0.65	*	0.63	0.53	0.27
		Deep-water Flatfish (GOA)	0.46	0.23	*	0.47	0.40	0.42	*	*	*	*
		Rex Sole (GOA)	1.05	0.97	0.99	0.87	0.91	1.08	1.12	1.09	0.98	0.84
		Shallow-water Flatfish (GOA)	0.59	0.47	0.57	0.39	0.51	0.62	0.63	1.07	0.58	1.07
	Fillets	Flathead Sole	1.94	2.13	2.07	2.45	*	*	*	*	*	*
		Arrowtooth	*	*	*	*	*	*	*	1.74	*	*
		Deep-water Flatfish (GOA)	*	*	*	*	*	*	*	1.76	2.04	*
		Rex Sole (GOA)	*	*	1.76	*	*	*	*	*	*	*
		Shallow-water Flatfish (GOA)	2.20	2.58	2.54	2.72	1.58	2.06	2.15	1.62	1.39	2.37

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Table F7: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Kirimi	Flathead Sole	*	*	*	*	*	*	*	*	*	*
		Arrowtooth	*	*	*	*	*	*	*	*	*	*
		Deep-water Flatfish (GOA)	-	-	-	-	-	*	-	-	-	-
		Rex Sole (GOA)	-	-	-	-	-	-	*	*	-	-
		Shallow-water Flatfish (GOA)	*	*	*	*	*	*	*	*	*	1.04
	Other Products	Flathead Sole	*	*	*	*	*	0.71	*	*	*	-
		Arrowtooth	0.55	0.79	*	*	0.78	0.87	0.94	1.70	*	*
		Deep-water Flatfish (GOA)	*	*	-	*	-	*	-	-	-	-
		Rex Sole (GOA)	*	*	*	*	*	*	*	*	*	-
		Shallow-water Flatfish (GOA)	0.38	*	*	*	0.81	*	*	*	*	-

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Table F7: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	Head And Gut	Yellowfin (BSAI)	0.66	0.68	0.61	0.50	0.54	0.65	0.63	0.51	0.46	0.48
		Rock Sole (BSAI)	0.71	0.73	0.62	0.51	0.56	0.69	0.80	0.54	0.44	0.49
		Flathead Sole	1.02	0.90	0.79	0.60	0.69	0.90	0.93	0.85	0.70	0.63
		Arrowtooth	0.61	0.54	0.64	0.48	0.48	0.73	0.85	0.63	0.82	0.74
		Kamchatka Flounder (BSAI)	-	-	-	-	-	0.70	1.00	0.55	0.74	0.67
		Turbot (BSAI)	1.74	1.31	1.44	1.40	1.80	2.65	2.09	1.95	2.19	2.15
		Flat Other (BSAI)	0.49	0.79	0.43	0.44	0.46	0.50	0.58	0.49	0.49	0.46
	H&G w/ Roe	Rock Sole (BSAI)	1.54	1.24	1.23	0.89	0.84	1.05	1.28	0.86	0.85	0.89
	Whole Fish	Yellowfin (BSAI)	0.51	0.51	0.49	0.48	0.41	0.55	0.63	1.34	0.46	0.44
		Rock Sole (BSAI)	0.55	0.44	0.42	0.38	0.36	0.62	0.66	0.50	0.53	0.50
		Flathead Sole	0.44	0.37	0.38	0.39	0.43	1.12	0.76	1.33	0.57	0.45
		Arrowtooth	*	*	*	*	*	*	*	*	0.45	0.30
		Kamchatka Flounder (BSAI)	-	-	-	-	-	-	-	*	-	-
		Turbot (BSAI)	-	-	*	*	-	-	-	-	*	*
		Flat Other (BSAI)	0.95	0.99	1.05	0.98	0.86	1.09	0.89	0.91	0.68	0.50

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Table F7: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	Fillets	Yellowfin (BSAI)	-	-	-	-	-	-	*	-	-	-
		Rock Sole (BSAI)	*	*	-	-	-	*	-	*	*	*
		Flathead Sole	-	*	*	-	-	*	*	-	*	*
		Arrowtooth	*	*	-	-	-	*	-	*	-	-
		Flat Other (BSAI)	-	-	*	-	-	*	-	-	-	-
	Kirimi	Yellowfin (BSAI)	*	*	*	*	*	*	-	-	-	-
		Arrowtooth	-	-	*	-	-	-	-	-	-	-
	Fishmeal	Kamchatka Flounder (BSAI)	-	-	-	-	-	0.75	0.66	1.29	0.92	0.94
	Other Products	Yellowfin (BSAI)	0.47	0.56	0.70	0.68	0.96	0.85	0.87	1.30	0.91	1.01
		Rock Sole (BSAI)	0.29	0.46	0.51	0.42	0.66	0.79	0.56	1.27	0.92	0.87
		Flathead Sole	0.29	0.44	0.41	0.42	0.72	0.79	0.58	1.33	0.93	0.87
		Arrowtooth	0.29	0.39	0.15	0.39	0.58	0.76	0.40	1.29	0.92	0.87
		Turbot (BSAI)	1.32	1.26	1.51	1.50	1.60	1.90	1.58	1.56	1.88	1.80
		Flat Other (BSAI)	0.30	0.54	0.57	0.55	0.94	0.83	0.76	1.27	0.91	0.87

Notes: These estimates are based on data from both federal and state of Alaska fisheries. Prices based on confidential data have been excluded. "*" 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 F8: Number of processors that processed flatfish off Alaska by area, product, and species, 2006-2015.

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Head And Gut	Flathead Sole	15	19	15	17	13	13	15	12	13	9
		Arrowtooth	31	28	27	24	16	25	27	19	18	15
		Deep-water Flatfish (GOA)	6	10	8	3	3	3	6	7	6	4
		Rex Sole (GOA)	2	3	5	3	3	4	3	4	5	4
		Shallow-water Flatfish (GOA)	11	18	18	16	16	16	18	14	14	11
	Whole Fish	Flathead Sole	9	7	6	10	10	7	9	9	9	6
		Arrowtooth	4	4	3	5	5	6	3	5	6	4
		Deep-water Flatfish (GOA)	6	8	3	4	4	4	3	3	3	2
		Rex Sole (GOA)	21	24	21	24	22	26	23	19	17	14
		Shallow-water Flatfish (GOA)	9	7	9	9	8	11	9	6	9	5
	Fillets	Flathead Sole	4	4	4	4	3	3	3	3	3	2
		Arrowtooth	3	1	1	2	2	2	2	5	2	1
		Deep-water Flatfish (GOA)	1	3	3	3	3	3	2	5	4	2
		Rex Sole (GOA)	2	1	4	2	2	3	2	3	1	2
		Shallow-water Flatfish (GOA)	5	6	6	8	6	6	6	6	6	8

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Table F8: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Kirimi	Flathead Sole	1	1	1	1	2	2	2	1	3	3
		Arrowtooth	2	2	1	1	1	2	1	1	1	1
		Deep-water Flatfish (GOA)	-	-	-	-	-	1	-	-	-	-
		Rex Sole (GOA)	-	-	-	-	-	-	1	1	-	-
		Shallow-water Flatfish (GOA)	1	1	1	1	2	2	2	1	2	4
	Other Products	Flathead Sole	3	3	3	2	2	5	1	2	1	-
		Arrowtooth	4	5	2	2	5	6	5	4	2	3
		Deep-water Flatfish (GOA)	1	1	-	1	-	1	-	-	-	-
		Rex Sole (GOA)	2	2	1	1	2	3	1	1	1	-
		Shallow-water Flatfish (GOA)	4	1	2	1	4	3	1	2	2	-

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Table F8: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	Head And Gut	Yellowfin (BSAI)	24	25	27	26	23	24	21	20	24	21
		Rock Sole (BSAI)	25	23	23	24	23	21	22	20	22	20
		Flathead Sole	28	27	26	23	26	21	22	20	25	22
		Arrowtooth	49	44	41	40	36	35	37	34	32	33
		Kamchatka Flounder (BSAI)	-	-	-	-	-	12	10	12	9	12
		Turbot (BSAI)	46	43	36	42	38	42	35	23	24	23
		Flat Other (BSAI)	11	16	25	21	20	22	20	19	20	20
	H&G w/ Roe	Rock Sole (BSAI)	21	22	21	20	18	18	17	14	18	18
	Whole Fish	Yellowfin (BSAI)	17	18	26	25	17	23	22	15	17	13
		Rock Sole (BSAI)	7	11	20	18	19	19	18	9	17	12
		Flathead Sole	4	8	15	15	13	11	15	9	12	13
		Arrowtooth	2	2	3	2	1	1	2	2	5	4
		Kamchatka Flounder (BSAI)	-	-	-	-	-	-	-	1	-	-
		Turbot (BSAI)	-	-	1	2	-	-	-	-	1	1
		Flat Other (BSAI)	26	31	27	29	26	29	29	28	26	24

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Table F8: Continued

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BSAI	Fillets	Yellowfin (BSAI)	-	-	-	-	-	-	1	-	-	-
		Rock Sole (BSAI)	1	1	-	-	-	1	-	1	3	3
		Flathead Sole	-	1	2	-	-	1	2	-	2	3
		Arrowtooth	1	1	-	-	-	1	-	1	-	-
		Flat Other (BSAI)	-	-	1	-	-	1	-	-	-	-
	Kirimi	Yellowfin (BSAI)	1	1	2	1	1	1	-	-	-	-
		Arrowtooth	-	-	1	-	-	-	-	-	-	-
	Fishmeal	Kamchatka Flounder (BSAI)	-	-	-	-	-	5	10	9	10	10
	Other Products	Yellowfin (BSAI)	13	13	14	13	13	13	13	14	14	14
		Rock Sole (BSAI)	12	13	13	12	14	13	14	14	14	14
		Flathead Sole	12	13	13	12	14	13	14	14	14	14
		Arrowtooth	12	13	14	15	14	14	14	14	15	14
		Turbot (BSAI)	29	25	26	30	37	38	34	27	30	31
		Flat Other (BSAI)	12	13	13	12	14	13	15	14	14	14

Notes: These estimates are based on data from both federal and state of Alaska fisheries. Based on federal permit files.

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 R1: Rockfish retained catch off Alaska by area, gear, and species, 2006-2015 (100 metric tons, round weight).

Area	Gear	Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	FIX	Northern	0.02	0.01	0.01	0.00	0.00	*	*	0.00	0.00	*
		Other	3.03	3.38	3.56	3.45	3.08	2.46	2.84	3.02	1.67	2.06
		POP	0.01	0.00	*	*	0.00	0.00	*	*	0.00	0.00
		Rougheye	1.45	1.34	1.36	1.03	1.14	1.11	1.24	1.17	1.00	1.07
		Shortraker	1.71	1.59	1.93	1.51	1.53	1.23	1.67	1.34	1.25	1.25
		Dusky	0.19	0.35	0.19	0.11	0.10	0.14	0.12	0.25	0.19	0.27
		Thornyhead	3.87	3.70	3.30	3.20	3.15	3.23	4.25	4.85	4.69	4.75
	TWL	Northern	45.03	40.83	38.69	38.30	38.42	33.10	49.49	46.79	41.13	37.64
		Other	2.37	3.08	2.23	2.97	2.66	3.06	4.17	1.71	5.13	4.15
		POP	125.27	124.71	119.48	120.98	149.68	132.88	141.95	121.78	159.88	180.14
		Rougheye	1.19	1.42	1.40	1.21	2.31	3.42	3.56	3.26	5.10	3.08
		Shortraker	3.40	3.46	2.91	2.49	1.72	3.05	3.01	2.73	3.17	2.63
		Dusky	22.51	32.58	35.67	29.89	29.82	24.44	38.39	29.69	29.46	26.07
		Thornyhead	2.97	3.68	3.18	2.52	1.79	2.14	1.41	1.99	4.61	3.17
BSAI	FIX	Northern	0.01	0.00	*	0.11	0.67	0.01	0.05	0.03	0.02	0.01
		Other	1.67	1.28	1.21	1.67	1.91	1.48	1.71	1.42	1.17	1.02
		POP	*	0.04	*	0.00	0.01	0.01	0.01	0.00	0.03	0.01
		Rougheye	0.09	0.23	0.28	0.21	0.28	0.09	0.22	0.04	0.01	0.05
		Shortraker	0.49	0.30	0.24	0.37	0.72	0.36	0.33	0.12	0.13	0.18
	TWL	Northern	10.74	8.73	15.31	19.71	32.87	26.08	20.55	18.13	21.88	67.43
		Other	2.00	2.27	2.91	2.59	3.85	6.01	6.02	4.66	5.98	4.28
		POP	106.20	155.55	169.58	144.74	173.35	232.68	233.51	308.08	313.80	300.15
		Rougheye	1.63	1.11	1.21	1.44	1.64	1.35	1.45	2.59	1.74	1.50
		Shortraker	0.81	1.32	0.78	0.99	1.57	2.63	2.57	2.49	0.93	0.94

Notes: These estimates include only catch counted against federal TACs. TWL is the trawl gear type and FIX is the fixed gear type. “*” 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 R2: Real ex-vessel value of the catch rockfish off Alaska by area, gear, and species, 2006-2015; calculations based on COAR ($1,000, base year = 2015).

Area	Gear	Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	FIX	Northern	2.5	1.7	0.3	0.2	0.3	*	*	0.0	0.2	*
		Other	599.4	670.8	762.8	677.0	562.3	526.3	818.1	781.7	449.7	478.8
		POP	1.6	0.5	*	*	0.1	0.3	*	*	0.1	0.0
		Rougheye	120.7	115.9	102.5	84.0	91.2	91.8	117.5	93.6	87.7	97.0
		Shortraker	138.8	125.7	166.1	116.4	118.7	106.5	185.1	131.3	138.5	126.2
		Dusky	16.4	18.9	13.4	6.7	5.9	10.2	11.3	19.6	19.0	22.1
		Thornyhead	779.2	756.4	695.4	615.0	615.8	649.8	859.3	1,037.5	882.4	870.8
	TWL	Northern	1,559.8	1,446.9	1,482.9	733.5	1,010.1	1,079.3	2,873.5	2,087.0	1,595.2	1,472.4
		Other	83.0	112.3	86.8	63.2	75.5	100.2	242.0	77.1	185.8	156.9
		POP	4,394.5	4,558.9	4,344.2	2,194.9	4,013.4	4,579.9	8,316.8	5,583.7	6,423.9	7,432.6
		Rougheye	50.2	59.2	56.4	32.6	68.1	120.6	201.6	151.4	209.5	127.1
		Shortraker	129.6	128.1	119.6	56.8	53.5	110.8	173.7	126.5	129.9	107.7
		Dusky	775.8	1,162.5	1,380.7	779.5	836.5	824.6	2,227.2	1,313.0	1,154.3	1,031.5
		Thornyhead	162.1	195.5	186.6	111.3	116.4	138.0	132.0	157.2	385.2	228.4
BSAI	FIX	Northern	0.8	0.2	*	22.0	133.5	2.0	7.6	7.1	2.1	2.7
		Other	269.4	178.6	221.4	341.8	384.2	244.3	261.9	311.2	167.1	187.4
		POP	*	5.3	*	0.4	1.3	1.9	1.1	0.8	4.5	1.4
		Rougheye	13.1	30.1	44.9	40.7	53.8	6.7	29.6	6.7	0.9	9.7
		Shortraker	74.4	41.0	39.2	72.1	139.2	55.4	49.5	24.0	15.9	32.7
	TWL	Northern	392.5	440.4	412.0	546.5	1,270.8	1,676.2	1,038.8	555.1	861.3	2,217.9
		Other	157.7	180.6	273.9	150.7	344.1	631.5	528.5	444.5	653.3	285.5
		POP	6,153.5	6,838.4	6,346.5	5,600.4	8,881.9	17,874.8	14,934.7	14,303.6	16,497.2	13,837.0
		Rougheye	92.8	47.0	60.2	84.3	90.8	85.2	88.5	117.5	80.1	65.3
		Shortraker	72.2	47.5	77.0	71.9	141.5	327.0	279.5	216.9	74.9	62.1

Notes: These estimates include the value of catch from both federal and state of Alaska fisheries. The data have been adjusted to 2015 dollars by applying the GDP deflator from the Bureau of Labor Statistics. TWL is the trawl gear type and FIX is the fixed gear type.

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 R3: Ex-vessel prices of rockfish off Alaska by area, gear, and species, 2006-2015; calculations based on COAR ($/lb, round weight).

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	FIX	Northern	0.70	0.70	0.21	0.30	0.50	*	*	0.36	0.26	*
		Other	0.90	0.90	0.97	0.89	0.83	0.97	1.30	1.17	1.22	1.06
		POP	0.60	0.71	*	*	0.67	0.50	*	*	0.64	0.19
		Rougheye	0.38	0.39	0.34	0.37	0.36	0.37	0.43	0.36	0.40	0.41
		Shortraker	0.37	0.36	0.39	0.35	0.35	0.39	0.50	0.44	0.50	0.46
		Dusky	0.40	0.24	0.33	0.29	0.27	0.32	0.42	0.36	0.44	0.37
		Thornyhead	0.91	0.93	0.96	0.87	0.89	0.91	0.92	0.97	0.85	0.83
	TWL	Northern	0.16	0.16	0.17	0.09	0.12	0.15	0.26	0.20	0.18	0.18
		Other	0.16	0.16	0.18	0.10	0.13	0.15	0.26	0.20	0.16	0.17
		POP	0.16	0.17	0.16	0.08	0.12	0.16	0.27	0.21	0.18	0.19
		Rougheye	0.19	0.19	0.18	0.12	0.13	0.16	0.26	0.21	0.19	0.19
		Shortraker	0.17	0.17	0.19	0.10	0.14	0.16	0.26	0.21	0.19	0.19
		Dusky	0.16	0.16	0.18	0.12	0.13	0.15	0.26	0.20	0.18	0.18
		Thornyhead	0.25	0.24	0.27	0.20	0.30	0.29	0.43	0.36	0.38	0.33
BSAI	FIX	Northern	0.72	0.32	*	0.92	0.90	0.74	0.69	0.97	0.63	0.83
		Other	0.73	0.63	0.83	0.93	0.91	0.75	0.69	0.99	0.65	0.83
		POP	*	0.63	*	0.92	0.90	0.74	0.69	0.98	0.63	0.69
		Rougheye	0.68	0.60	0.73	0.88	0.88	0.35	0.62	0.82	0.48	0.83
		Shortraker	0.69	0.61	0.75	0.89	0.88	0.71	0.67	0.91	0.54	0.83
	TWL	Northern	0.17	0.23	0.12	0.13	0.18	0.29	0.23	0.14	0.18	0.15
		Other	0.36	0.36	0.43	0.26	0.41	0.48	0.40	0.43	0.50	0.30
		POP	0.26	0.20	0.17	0.18	0.23	0.35	0.29	0.21	0.24	0.21
		Rougheye	0.26	0.19	0.23	0.27	0.25	0.29	0.28	0.21	0.21	0.20
		Shortraker	0.40	0.16	0.45	0.33	0.41	0.56	0.49	0.40	0.36	0.30

Notes: 1) Prices are for catch from both federal and state of Alaska fisheries.
3) Trawl-caught rockfish in the BSAI and trawl-caught are not well represented by on-shore landings. A price was calculated for these categories from product-report prices; the price in this case is the value of the product divided by the calculated round weight and multiplied by a constant 0.4 to correct for value added by processing.
4) The "All Alaska/All gear" column is the weighted average of the other columns.
TWL is the trawl gear type and FIX is the fixed gear type. "*" 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 R4: Number of vessels that caught rockfish off Alaska by area, gear, and species, 2006-2015.

		Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	FIX	Northern	6	5	4	4	6	2	2	5	8	2
		Other	66	66	61	64	57	63	50	50	54	48
		POP	5	4	2	3	5	5	3	3	4	4
		Rougheye	49	48	46	41	37	38	40	37	34	33
		Shortraker	43	47	41	37	37	39	33	34	32	28
		Dusky	24	27	25	25	23	25	28	26	24	27
		Thornyhead	56	51	46	47	42	44	42	42	38	38
	TWL	Northern	17	19	21	24	24	26	24	25	22	19
		Other	15	16	18	23	23	24	25	22	20	16
		POP	21	24	25	28	30	30	30	26	23	20
		Rougheye	18	20	19	25	27	25	26	18	21	18
		Shortraker	19	14	17	21	23	24	22	16	19	14
		Dusky	21	23	23	25	27	26	27	24	20	17
		Thornyhead	21	22	20	25	28	25	25	18	19	16
BSAI	FIX	Northern	8	10	2	6	9	9	8	12	12	12
		Other	32	24	24	26	41	36	28	27	27	27
		POP	2	6	3	6	10	10	7	9	14	12
		Rougheye	17	15	14	14	27	14	17	18	13	14
		Shortraker	16	19	20	24	30	22	22	18	20	13
	TWL	Northern	32	34	26	30	29	37	31	29	30	34
		Other	36	40	40	34	33	42	41	34	32	38
		POP	42	42	40	40	38	43	41	39	38	41
		Rougheye	23	26	24	20	19	26	25	18	25	26
		Shortraker	23	29	27	23	21	31	26	18	23	28

Notes: These estimates include only vessels fishing federal TACs. Based on federal permit files. TWL is the trawl gear type and FIX is the fixed gear type.

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 R5: Rockfish first-wholesale production off Alaska by area, product, and species, 2006-2015 (1000 pounds, product weight).

		Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Northern	Whole Fish	896.65	*	180.17	217.65	618.56	*	*	173.14	694.71	*
		Head And Gut	4,451.72	3,573.35	3,913.16	3,754.17	3,886.95	3,850.43	5,098.92	4,836.73	4,060.14	3,849.23
		Other Products	174.10	235.39	56.91	584.27	309.88	44.04	238.59	156.86	55.72	*
	Other	Whole Fish	435.94	558.33	558.01	529.48	393.74	361.38	472.39	548.78	308.00	341.43
		Head And Gut	60.14	63.58	155.21	120.87	98.61	219.45	170.28	79.73	133.79	348.60
		Other Products	28.97	48.55	31.33	35.46	47.96	218.50	51.49	109.13	97.25	59.43
	POP	Whole Fish	2,631.09	840.89	1,204.04	2,057.13	4,940.50	5,203.09	2,740.77	5,434.83	6,065.49	6,894.59
		Head And Gut	11,788.23	10,957.16	10,990.05	11,199.94	13,361.48	11,991.26	13,196.15	10,430.69	13,909.57	15,341.73
		Other Products	301.07	1,416.91	1,278.84	234.67	422.17	164.78	457.43	168.88	195.45	120.19
	Rougheye	Whole Fish	81.25	87.10	54.26	43.18	34.02	41.03	33.13	53.55	48.96	21.07
		Head And Gut	159.78	177.72	146.64	169.33	229.08	391.84	373.25	343.82	542.66	325.31
		Other Products	35.29	45.73	61.18	31.55	45.46	36.01	34.49	32.03	28.73	49.91
	Shortraker	Whole Fish	77.41	85.22	128.06	100.24	75.92	62.30	94.99	105.85	68.36	58.88
		Head And Gut	304.21	291.64	313.72	269.49	261.59	308.03	366.33	304.74	464.83	319.05
		Other Products	55.90	62.20	65.15	46.31	41.53	89.27	52.53	51.48	53.28	57.18
	Dusky	Whole Fish	708.97	777.84	637.10	1,235.53	778.16	159.97	288.18	737.23	576.87	603.30
		Head And Gut	1,933.34	2,061.94	2,602.52	2,008.05	2,301.16	2,522.95	3,322.21	2,527.36	2,532.93	2,256.35
		Other Products	205.25	372.51	270.94	94.07	218.97	228.55	468.61	254.69	336.86	257.49

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Table R5: Continued

		Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Thornyhead	Whole Fish	629.98	857.38	666.05	487.61	265.81	353.83	246.32	239.54	622.53	512.03
		Head And Gut	355.98	378.19	314.66	309.68	364.56	352.00	405.26	506.22	561.06	478.47
		Other Products	3.20	19.70	4.59	8.40	40.98	67.94	75.54	9.85	34.93	133.26
BSAI	Northern	Whole Fish	164.89	*	*	-	*	6.57	*	*	4.51	*
		Head And Gut	988.46	698.88	1,316.35	1,664.03	3,441.15	2,768.41	2,162.38	1,664.77	2,690.48	7,914.13
		Other Products	30.47	9.18	1.89	3.03	4.05	3.77	22.56	9.14	30.95	21.83
	Other	Whole Fish	81.53	125.26	202.23	214.72	302.49	482.00	241.96	560.15	542.81	218.05
		Head And Gut	310.68	273.44	261.21	419.89	443.44	592.44	656.52	307.78	444.49	407.20
		Other Products	31.76	34.64	16.99	9.88	10.15	6.26	9.42	9.08	13.60	6.76
	POP	Whole Fish	1,595.99	*	158.78	894.02	291.28	952.35	2,542.31	502.16	471.44	809.33
		Head And Gut	10,982.92	15,724.23	18,857.99	15,383.83	19,666.04	25,848.70	23,791.32	33,638.98	35,162.75	32,849.86
		Other Products	105.05	199.30	15.19	37.75	38.16	69.65	101.44	61.62	113.39	353.13
	Rougheye	Whole Fish	*	*	*	-	-	*	*	-	-	*
		Head And Gut	143.94	129.66	275.89	179.24	177.04	109.61	153.77	206.34	182.68	129.46
		Other Products	*	46.24	1.36	*	*	0.62	4.30	*	2.27	0.52
	Shortraker	Whole Fish	*	*	*	-	*	-	*	-	*	*
		Head And Gut	88.96	199.60	78.38	95.74	200.99	245.82	251.47	225.85	94.75	68.55
		Other Products	5.55	24.94	4.05	2.67	12.06	17.92	12.99	10.32	1.96	7.59

Notes: These estimates include production from catch of 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 R6: Real first-wholesale value of the catch of rockfish off Alaska by area, product, and species, 2006-2015 ($1,000, base year = 2015).

		Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Northern	Whole Fish	596.1	*	107.2	110.8	339.4	*	*	123.3	413.2	*
		Head And Gut	4,949.0	2,764.3	3,012.7	2,701.2	3,763.9	6,079.9	6,446.2	3,935.4	4,476.0	3,736.6
		Other Products	256.7	474.4	82.1	1,414.3	527.4	92.1	967.6	407.6	113.2	*
	Other	Whole Fish	777.8	926.4	875.0	1,072.0	731.1	700.5	1,065.4	1,361.5	741.0	748.6
		Head And Gut	73.6	80.9	174.9	125.3	129.7	271.4	151.7	104.4	112.5	640.9
		Other Products	83.8	134.4	66.3	96.1	138.1	730.5	170.1	441.9	326.2	234.9
	POP	Whole Fish	1,997.5	582.1	764.7	1,048.4	3,956.5	4,537.1	2,341.3	3,406.5	3,660.0	4,980.0
		Head And Gut	14,343.2	9,084.1	9,590.1	10,018.3	15,322.1	20,387.9	19,932.4	11,131.8	15,673.2	16,252.0
		Other Products	539.7	2,659.4	1,808.0	487.2	697.1	444.2	1,804.8	493.4	383.9	284.0
	Rougheye	Whole Fish	54.7	85.3	51.2	43.6	24.6	40.3	33.1	52.3	55.9	17.3
		Head And Gut	229.9	175.7	188.9	259.8	323.6	495.1	490.5	538.9	469.8	259.8
		Other Products	94.5	120.8	97.8	87.9	140.6	108.5	121.1	115.4	108.5	155.7
	Shortraker	Whole Fish	87.7	97.7	113.5	90.6	55.2	69.3	116.2	132.8	98.9	61.1
		Head And Gut	516.4	392.0	572.3	448.1	490.3	693.1	702.3	451.6	827.6	494.6
		Other Products	132.7	156.0	151.5	126.5	119.7	178.2	146.4	158.9	190.6	218.4
	Dusky	Whole Fish	466.5	534.6	348.1	654.9	442.1	215.8	189.3	918.2	378.1	643.1
		Head And Gut	2,098.5	1,717.0	2,091.4	1,644.6	1,826.7	3,722.0	4,105.9	1,727.6	2,771.9	2,577.9
		Other Products	383.5	709.3	415.5	197.5	435.5	657.0	1,750.7	613.2	546.3	508.5

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Table R6: Continued

		Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Thornyhead	Whole Fish	1,122.3	1,205.6	961.3	781.4	441.3	705.0	377.8	330.8	1,115.2	799.7
		Head And Gut	1,262.5	1,105.5	906.9	870.7	1,046.2	1,247.4	1,465.0	1,712.3	1,596.6	1,442.5
		Other Products	6.0	29.7	6.6	11.3	40.9	64.2	75.3	19.0	19.2	134.4
BSAI	Northern	Whole Fish	96.8	*	*	-	*	6.3	*	*	4.1	*
		Head And Gut	809.4	808.7	802.2	1,043.4	3,051.1	4,044.4	2,459.3	1,160.1	2,482.1	5,925.3
		Other Products	8.3	3.4	0.1	1.1	2.3	4.1	12.3	9.0	24.8	19.0
	Other	Whole Fish	182.3	244.5	423.5	424.0	623.7	1,015.9	523.4	825.6	1,117.5	371.1
		Head And Gut	726.7	513.5	466.9	651.1	846.4	1,206.0	1,221.5	549.0	544.3	558.4
		Other Products	14.1	30.8	15.5	7.6	10.8	13.5	3.3	27.6	7.3	8.8
	POP	Whole Fish	1,366.3	*	111.6	464.3	214.1	929.6	1,927.2	296.9	258.8	454.6
		Head And Gut	14,421.2	15,659.7	15,821.6	13,427.7	22,981.1	45,042.5	34,861.8	36,076.2	42,234.4	34,897.6
		Other Products	30.5	74.0	2.1	14.1	21.3	75.2	83.8	59.5	90.8	307.2
	Rougheye	Whole Fish	*	*	*	-	-	*	*	-	-	*
		Head And Gut	205.0	123.3	313.2	242.7	233.3	163.9	205.4	215.3	190.1	121.2
		Other Products	*	17.2	0.1	*	*	1.4	3.4	*	1.8	0.5
	Shortraker	Whole Fish	*	*	*	-	*	-	*	-	*	*
		Head And Gut	190.1	369.8	179.5	181.6	388.2	623.3	566.5	426.8	169.1	97.8
		Other Products	4.6	12.6	4.0	2.4	20.9	45.3	18.4	14.8	1.8	7.6

Notes: These estimates include the value of products from catch of both federal and state of Alaska fisheries. The data have been adjusted to 2015 dollars by applying the GDP deflator from the Bureau of Labor Statistics.

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 R7: First-wholesale prices of rockfish off Alaska by area, product, and species, 2006-2015 ($/lb, product weight).

		Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Northern	Whole Fish	0.66	*	0.60	0.51	0.55	*	*	0.71	0.60	*
		Head And Gut	1.11	0.77	0.77	0.72	0.97	1.58	1.26	0.81	1.10	0.97
		Other Products	1.47	2.02	1.44	2.42	1.70	2.09	4.06	2.60	2.03	*
	Other	Whole Fish	1.78	1.66	1.57	2.02	1.86	1.94	2.25	2.48	2.41	2.19
		Head And Gut	1.22	1.27	1.13	1.04	1.31	1.24	0.89	1.31	0.84	1.84
		Other Products	2.89	2.77	2.12	2.71	2.88	3.34	3.30	4.05	3.35	3.95
	POP	Whole Fish	0.76	0.69	0.64	0.51	0.80	0.87	0.85	0.63	0.60	0.72
		Head And Gut	1.22	0.83	0.87	0.89	1.15	1.70	1.51	1.07	1.13	1.06
		Other Products	1.79	1.88	1.41	2.08	1.65	2.70	3.95	2.92	1.96	2.36
	Rougheye	Whole Fish	0.67	0.98	0.94	1.01	0.72	0.98	1.00	0.98	1.14	0.82
		Head And Gut	1.44	0.99	1.29	1.53	1.41	1.26	1.31	1.57	0.87	0.80
		Other Products	2.68	2.64	1.60	2.79	3.09	3.01	3.51	3.60	3.78	3.12
	Shortraker	Whole Fish	1.13	1.15	0.89	0.90	0.73	1.11	1.22	1.25	1.45	1.04
		Head And Gut	1.70	1.34	1.82	1.66	1.87	2.25	1.92	1.48	1.78	1.55
		Other Products	2.37	2.51	2.33	2.73	2.88	2.00	2.79	3.09	3.58	3.82
	Dusky	Whole Fish	0.66	0.69	0.55	0.53	0.57	1.35	0.66	1.25	0.66	1.07
		Head And Gut	1.08	0.83	0.80	0.82	0.79	1.48	1.24	0.68	1.09	1.14
		Other Products	1.87	1.90	1.53	2.10	1.99	2.88	3.74	2.41	1.62	1.98

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Table R7: Continued

		Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Thornyhead	Whole Fish	1.78	1.41	1.44	1.60	1.66	1.99	1.53	1.38	1.79	1.56
		Head And Gut	3.55	2.92	2.88	2.81	2.87	3.54	3.62	3.38	2.85	3.02
		Other Products	1.87	1.51	1.43	1.34	1.00	0.94	1.00	1.93	0.55	1.01
BSAI	Northern	Whole Fish	0.59	*	*	-	*	0.96	*	*	0.92	*
		Head And Gut	0.82	1.16	0.61	0.63	0.89	1.46	1.14	0.70	0.92	0.75
		Other Products	0.27	0.37	0.05	0.37	0.56	1.08	0.55	0.98	0.80	0.87
	Other	Whole Fish	2.23	1.95	2.09	1.98	2.06	2.11	2.16	1.47	2.06	1.70
		Head And Gut	2.34	1.88	1.79	1.55	1.91	2.04	1.86	1.78	1.23	1.37
		Other Products	0.44	0.89	0.91	0.77	1.06	2.15	0.35	3.04	0.54	1.30
	POP	Whole Fish	0.86	*	0.70	0.52	0.74	0.98	0.76	0.59	0.55	0.56
		Head And Gut	1.31	1.00	0.84	0.87	1.17	1.74	1.47	1.07	1.20	1.06
		Other Products	0.29	0.37	0.14	0.37	0.56	1.08	0.83	0.97	0.80	0.87
	Rougheye	Whole Fish	*	*	*	-	-	*	*	-	-	*
		Head And Gut	1.42	0.95	1.14	1.35	1.32	1.50	1.34	1.04	1.04	0.94
		Other Products	*	0.37	0.06	*	*	2.24	0.78	*	0.80	0.92
	Shortraker	Whole Fish	*	*	*	-	*	-	*	-	*	*
		Head And Gut	2.14	1.85	2.29	1.90	1.93	2.54	2.25	1.89	1.78	1.43
		Other Products	0.83	0.51	0.98	0.89	1.73	2.53	1.41	1.43	0.93	1.00

Notes: These estimates are based on data from both federal and state of Alaska fisheries. Prices based on confidential data have been excluded. "*" 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 R8: Number of processors that processed rockfish off Alaska by area, product, and species, 2006-2015.

		Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Northern	Whole Fish	6	2	6	6	6	3	3	5	4	2
		Head And Gut	15	12	14	18	20	20	22	20	18	14
		Other Products	6	8	6	5	7	6	7	7	8	3
	Other	Whole Fish	19	24	25	26	25	22	22	24	24	23
		Head And Gut	25	26	33	31	32	30	32	26	22	23
		Other Products	14	15	13	14	16	17	19	18	20	19
	POP	Whole Fish	8	8	8	7	15	11	8	8	8	7
		Head And Gut	18	18	19	23	24	23	24	20	16	15
		Other Products	6	8	6	6	6	6	6	7	6	4
	Rougheye	Whole Fish	14	14	14	17	16	14	11	15	15	12
		Head And Gut	32	31	35	35	35	35	32	24	19	20
		Other Products	14	17	12	11	14	17	16	17	18	16
	Shortraker	Whole Fish	13	13	14	14	14	13	10	11	14	11
		Head And Gut	33	28	34	38	38	35	31	27	20	18
		Other Products	17	20	18	17	15	23	22	19	17	19
	Dusky	Whole Fish	8	9	8	13	11	11	10	10	10	10
		Head And Gut	17	15	19	21	24	23	25	23	20	16
		Other Products	9	13	11	9	12	12	13	12	16	13

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Table R8: Continued

		Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GOA	Thornyhead	Whole Fish	30	28	29	32	29	28	25	26	27	19
		Head And Gut	35	42	42	39	41	38	41	36	32	34
		Other Products	9	12	9	11	11	11	15	13	7	11
BSAI	Northern	Whole Fish	5	1	2	-	2	4	3	2	4	3
		Head And Gut	12	11	7	14	12	15	14	14	10	13
		Other Products	6	12	6	7	9	12	10	11	11	12
	Other	Whole Fish	12	13	16	18	14	20	23	15	15	14
		Head And Gut	38	36	26	33	38	38	34	28	28	24
		Other Products	16	17	19	17	17	12	12	17	14	14
	POP	Whole Fish	5	3	7	4	4	9	11	7	7	5
		Head And Gut	23	20	18	18	20	25	19	22	22	20
		Other Products	10	12	10	11	12	13	13	13	12	13
	Rougheye	Whole Fish	1	2	2	-	-	2	2	-	-	1
		Head And Gut	19	15	14	17	21	19	18	15	14	13
		Other Products	3	9	4	1	2	4	7	3	7	8
	Shortraker	Whole Fish	2	3	1	-	1	-	1	-	3	1
		Head And Gut	19	20	25	26	36	32	33	22	26	20
		Other Products	7	12	13	9	10	8	14	5	6	11

Notes: These estimates are based on data from both federal and state of Alaska fisheries. Based on federal permit files.

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.

A.2. Expanded Economic Data Tables for Fishmeal

Table M1: Gross wholesale value of groundfish fishmeal products in the fisheries off Alaska by species, region and sector, 2011-2015, (million dollars).

		Gulf of Alaska	Bering Sea & Aleutian Islands	
	Year	Shoreside	At-sea	Shoreside
Pollock	2011	0.13	39.29	43.09
	2012	*	40.04	38.75
	2013	*	40.67	52.22
	2014	*	49.15	46.98
	2015	*	53.72	47.76
Pacific cod	2011	0.02	0.90	1.50
	2012	0.00	0.44	0.39
	2013	*	0.82	1.55
	2014	0.09	0.68	3.62
	2015	0.28	1.41	1.76
Flatfish	2011	0.04	3.02	1.10
	2012	*	2.14	0.69
	2013	*	3.93	1.05
	2014	*	2.19	0.58
	2015	*	1.07	0.37
Other	2011	0.00	0.20	0.07
	2012	*	0.17	0.26
	2013	*	0.22	0.08
	2014	*	0.23	0.23
	2015	*	0.29	1.08

Notes: Fishmeal data in this table use COAR production reports, which for some sectors, may exclude some secondary fishmeal production carried out at processing facilities not covered by COAR. Because of these tables may under report fishmeal production and value for Alaska.
Species in "Other" include sablefish, atka mackerel, rockfish, skate, squid, octopus, shark, and sculpin. These estimates are for catch from both federal and state of Alaska fisheries. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: At-sea and shoreside production reports and commercial operators annual report. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table M2: Wholesale production of groundfish fishmeal products in the fisheries off Alaska by species, region and sector, 2011-2015, (1,000 metric tons product weight).

		Gulf of Alaska	Bering Sea & Aleutian Islands	
	Year	Shoreside	At-sea	Shoreside
Pollock	2011	0.11	22.58	30.23
	2012	*	21.08	31.44
	2013	*	20.98	32.89
	2014	*	23.25	33.60
	2015	*	26.45	34.59
Pacific cod	2011	0.01	0.58	0.96
	2012	0.00	0.48	1.04
	2013	*	0.47	1.02
	2014	0.14	0.49	2.49
	2015	0.15	0.81	1.06
Flatfish	2011	0.02	1.66	0.68
	2012	*	1.23	0.84
	2013	*	1.38	0.37
	2014	*	1.08	0.28
	2015	*	0.54	0.19
Other	2011	0.00	0.14	0.08
	2012	*	0.11	0.33
	2013	*	0.13	0.06
	2014	*	0.15	0.19
	2015	*	0.15	0.56

Notes: Fishmeal data in this table use COAR production reports, which for some sectors, may exclude some secondary fishmeal production carried out at processing facilities not covered by COAR. Because of these tables may under report fishmeal production and value for Alaska.
Species in "Other" include sablefish, atka mackerel, rockfish, skate, squid, octopus, shark, and sculpin. These estimates are for catch from both federal and state of Alaska fisheries. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: At-sea and shoreside production reports and commercial operators annual report. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table M3: Wholesale price per pound of groundfish fishmeal products in the fisheries off Alaska by species, region and sector, 2011-2015, (dollars).

		Gulf of Alaska	Bering Sea & Aleutian Islands	
	Year	Shoreside	At-sea	Shoreside
Pollock	2011	0.53	0.79	0.65
	2012	*	0.86	0.56
	2013	*	0.88	0.72
	2014	*	0.96	0.63
	2015	*	0.92	0.63
Pacific cod	2011	0.71	0.70	0.71
	2012	0.77	0.42	0.17
	2013	*	0.79	0.69
	2014	0.29	0.63	0.66
	2015	0.81	0.79	0.75
Flatfish	2011	0.74	0.83	0.74
	2012	*	0.79	0.37
	2013	*	1.29	1.30
	2014	*	0.92	0.92
	2015	*	0.89	0.87
Other	2011	0.62	0.65	0.39
	2012	*	0.69	0.36
	2013	*	0.79	0.61
	2014	*	0.69	0.54
	2015	*	0.87	0.87

Notes: Fishmeal data in this table use COAR production reports, which for some sectors, may exclude some secondary fishmeal production carried out at processing facilities not covered by COAR. Because of these tables may under report fishmeal production and value for Alaska.
Species in "Other" include sablefish, atka mackerel, rockfish, skate, squid, octopus, shark, and sculpin. These estimates are for catch from both federal and state of Alaska fisheries. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: At-sea and shoreside production reports and Commercial Operators Annual Reports (COAR) (compiled and provided by the Alaska Fisheries Information Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

A.3. Supplementary Data Tables

Table E.1: Global capture production and value of whitefish (cods, hakes, haddocks) 2010 - 2014 (1,000 metric tons product weight and million dollars)

Data	2010	2011	2012	2013	2014
Production	5966	6512	6504	6607	6612
Value	8978	9145	8869	8870	9394

Notes: Production and Value include capture and aquaculture.

Source: FAO. 2015. Fishery and Aquaculture Statistics. Global capture production 1950-2013 (FishStatJ). Yearbook of Fishery Statistics Summary tables, Appendix II - World fishery production: estimated value by groups of species (2006-2012); ftp://ftp.fao.org/FI/STAT/summary/appIIybc.pdf

Table E.2: Quantities and value of groundfish exports originating from Alaska and Washington by species (group), destination country, and product type 2012 - 2016 (through June 2015) (1,000 metric tons product weight and million dollars).

			2012		2013		2014		2015		2016	
		Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Alaska Pollock	Japan	Frozen Fillet	0.23	$ 0.42	1.75	$ 4.97	3.5	$ 6.13	0.65	$ 1.39	0.31	$ 0.62
		Frozen Surimi	0.14	$ 0.32	0.9	$ 2.81	0.28	$ 0.66	1.13	$ 3.26	0.18	$ 0.53
		Roe	67.6	$ 159.7	56.23	$ 115.84	71.89	$ 156.83	81.83	$ 186.38	28.6	$ 67.24
		Frozen Meat	7.62	$ 46.83	6.54	$ 42.54	11.21	$ 67.72	10.46	$ 72.21	5.17	$ 37.88
		Frozen	-	$ -	-	$ -	0.61	$ 3.25	0.27	$ 1.53	0.04	$ 0.22
	China	Frozen Fillet	24.15	$ 53.91	43.38	$ 89.34	48.31	$ 102.69	36.64	$ 78.5	11.24	$ 23.41
		Frozen Surimi	8.87	$ 22.38	5.06	$ 11.8	5.2	$ 13.41	6.4	$ 14.61	3.48	$ 7.72
		Roe	1.43	$ 3.07	3.3	$ 6.61	3.07	$ 6.85	3.94	$ 9.71	2.13	$ 4.89
		Frozen Meat	0.55	$ 4.55	0.9	$ 6.19	0.75	$ 5.05	0.5	$ 3.84	0.21	$ 1.58
		Frozen	-	$ -	0.09	$ 0.17	0.32	$ 1.13	0.44	$ 1.44	0.42	$ 1
	S.Korea	Frozen Fillet	0.86	$ 1.71	2.59	$ 4.72	6.1	$ 11.01	9.77	$ 18.17	3.05	$ 6.05
		Frozen Surimi	1.6	$ 4	0.85	$ 1.73	0.84	$ 2.06	2.7	$ 4.88	4.88	$ 11.4
		Roe	44.95	$ 144.18	61.41	$ 156.44	56.85	$ 143.61	60.41	$ 154.15	28.67	$ 72.14
		Frozen Meat	7.56	$ 64.94	7.41	$ 64.55	9.79	$ 79.91	9.28	$ 75.85	8	$ 66.8
		Frozen	0.95	$ 1.76	0.04	$ 0.1	0.24	$ 0.51	0.27	$ 0.73	0.31	$ 0.63
	Germany	Frozen Fillet	23.77	$ 74.58	4.44	$ 12.35	2.43	$ 7.13	0.78	$ 2.22	-	$ -
		Frozen Surimi	37.35	$ 119.99	66.9	$ 200.35	81.38	$ 237.67	73.41	$ 204.67	21.75	$ 60.52
		Roe	8.52	$ 18.69	10.41	$ 20.89	5.61	$ 11.28	4.76	$ 9.38	2.01	$ 4.63
		Frozen Meat	0.02	$ 0.1	-	$ -	-	$ -	-	$ -	-	$ -
		Frozen	0.27	$ 0.53	0.33	$ 0.81	2.99	$ 6.67	1.38	$ 3.48	0.87	$ 1.83

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Table E.2: Continued

			2012		2013		2014		2015		2016	
		Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Alaska Pollock	Netherlands	Frozen	1.54	$ 4.08	0.81	$ 1.75	1.53	$ 3.21	2.45	$ 7.59	0.67	$ 1.63
		Fillet Frozen	21.57	$ 67.41	25.38	$ 75.49	24.69	$ 71.53	25.2	$ 76.7	10.64	$ 30.39
		Surimi	4.47	$ 13.76	2.35	$ 6.11	2.67	$ 6.5	3.26	$ 8.18	1.25	$ 3.07
		Roe Frozen	-	$ -	-	$ -	-	$ -	0	$ 0.01	-	$ -
		Meat Frozen	0	$ 0.01	0.14	$ 0.27	0.21	$ 0.47	-	$ -	0.15	$ 0.3
	Other	Frozen	11.24	$ 27.26	10.74	$ 26.04	7.82	$ 18.85	2.65	$ 5.97	2.98	$ 6.7
		Fillet Frozen	9.95	$ 29.43	14.23	$ 41.37	18.05	$ 51.16	13.71	$ 33.4	5.05	$ 11.85
		Surimi	23.97	$ 55.3	25.74	$ 53.7	20.61	$ 45.09	17.23	$ 38.78	12.57	$ 29.1
		Roe Frozen	0.15	$ 1.45	0.11	$ 0.96	0.01	$ 0.11	-	$ -	0.03	$ 0.28
		Fresh	-	$ -	-	$ -	-	$ -	-	$ -	0.01	$ 0.03
		Meat Frozen	3.47	$ 12.47	3.29	$ 7.85	4.57	$ 11.59	4.84	$ 11.54	1.45	$ 3.12
Sablefish	Japan	Frozen	6.39	$ 68.18	5.79	$ 60.93	4.32	$ 50.92	4.14	$ 45.77	1.51	$ 19.02
		Fresh	0.92	$ 8.9	0.5	$ 5.6	0.15	$ 1.75	0.1	$ 1.32	-	$ -
	China	Frozen	0.67	$ 6.3	0.53	$ 6.89	0.47	$ 7.42	0.77	$ 13.02	0.41	$ 6.84
		Fresh	0.47	$ 4.28	0.27	$ 3.16	0.1	$ 0.8	0.07	$ 0.65	-	$ -
	S.Korea	Frozen	0.14	$ 1.09	0.04	$ 0.46	0.04	$ 0.57	0.06	$ 0.95	0.03	$ 0.37
		Fresh	0.02	$ 0.1	0.01	$ 0.17	-	$ -	-	$ -	-	$ -
	Germany	Frozen	0.03	$ 0.26	0.01	$ 0.19	0.01	$ 0.18	0.02	$ 0.46	-	$ -
		Fresh	-	$ -	-	$ -	0	$ 0.03	0.01	$ 0.01	-	$ -
	Netherlands	Frozen	0.01	$ 0.08	0.05	$ 0.48	0.07	$ 0.83	0.05	$ 0.73	0.01	$ 0.13
		Fresh	-	$ -	0.02	$ 0.03	-	$ -	0.02	$ 0.18	-	$ -
	Other	Frozen	0.87	$ 8.67	0.85	$ 11.54	0.65	$ 10.11	0.83	$ 12.78	0.26	$ 4.37
		Fresh	0.15	$ 1.25	0.08	$ 0.87	0.13	$ 1.25	0.05	$ 0.42	-	$ -

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Table E.2: Continued

		Product	2012 Quantity	2012 Value	2013 Quantity	2013 Value	2014 Quantity	2014 Value	2015 Quantity	2015 Value	2016 Quantity	2016 Value
Cod NSPF	Japan	Frozen	14.62	$ 50.43	10.75	$ 33.94	16.29	$ 47.42	14	$ 43.11	5.69	$ 17.62
		Fillet Frozen	0.47	$ 1.43	0.06	$ 0.18	0.05	$ 0.16	0.05	$ 0.12	0.02	$ 0.03
		Fresh	0.17	$ 0.53	0.16	$ 0.55	0.05	$ 0.17	-	$ -	0.01	$ 0.04
		Salted | Dried	0.01	$ 0.02	0.13	$ 0.32	-	$ -	0.07	$ 0.18	-	$ -
		Minced Frozen	0.06	$ 0.13	0.02	$ 0.05	0.08	$ 0.12	-	$ -	0.16	$ 0.36
	China	Frozen	40.37	$ 125.39	46.77	$ 136.19	55.16	$ 154.06	56.72	$ 162.45	43.9	$ 119.09
		Fillet Frozen	4.24	$ 13.2	0.98	$ 3.87	0.76	$ 3.04	1.49	$ 4.21	0.91	$ 2.48
		Fresh	4.71	$ 14.15	0.19	$ 0.53	0.03	$ 0.08	0.02	$ 0.07	-	$ -
		Salted | Dried	1.57	$ 4.03	2.52	$ 6.03	1.33	$ 3.29	0.92	$ 2.48	0.59	$ 1.65
		Minced Frozen	0.1	$ 0.18	0.02	$ 0.06	-	$ -	0.15	$ 0.24	-	$ -
	S.Korea	Frozen	4.61	$ 13.7	7.69	$ 21.38	5.34	$ 12.26	8.9	$ 22.92	5.71	$ 16.06
		Fillet Frozen	0.05	$ 0.11	-	$ -	0.07	$ 0.14	0.04	$ 0.1	0.02	$ 0.08
		Fresh	0.85	$ 2.46	-	$ -	0.05	$ 0.08	0.02	$ 0.05	0.05	$ 0.1
		Salted | Dried	0.94	$ 2.73	0.28	$ 0.68	0.04	$ 0.08	2.09	$ 5.8	-	$ -
		Minced Frozen	0.04	$ 0.07	-	$ -	-	$ -	0.02	$ 0.07	-	$ -
	Germany	Frozen	3.04	$ 11.01	2.85	$ 9.04	2.89	$ 10.19	2.75	$ 8.75	0.75	$ 2.09
		Fillet Frozen	0.05	$ 0.18	0.03	$ 0.07	-	$ -	0.01	$ 0.04	0.01	$ 0.02
		Minced Frozen	-	$ -	-	$ -	-	$ -	0.12	$ 0.2	-	$ -

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Table E.2: Continued

			2012		2013		2014		2015		2016	
		Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Cod NSPF	Nether-lands	Frozen	6.15	$ 19.93	5.01	$ 16.15	6.21	$ 20.96	5.71	$ 18.07	3	$ 8.99
		Fillet Frozen	0.1	$ 0.37	0.22	$ 0.81	0.22	$ 0.65	0.09	$ 0.36	0.01	$ 0.02
		Fresh	0.02	$ 0.04	-	$ -	-	$ -	-	$ -	-	$ -
	Other	Frozen	18.73	$ 66.2	16.49	$ 51.74	11.53	$ 37.27	13.78	$ 42.45	7.97	$ 24.47
		Fillet Frozen	4.84	$ 20.9	1.23	$ 6.86	1.04	$ 5.34	1.58	$ 7.41	0.88	$ 4.52
		Fresh	0.08	$ 0.31	0.23	$ 0.79	0.17	$ 0.58	0.25	$ 0.74	0	$ 0.01
		Salted | Dried	0.39	$ 1.17	0.51	$ 1.45	2.44	$ 6.58	0.61	$ 1.82	0.18	$ 0.33
		Minced Frozen	-	$ -	0.04	$ 0.11	-	$ -	0.22	$ 0.37	-	$ -
Yellowfin Sole	Japan	Frozen	0.32	$ 0.4	0.03	$ 0.04	0.02	$ 0.03	0.05	$ 0.08	-	$ -
	China	Frozen	33.82	$ 45.26	62.54	$ 88.88	62.09	$ 86.25	52.68	$ 70.15	26.41	$ 37.06
	S.Korea	Frozen	10.58	$ 13.09	9.38	$ 12.77	10.02	$ 12.26	12.38	$ 15.35	6.29	$ 7.82
	Other	Frozen	0.53	$ 0.81	-	$ -	0.01	$ 0.01	0.04	$ 0.06	-	$ -
Flatfish NSPF	Japan	Frozen	2.44	$ 3.92	3.95	$ 7.54	5.27	$ 9.81	2.65	$ 4.67	2.17	$ 3.9
		Fillet Frozen	0.01	$ 0.03	0	$ 0.01	0	$ 0.02	0	$ 0.01	-	$ -
		Fresh	0.36	$ 0.58	-	$ -	0	$ 0.01	-	$ -	-	$ -
		Fillet Fresh	0	$ 0.01	-	$ -	-	$ -	-	$ -	-	$ -
	China	Frozen	16.47	$ 28.1	34.56	$ 57.74	38.4	$ 64.56	34.57	$ 53.55	20.35	$ 31.55
		Fillet Frozen	0.03	$ 0.12	0.21	$ 0.85	0.04	$ 0.21	0.12	$ 0.59	0.02	$ 0.08
		Fresh	4.07	$ 6.38	-	$ -	0.01	$ 0.07	0.02	$ 0.04	0	$ 0.03

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Table E.2: Continued

			2012		2013		2014		2015		2016	
		Product	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Flatfish NSPF	S.Korea	Frozen	4.03	$ 5.85	1.48	$ 2.35	0.96	$ 1.58	3.74	$ 6.86	1.9	$ 3.44
		Fillet Frozen	0.06	$ 0.24	0.26	$ 0.97	0.22	$ 0.65	-	$ -	0	$ 0.01
		Fresh	0.22	$ 0.34	0.01	$ 0.08	0.02	$ 0.05	-	$ -	-	$ -
	Netherlands	Frozen	-	$ -	0	$ 0.01	-	$ -	-	$ -	0.04	$ 0.09
	Other	Frozen	0.76	$ 0.97	0.75	$ 1.24	0.68	$ 1.47	0.36	$ 0.71	0.27	$ 0.35
		Fillet Frozen	0.02	$ 0.15	0.03	$ 0.13	0.04	$ 0.25	0	$ 0.01	0.02	$ 0.06
		Fresh	0.03	$ 0.09	0.09	$ 0.24	0.02	$ 0.12	0	$ 0.01	-	$ -
		Fillet Fresh	0.17	$ 1.39	0.15	$ 1.25	0.07	$ 0.55	0.06	$ 0.49	0.06	$ 0.46
Pac. Ocean Perch	Japan	Frozen	3.23	$ 7.91	9.33	$ 33.63	6.86	$ 24.54	9.62	$ 35.33	0.55	$ 2.08
	China	Frozen	8.14	$ 24.55	8.98	$ 27.64	15.57	$ 51.41	12.24	$ 40.24	6.18	$ 19.52
	S.Korea	Frozen	1.41	$ 4.06	1.4	$ 4.44	0.92	$ 2.7	0.85	$ 2.09	0.3	$ 0.63
	Other	Frozen	-	$ -	0.1	$ 0.17	0.05	$ 0.13	0.03	$ 0.05	0.02	$ 0.06
Atka Mackerel	Japan	Frozen	11.45	$ 24.7	7.79	$ 21.69	12.63	$ 35.07	22.05	$ 61.46	9.42	$ 26.16
	China	Frozen	5.86	$ 11.2	2.5	$ 6.95	3.74	$ 10.4	6	$ 16.79	2.12	$ 5.89
	S.Korea	Frozen	2.42	$ 3.92	2.24	$ 5.83	2.81	$ 7.18	1.93	$ 5.69	1.42	$ 3.83
	Other	Frozen	0.29	$ 0.5	0.15	$ 0.2	0.33	$ 0.5	0.02	$ 0.03	-	$ -

Notes: Totals for China include Taipei and Hong Kong. Totals for ”FLATFISH NSPF” include species ”TURBOT GREENLAND”, ”PLAICE” and ”SOLE ROCK”

Source: NOAA Fisheries, Fisheries Statistics Division, Foreign Trade Division of the U.S. Census Bureau, http://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/index.

Table E.3: Monthly Employment of Seafood Processing Workers in Alaska (thousands), 2011 - 2016.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2011	7.3	9	9.4	8.1	7.2	13.1	20.4	18.3	13.4	7.6	5.6	3.2	10.2
2012	7.7	9.8	10.3	8.9	8.2	13.6	19.5	16.8	11.4	7.7	5.7	3.7	10.3
2013	7.6	9.4	9.6	9.2	8.3	13.2	20.4	17.4	13.1	8.9	6.6	4	10.6
2014	8.7	10	10	10.2	8.2	14	20.9	17	11.5	6.3	4.6	3.1	10.4
2015	7.9	9.4	9.6	8.7	7.5	13	20.6	17.2	11.9	7.1	5.2	3.7	10.2
2016	8.3	9.7	9.7	9.1	7.7	13.5	20.8	-	-	-	-	-	-

Notes: Series code: 32311700.

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, http://live.laborstats.alaska.gov/ces/ces.cfm?at=01&a=000000&adj=0.

Table E.4: Monthly Employment of Seafood Harvesting Workers in Alaska, 2008 - 2012.

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
All Species	2008	2,738	3,138	4,511	4,445	5,572	17,022	20,447	13,634	8,226	4,202	2,708	602
	2009	2,527	2,817	3,126	4,874	5,693	17,609	20,076	13,687	7,148	4,593	2,388	507
	2010	2,668	3,060	4,005	5,255	5,685	18,878	23,128	15,287	7,759	4,992	2,887	850
	2011	2,898	3,214	4,010	4,723	5,610	20,101	23,813	15,574	7,916	5,721	2,303	849
	2012	2,923	3,409	4,609	5,402	6,163	19,237	24,761	16,191	6,988	5,453	2,274	853
Groundfish	2008	2,034	2,135	2,348	1,714	1,514	1,736	1,647	1,817	2,182	1,494	805	90
	2009	1,834	1,811	1,728	1,746	1,686	1,592	1,383	1,596	1,738	1,420	567	111
	2010	1,448	1,690	1,773	1,716	1,660	1,436	1,214	1,518	1,929	1,230	589	196
	2011	1,571	1,767	2,108	1,935	1,663	1,622	1,341	1,586	2,321	1,938	628	465
	2012	1,774	2,052	2,626	2,099	1,954	1,924	1,580	1,735	2,230	1,878	765	437
Halibut	2008	3	0	1,066	1,260	1,859	2,284	1,866	2,345	1,865	1,004	590	0
	2009	0	0	372	1,274	1,802	1,955	1,501	2,033	1,727	1,385	514	0
	2010	0	0	1,002	1,355	1,895	1,963	1,735	2,147	1,685	1,280	480	0
	2011	0	0	774	1,134	1,929	2,066	1,595	1,820	1,553	1,162	374	0
	2012	0	0	614	969	1,694	1,936	1,530	1,941	1,464	1,241	297	0
Salmon	2008	126	145	286	500	1603	12,383	16,308	8,924	4,014	306	148	126
	2009	72	157	182	449	1,353	13,452	16,611	9,565	3,420	370	171	163
	2010	155	296	358	635	1,629	14,938	19,608	11,153	3,945	479	259	193
	2011	193	225	381	607	1,640	15,882	20,344	11,869	3,894	704	265	174
	2012	104	220	404	635	1,575	14,467	21,130	12,066	3,103	528	266	121

Notes: See original data source for details.

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, http://live.laborstats.alaska.gov/seafood/statewide/AKAvgMonthlySpec.pdf

A.4. Ex-vessel Value and Price Data Tables: alternative CFEC fish ticket based pricing

These tables present ex-vessel prices and value utilizing prices derived from ADF&G fish tickets priced by the Alaska Commercial Fisheries Entry Commission (CFEC). This provides an alternative source of ex-vessel prices to the Commercial Operator Annual Report (COAR) purchasing data that has historically been used to assemble Tables 16-24. CFEC fish ticket prices reflect individual transactions reported on shoreside and mothership landing reports, adjusted by analysts with consideration to COAR buying data, and therefore may be subject to additional scrutiny. Work is ongoing to analyze and characterize differences between the two pricing methods, and we are working with industry to get their perspective on which source may best reflect the pricing conditions faced by their companies. Until we have finalized this inquiry we will retain the CFEC pricing in this appendix. Note that Tables 16.B-24.B are valid only for the years after 2003.

Table 16.B: Real ex-vessel value of the catch in the domestic commercial fisheries off Alaska by species group, 2004-2015; calculations based on CFEC fish tickets ($ millions, base year=2015).

Year	Shellfish	Salmon	Herring	Halibut	Groundfish	Total
2004	202.3	311.4	17.1	206.0	638.5	1,375.3
2005	199.9	372.5	17.5	201.9	776.9	1,568.8
2006	163.3	363.0	11.4	223.0	824.8	1,585.5
2007	212.6	436.1	17.4	245.2	818.7	1,730.0
2008	284.2	454.0	28.1	229.3	995.1	1,990.8
2009	211.7	425.1	26.2	147.4	609.2	1,419.6
2010	248.8	561.8	23.8	216.0	710.8	1,761.3
2011	313.1	643.4	11.4	215.8	929.8	2,113.5
2012	329.2	549.8	22.4	149.5	970.5	2,021.3
2013	242.7	691.9	16.6	113.5	889.4	1,954.2
2014	245.1	548.1	11.5	107.1	821.5	1,733.4
2015	293.1	413.2	7.0	110.7	902.3	1,726.3

Notes: These estimates include the value of catch from both federal and state of Alaska fisheries. The data have been adjusted to 2015 dollars by applying the Producer Price Index for unprocessed and packaged fish by applying the Personal Consumption Expenditure Index at (https://research.stlouisfed.org/fred2/series/PCEPI)

Source: NMFS Alaska Region Blend and Catch-Accounting System estimates, At-Sea Production Report, Alaska Commercial Fisheries Entry Commission (CFEC) fish tickets, Fisheries of the United States (compiled and provided by the Alaska Fisheries Information Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 17.B: Percentage distribution of ex-vessel value of the catch in the domestic commercial fisheries off Alaska by species group, 2004-2015; calculations based on CFEC fish tickets.

Year	Shellfish	Salmon	Herring	Halibut	Groundfish
2004	14.7 %	22.6 %	1.2 %	15.0 %	46.4 %
2005	12.7 %	23.7 %	1.1 %	12.9 %	49.5 %
2006	10.3 %	22.9 %	0.7 %	14.1 %	52.0 %
2007	12.3 %	25.2 %	1.0 %	14.2 %	47.3 %
2008	14.3 %	22.8 %	1.4 %	11.5 %	50.0 %
2009	14.9 %	29.9 %	1.8 %	10.4 %	42.9 %
2010	14.1 %	31.9 %	1.4 %	12.3 %	40.4 %
2011	14.8 %	30.4 %	0.5 %	10.2 %	44.0 %
2012	16.3 %	27.2 %	1.1 %	7.4 %	48.0 %
2013	12.4 %	35.4 %	0.8 %	5.8 %	45.5 %
2014	14.1 %	31.6 %	0.7 %	6.2 %	47.4 %
2015	17.0 %	23.9 %	0.4 %	6.4 %	52.3 %

Notes: These estimates report the distribution of the value of catch from both federal and state of Alaska fisheries.

Source: NMFS Alaska Region Blend and Catch-Accounting System estimates, At-Sea Production Report, Alaska Commercial Fisheries Entry Commission (CFEC) fish tickets, Fisheries of the United States. (compiled and provided by the Alaska Fisheries Information Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 18.B: Ex-vessel prices in the groundfish fisheries off Alaska by area, gear, and species, 2011-2015; calculations based on CFEC fish tickets ($/lb, round weight).

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska
	Year	Fixed	Trawl	Fixed	Trawl	All Gear
Pollock	2011	0.141	0.161	0.172	0.142	0.143
	2012	0.146	0.170	0.161	0.157	0.158
	2013	0.166	0.170	0.155	0.147	0.149
	2014	0.114	0.129	0.131	0.134	0.134
	2015	0.097	0.112	0.102	0.162	0.156
Sablefish	2011	4.935	4.032	4.883	1.791	4.844
	2012	3.968	3.246	3.506	1.013	3.824
	2013	2.785	2.333	2.720	1.173	2.729
	2014	3.470	2.768	3.438	1.317	3.403
	2015	3.734	2.510	3.655	1.276	3.625
Pacific Cod	2011	0.319	0.299	0.218	0.224	0.246
	2012	0.342	0.310	0.194	0.238	0.239
	2013	0.277	0.237	0.327	0.203	0.279
	2014	0.292	0.262	0.186	0.214	0.217
	2015	0.298	0.249	0.246	0.224	0.250
Flatfish	2011	0.056	0.091	0.065	0.180	0.169
	2012	0.072	0.108	0.049	0.199	0.191
	2013	0.051	0.117	0.496	0.160	0.157
	2014	0.065	0.099	0.373	0.140	0.135
	2015	0.076	0.105	0.237	0.138	0.135
Rockfish	2011	0.697	0.259	0.526	0.345	0.316
	2012	0.801	0.265	0.501	0.289	0.290
	2013	0.816	0.196	0.579	0.213	0.221
	2014	0.776	0.212	0.570	0.238	0.237
	2015	0.736	0.193	0.592	0.197	0.205
Atka Mackerel	2011	0.016	0.364	0.151	0.265	0.267
	2012	0.131	0.386	0.152	0.293	0.295
	2013	*	0.366	0.318	0.322	0.324
	2014	*	0.372	0.327	0.356	0.357
	2015	*	0.290	0.136	0.259	0.260

Notes: 1) Prices are for catch from both federal and state of Alaska fisheries.
2) Prices do not include the value added by at-sea processing except for the value added by dressing fish at sea where the fish have not been frozen. The unfrozen landings price is calculated as landed value divided by estimated or actual round weight.
3) 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 by on-shore landings. A price was calculated for these categories from product-report prices; the price in this case is the value of the product divided by the calculated round weight and multiplied by a constant 0.4 to correct for value added by processing.
4) The "All Alaska/All gear" column is the weighted average of the other columns.
Values not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Catch Accounting System, Alaska Commercial Fisheries Entry Commission (CFEC) fish tickets, At-Sea Production Report, (compiled and provided by the Alaska Fisheries Information Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 19.B: Ex-vessel value of the groundfish catch off Alaska by area, vessel category, gear, and species, 2011-2015; calculations based on CFEC fish tickets ($ millions).

			Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Year	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors
Hook & Line	Sablefish	2011	105.0	8.4	113.4	7.4	4.6	12.0	112.4	12.9	125.4
		2012	94.5	6.1	100.6	6.1	4.1	10.2	100.6	10.2	110.8
		2013	64.4	4.2	68.6	3.6	2.9	6.5	68.0	7.1	75.1
		2014	69.4	4.3	73.7	4.1	1.5	5.6	73.4	5.9	79.3
		2015	71.8	4.7	76.5	3.0	1.0	3.9	74.7	5.7	80.5
	Pacific Cod	2011	10.7	3.4	14.1	0.8	49.5	50.3	11.4	52.9	64.4
		2012	13.1	1.6	14.7	0.7	46.2	46.9	13.8	47.8	61.6
		2013	6.6	2.4	9.0	0.7	93.6	94.2	7.2	95.9	103.2
		2014	9.0	2.0	11.0	1.4	42.0	43.4	10.4	44.0	54.5
		2015	8.0	2.7	10.7	0.5	65.5	66.0	8.5	68.2	76.7
	Flatfish	2011	0	0	0	*	0.3	0.3	0	0.3	0.3
		2012	0	0	0	*	0.3	0.3	0	0.3	0.3
		2013	0	*	0	*	0.8	0.8	0	0.8	0.8
		2014	0	*	0	*	0.7	0.7	0	0.7	0.7
		2015	0	0	0	*	0.6	0.6	0	0.6	0.6
	Rockfish	2011	1.3	0.1	1.4	0.1	0.1	0.2	1.4	0.2	1.7
		2012	1.8	0.1	2.0	0.1	0.2	0.3	1.9	0.3	2.2
		2013	2.1	0.1	2.2	0.1	0.1	0.2	2.1	0.2	2.4
		2014	1.7	0.1	1.8	0.1	0.1	0.2	1.7	0.2	1.9
		2015	1.7	0.1	1.8	0.1	0.1	0.2	1.7	0.2	1.9
	All Species	2011	117.6	12.1	129.7	8.3	58.3	66.5	125.8	70.4	196.2
		2012	110.4	8.0	118.3	6.8	56.0	62.8	117.2	64.0	181.2
		2013	73.7	6.7	80.4	4.3	103.0	107.2	78.0	109.7	187.7
		2014	80.6	6.5	87.1	5.5	51.1	56.6	86.1	57.6	143.7
		2015	82.1	7.6	89.7	3.5	70.6	74.1	85.6	78.2	163.8

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Table 19.B: Continued

			Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Year	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors
Pot	Pacific Cod	2011	33.3	*	33.3	18.2	1.3	19.5	51.5	1.3	52.7
		2012	28.7	*	28.7	19.9	2.2	22.0	48.6	2.2	50.8
		2013	18.3	-	18.3	16.5	*	16.5	34.7	*	34.7
		2014	25.2	-	25.2	22.3	2.8	25.1	47.5	2.8	50.2
		2015	26.0	-	26.0	18.0	6.1	24.1	44.0	6.1	50.1
Trawl	Pollock	2011	27.8	0.4	28.1	223.3	148.6	372.0	251.1	149.0	400.1
		2012	37.8	0.4	38.2	235.0	178.3	413.3	272.8	178.7	451.6
		2013	34.7	0.4	35.1	216.4	193.4	409.8	251.2	193.8	445.0
		2014	39.6	0.5	40.1	223.6	155.8	379.4	263.2	156.2	419.5
		2015	40.7	0.4	41.1	223.4	242.6	466.0	264.1	242.9	507.1
	Sablefish	2011	4.7	3.5	8.2	0	0.3	0.3	4.7	3.8	8.5
		2012	2.9	2.8	5.7	*	0.5	0.5	2.9	3.3	6.2
		2013	2.1	2.0	4.1	*	0.5	0.5	2.1	2.5	4.6
		2014	2.8	2.7	5.4	*	0.2	0.2	2.8	2.8	5.6
		2015	2.4	2.4	4.8	0	0.1	0.1	2.4	2.5	4.9
	Pacific Cod	2011	9.9	0.5	10.4	17.8	18.1	35.9	27.7	18.6	46.3
		2012	12.8	0.4	13.3	28.2	17.4	45.6	41.0	17.9	58.9
		2013	9.7	0.4	10.1	20.9	18.6	39.5	30.6	19.0	49.7
		2014	13.0	0.4	13.5	20.4	16.6	37.0	33.4	17.0	50.5
		2015	11.1	0.6	11.8	15.3	20.5	35.7	26.4	21.1	47.5
	Flatfish	2011	4.1	2.5	6.6	0.5	102.2	102.7	4.6	104.7	109.3
		2012	3.5	2.1	5.6	0.5	116.9	117.4	4.0	119.0	123.0
		2013	4.3	2.8	7.1	0.2	95.3	95.5	4.6	98.1	102.6
		2014	5.1	4.4	9.4	0.2	79.2	79.4	5.3	83.6	88.9
		2015	2.6	3.0	5.5	0.1	62.7	62.8	2.7	65.6	68.3

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Table 19.B: Continued

			Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Year	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors
Trawl	Rockfish	2011	2.9	8.7	11.5	0	20.4	20.5	2.9	29.1	32.0
		2012	6.1	8.1	14.2	0	16.8	16.8	6.1	24.9	31.0
		2013	4.2	4.8	9.0	0	15.8	15.8	4.2	20.5	24.8
		2014	4.3	7.3	11.6	0	18.0	18.0	4.4	25.3	29.7
		2015	4.5	6.5	10.9	0.1	16.2	16.2	4.6	22.6	27.2
	Atka Mackerel	2011	0	0.8	0.8	0.1	29.1	29.2	0.1	29.9	30.0
		2012	0	0.6	0.6	0	30.0	30.1	0	30.6	30.6
		2013	0	0.7	0.7	0	16.0	16.0	0	16.6	16.6
		2014	0	0.8	0.8	0	24.0	24.0	0	24.8	24.8
		2015	0	0.6	0.6	0	30.0	30.0	0	30.6	30.6
	All Species	2011	50.7	16.7	67.4	241.8	319.1	560.8	292.5	335.7	628.2
		2012	64.6	14.8	79.3	263.8	361.0	624.8	328.4	375.7	704.1
		2013	56.6	11.1	67.7	237.6	339.9	577.6	294.2	351.0	645.3
		2014	65.5	16.2	81.7	244.5	294.6	539.1	310.0	310.8	620.8
		2015	61.8	13.5	75.3	239.0	372.1	611.1	300.8	385.6	686.4
All Gear	Pollock	2011	27.8	0.4	28.2	223.3	150.4	373.7	251.1	150.8	401.9
		2012	37.9	0.4	38.3	235.0	179.9	414.9	272.9	180.3	453.2
		2013	34.8	0.4	35.2	216.4	194.9	411.4	251.2	195.3	446.6
		2014	39.6	0.5	40.1	223.6	157.3	381.0	263.3	157.8	421.1
		2015	40.7	0.4	41.1	223.4	244.0	467.5	264.2	244.4	508.6
	Sablefish	2011	110.1	11.9	122.0	12.7	4.9	17.6	122.8	16.8	139.6
		2012	97.4	8.9	106.3	6.1	4.6	10.7	103.5	13.5	117.0
		2013	66.7	6.2	72.9	3.6	3.4	7.0	70.3	9.7	79.9
		2014	72.1	7.0	79.1	4.1	1.7	5.8	76.2	8.7	84.9
		2015	74.2	7.2	81.3	3.0	1.1	4.0	77.1	8.2	85.4

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Table 19.B: Continued

			Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
		Year	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors	Catcher Vessel	Catcher Processor	All Sectors
All Gear	Pacific Cod	2011	53.8	3.9	57.7	36.7	68.9	105.6	90.6	72.8	163.4
		2012	54.7	2.0	56.7	48.7	65.8	114.5	103.3	67.8	171.2
		2013	34.5	2.8	37.3	38.1	112.2	150.2	72.6	115.0	187.6
		2014	47.2	2.5	49.7	44.1	61.4	105.5	91.3	63.8	155.2
		2015	45.2	3.3	48.5	33.8	92.1	125.9	79.0	95.4	174.4
	Flatfish	2011	4.1	2.5	6.6	0.5	102.5	103.0	4.6	105.0	109.7
		2012	3.5	2.1	5.6	0.5	117.2	117.7	4.0	119.3	123.3
		2013	4.3	2.8	7.1	0.2	96.1	96.3	4.6	98.9	103.5
		2014	5.1	4.4	9.4	0.2	79.9	80.1	5.3	84.3	89.5
		2015	2.6	3.0	5.5	0.1	63.3	63.4	2.7	66.3	68.9
	Rockfish	2011	4.2	8.8	13.0	0.1	20.6	20.7	4.3	29.3	33.6
		2012	8.0	8.2	16.1	0.1	17.0	17.1	8.1	25.2	33.2
		2013	6.3	4.9	11.2	0.1	15.9	16.0	6.4	20.8	27.2
		2014	6.0	7.4	13.4	0.1	18.1	18.2	6.1	25.5	31.6
		2015	6.2	6.6	12.7	0.1	16.3	16.4	6.3	22.8	29.1
	Atka Mackerel	2011	0	0.8	0.8	0.1	29.1	29.2	0.1	29.9	30.0
		2012	0	0.6	0.6	0	30.0	30.1	0	30.6	30.6
		2013	0	0.7	0.7	0	16.0	16.0	0	16.6	16.6
		2014	0	0.8	0.8	0	24.0	24.0	0	24.8	24.8
		2015	0	0.6	0.6	0	30.0	30.0	0	30.6	30.6
	All Species	2011	202.4	28.8	231.2	273.5	378.6	652.1	475.8	407.4	883.2
		2012	204.0	22.7	226.7	290.5	419.2	709.7	494.5	441.9	936.4
		2013	149.0	17.8	166.8	258.4	442.9	701.3	407.4	460.7	868.1
		2014	171.9	22.7	194.6	272.4	348.5	620.8	444.3	371.2	815.4
		2015	170.3	21.1	191.5	260.6	448.7	709.3	430.9	469.9	900.8

Notes: These estimates include the value of catch from both federal and state of Alaska fisheries. Ex-vessel value is calculated using prices on Table 18b. Please refer to Table 18b for a description of the price derivation. All groundfish includes additional species categories. The value added by at-sea processing is not included in these estimates of ex-vessel value. Values not adjusted for inflation. “*” indicates a confidential value; “-” indicates no applicable data or value.

Source: NMFS Alaska Region Catch Accounting System, Alaska Commercial Fisheries Entry Commission (CFEC) fish tickets, At-Sea Production Report (compiled and provided by the Alaska Fisheries Information Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 20.B: Ex-vessel value of Alaska groundfish delivered to shoreside processors by area, gear and catcher-vessel length, 2006-2015; calculations based on CFEC fish tickets ($ millions).

		Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
	Year	<60	60-125	>=125	<60	60-125	>=125	<60	60-125	>=125
Fixed	2006	60.9	30.7	0.2	6.2	13.2	3.6	67.2	43.9	3.8
	2007	70.1	31.4	0	5.8	16.4	2.7	75.9	47.8	2.7
	2008	81.4	33.1	0.3	9.4	16.5	3.8	90.8	49.6	4.1
	2009	63.3	24.8	*	5.4	7.9	1.7	68.7	32.8	1.7
	2010	74.5	28.8	*	7.0	10.9	2.9	81.5	39.7	2.9
	2011	109.0	42.6	*	12.3	15.4	4.0	121.4	58.0	4.0
	2012	101.1	38.6	*	15.4	10.6	3.6	116.5	49.2	3.6
	2013	68.4	24.0	*	11.7	8.2	3.2	80.2	32.1	3.2
	2014	79.0	27.6	-	19.3	8.3	2.5	98.3	35.9	2.5
	2015	80.0	28.7	-	14.3	7.5	0.6	94.4	36.2	0.6
Trawl	2006	7.2	31.4	-	*	92.6	110.3	7.2	124.0	110.3
	2007	7.7	29.6	-	*	88.0	96.9	7.7	117.6	96.9
	2008	12.1	38.1	*	*	103.4	118.0	12.1	141.5	118.0
	2009	6.0	23.9	-	*	69.9	81.3	6.0	93.8	81.3
	2010	8.8	37.8	-	*	60.4	67.8	8.8	98.2	67.8
	2011	7.2	43.5	-	*	96.3	104.7	7.2	139.8	104.7
	2012	13.9	50.7	-	*	107.0	114.6	13.9	157.7	114.6
	2013	8.6	48.0	-	*	93.1	106.7	8.6	141.0	106.7
	2014	12.0	53.5	-	*	96.1	111.1	12.0	149.6	111.1
	2015	13.7	48.1	-	-	91.4	112.7	13.7	139.5	112.7
All Gear	2006	68.2	62.1	0.2	6.2	105.8	113.8	74.4	167.9	114.1
	2007	77.8	61.0	0	5.8	104.3	99.6	83.7	165.4	99.6
	2008	93.5	71.2	0.3	9.4	119.9	121.7	102.9	191.1	122.0
	2009	69.3	48.7	*	5.4	77.8	83.0	74.7	126.5	83.0
	2010	83.3	66.6	*	7.0	71.2	70.7	90.3	137.8	70.7
	2011	116.2	86.1	*	12.3	111.6	108.7	128.6	197.8	108.7
	2012	114.9	89.3	*	15.4	117.6	118.3	130.3	206.9	118.3
	2013	77.0	71.9	*	11.7	101.2	109.9	88.8	173.2	109.9
	2014	91.0	81.1	-	19.3	104.5	113.6	110.3	185.6	113.6
	2015	93.7	76.8	-	14.3	98.9	113.3	108.1	175.7	113.3

Notes: These estimates include only catch counted against federal TACs. Values not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Catch-Accounting System and At-Sea Production Report, Alaska Commercial Fisheries Entry Commission (CFEC) fish tickets, ADF&G COAR production 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.B: Ex-vessel value per catcher vessel for Alaska groundfish delivered to shoreside processors by area, gear and catcher-vessel length, 2006-2015; calculations based on CFEC fish tickets ($ thousands).

		Gulf of Alaska			Bering Sea & Aleutian Islands			All Alaska		
	Year	<60	60-125	>=125	<60	60-125	>=125	<60	60-125	>=125
Fixed	2006	61	245	60	96	210	296	65	295	316
	2007	67	283	9	81	282	222	71	339	224
	2008	75	315	75	120	271	376	82	376	369
	2009	62	256	*	78	168	210	66	275	187
	2010	72	303	*	103	227	320	77	345	288
	2011	98	463	*	172	275	497	109	496	442
	2012	91	471	*	241	230	403	104	464	363
	2013	74	324	*	149	174	358	84	328	358
	2014	84	395	-	379	198	276	103	387	276
	2015	85	422	-	228	197	101	98	416	101
Trawl	2006	279	641	-	*	1,285	4,241	279	1,305	4,241
	2007	286	644	-	*	1,222	3,728	286	1,321	3,728
	2008	432	866	*	*	1,477	4,213	432	1,590	4,213
	2009	213	542	-	*	1,043	3,011	213	1,103	3,011
	2010	352	879	-	*	974	2,513	339	1,227	2,513
	2011	300	967	-	*	1,416	3,878	300	1,704	3,878
	2012	578	1,102	-	*	1,647	4,094	578	1,923	4,094
	2013	332	1,090	-	*	1,432	3,953	332	1,720	3,953
	2014	446	1,244	-	*	1,576	4,115	446	1,847	4,115
	2015	526	1,118	-	-	1,451	4,175	526	1,722	4,175
All Gear	2006	67	381	60	92	790	2,995	72	724	3,001
	2007	74	402	9	74	809	2,621	78	738	2,622
	2008	85	494	60	113	922	3,203	92	889	3,129
	2009	67	358	*	71	689	2,371	72	639	2,305
	2010	80	501	*	97	648	1,964	85	726	1,911
	2011	104	648	*	169	900	3,105	114	1,014	3,019
	2012	103	714	*	223	1,059	3,196	116	1,118	3,112
	2013	83	626	*	145	904	3,054	92	978	3,054
	2014	96	737	-	364	1,014	3,155	114	1,085	3,155
	2015	98	711	-	228	979	3,434	111	1,065	3,434

Notes: These estimates include only catch counted against federal TACs. Values not adjusted for inflation. "*" indicates a confidential value; "-" indicates no applicable data or value.

Source: NMFS Alaska Region Catch-Accounting System and At-Sea Production Report; Alaska Commercial Fisheries Entry Commission (CFEC) fish tickets, ADF&G COAR production 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.B: Ex-vessel value of the groundfish catch off Alaska by area, residency, and species, 2011-2015; calculations based on CFEC fish tickets ($ millions).

		Gulf of Alaska		Bering Sea & Aleutian Islands		All Alaska	
	Year	Alaska	Other	Alaska	Other	Alaska	Other
Pollock	2011	0.1	28.1	64.3	309.4	64.4	337.5
	2012	0.1	38.2	68.3	346.6	68.4	384.8
	2013	*	35.1	68.5	342.9	68.5	377.9
	2014	0.1	40.1	59.2	321.8	59.3	361.8
	2015	0	41.1	77.0	390.4	77.1	431.5
Sablefish	2011	3.7	118.3	0.9	16.7	4.6	134.9
	2012	2.5	104.2	*	9.5	2.5	113.7
	2013	1.7	71.3	1.6	7.8	3.3	79.0
	2014	2.0	77.3	1.3	4.5	3.3	81.8
	2015	2.3	79.2	0.8	3.2	3.1	82.4
Pacific Cod	2011	2.4	55.4	16.8	88.8	19.2	144.2
	2012	1.3	55.4	15.3	99.2	16.6	154.6
	2013	*	36.3	29.2	121.0	29.2	157.3
	2014	0.6	49.1	13.7	91.7	14.3	140.9
	2015	1.8	46.7	21.7	104.2	23.5	150.9
Flatfish	2011	0.9	5.8	8.6	94.5	9.4	100.2
	2012	0.6	5.0	1.7	116.1	2.3	121.1
	2013	1.4	5.8	5.4	90.9	6.8	96.7
	2014	1.2	8.3	4.5	75.6	5.7	83.9
	2015	1.0	4.5	3.9	59.5	4.9	64.0
Rockfish	2011	0.1	12.9	0.5	20.2	0.6	33.0
	2012	0.1	16.1	0.1	17.0	0.1	33.1
	2013	0.1	11.0	0.2	15.8	0.3	26.8
	2014	0.1	13.3	0.1	18.1	0.2	31.4
	2015	0.1	12.6	0.5	15.9	0.6	28.5
Atka Mackerel	2011	*	0.8	0	29.2	0	30.0
	2012	-	0.6	0	30.1	0	30.6
	2013	*	0.7	0	16.0	0	16.6
	2014	*	0.8	0	24.0	0	24.8
	2015	*	0.6	0	30.0	0	30.6
All Groundfish	2011	7.6	223.6	91.7	560.4	99.2	784.0
	2012	4.9	222.1	86.9	621.7	91.7	843.8
	2013	3.3	162.5	106.0	597.6	109.3	760.2
	2014	4.1	190.7	80.2	540.7	84.2	731.4
	2015	5.5	186.2	104.3	605.0	109.8	791.2

Notes: These estimates include only catches counted against federal TACs. Ex-vessel value is calculated using prices on Table 18b. Please refer to Table 18b for a description of the price derivation. Catch delivered to motherships is classified by the residence 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 not adjusted for inflation.

Source: NMFS Alaska Region Catch Accounting System, Alaska Commercial Fisheries Entry Commission (CFEC) fish tickets, At-Sea Production Report (compiled and provided by the Alaska Fisheries Information Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 23.B: Ex-vessel value of groundfish delivered to shoreside processors by processor group, 2011-2015; calculations based on CFEC fish tickets ($ millions).

Region	2011	2012	2013	2014	2015
Bering Sea Pollock	247.7	262.8	230.2	247.4	209.1
AK Peninsula/Aleutians	12.0	19.7	14.9	14.1	11.4
Kodiak	79.0	87.7	68.8	80.6	76.0
South Central	44.3	36.5	26.0	28.6	30.1
Southeastern	41.9	39.9	26.2	28.3	30.5
All Regions	424.9	446.5	366.1	399.0	357.0

Table 24.B: Ex-vessel value of groundfish as a percentage of the ex-vessel value of all species delivered to shoreside processors by processor group, 2011-2015; calculations based on CFEC fish tickets (percent).

Region	2011	2012	2013	2014	2015
Bering Sea Pollock	59.2	64.2	63.3	67.0	60.2
AK Peninsula/Aleutians	4.4	7.2	5.8	4.7	4.3
Kodiak	43.7	49.2	41.5	54.0	54.1
South Central	17.0	15.6	9.7	14.4	14.9
Southeastern	13.9	15.4	8.2	12.0	15.7
All Regions	29.6	32.9	26.7	31.8	31.0

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 in Table 34. The data are for catch from both federal and state of Alaska fisheries. The processor groups are defined as follows: "Bering Sea Pollock" are the AFA inshore pollock processors including the two AFA floating processors. "AK Peninsula/Aleutian" are other processors on the Alaska Peninsula or in the Aleutian Islands. "Kodiak" are processors on Kodiak Island. "South Central" are processors west of Yakutat and on the Kenai Peninsula. "Southeastern" are processors located from Yakutat south. Values not adjusted for inflation.

Source: Alaska Commercial Fisheries Entry Commission (CFEC) fish tickets, ADFG intent to process (compiled and provided by the Alaska Fisheries Information Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

B. RESEARCH AND DATA COLLECTION PROJECT SUMMARIES AND UPDATES 2016 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 have met with a number of 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 will be a culmination of the information obtained regarding seafood markets and sources of information industry relies upon for some of their business decisions. The report 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, 2014*. 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*). We are currently seeking funding to update the market profiles in 2017.

Alaska Groundfish Wholesale Price Projections

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For a significant portion of the year there is a temporal lag in officially reported 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 2015 the most recent available official prices were from 2014). To provide information on the current state of fisheries markets, nowcasting is used to estimate 2014 first-wholesale prices from corresponding export prices which are available in near real time. 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 2016 - 2019. Resampling methods are used estimate a prediction density of potential future prices. Confidence bounds are calculated from the prediction density to give the probability that the prices will fall within a certain range. Prediction densities also provide information on the expected volatility of prices. As prices are projected past the current year the confidence bounds grow reflecting increasing uncertainty further out in the future. The results of this project will be presented in the *Status Report for the Groundfish Fisheries Off Alaska, 2014*. A technical report, Fissel (2015), details the methods used for creating the price projections.

References

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Economic Indices for the North Pacific Groundfish Fisheries: Calculation and Visualization.

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Fisheries markets are complex; goods have many attributes such as the species, product form, and the gear with which it was caught. The price that fisheries goods command and the products they compete against are both functions of these various attributes. For example, whitefish products of one species may compete with whitefish products of another species. Additionally, markets influence a processing company's decision to convert their available catch into different product types. During any given year it is determining whether to produce fillets or surimi, or perhaps to adjusting gear types to suit markets and consumer preferences. This myriad of market influences can make it difficult to disentangle the relative influence of different factors in monitoring aggregate performance in Alaska fisheries. This research employs a method that takes an aggregate index (e.g. wholesale-value index) and decomposes it into subindices (e.g. a pollock wholesale-value index and a Pacific cod wholesale-value index). These indices provide management with a broad perspective on aggregate performance while simultaneously characterizing and simplifying significant amounts of information across multiple market dimensions. A series of graphs were designed and organized to display the indices and supporting statistics. Market analysis based on these indices has been published as a section in the Economic Status of the Groundfish Fisheries Off Alaska since 2010. A technical report, Fissel (2014), details the methods used for creating the indices.

References

Fissel, B. 2014. "Economic Indices for the North Pacific Groundfish Fisheries: Calculation and Visualization." *NOAA Technical Memorandum* NMFS-AFSC-279, 59 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 rationalization or new bycatch management measures in the Gulf of Alaska (GOA) trawl groundfish fishery currently in development by the NPFMC, EDR data collection will begin 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 AFAâĂŘpermitted 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 towâĂŘlevel 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 2012-2015), 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 processors were developed, evaluated, and revised in workshop meetings and individual interviews with members of industry, and modifications to the existing A80 Trawl CP EDR form have been made to accommodate Council recommendations to extend the A80 data collection to incorporate A80 CPs GOA activity and capture data from non-A80 CPs in the GOA. The draft data collection forms and proposed rule were reviewed and approved by the Council at their April, 2014 meeting, and the proposed rule was published August 11, 2014 (79 FR 46758; see *http://alaskafisheries.noaa.gov/sustainablefisheries/trawl/edr.htm* for more information). The final rule is expected to be published by the end of 2014, authorizing mandatory data collection to begin with reporting of 2015 calendar year data (to be submitted in 2016). In preparation for this, AFSC will continue 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, and 2016.

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 data are being validated and will be analyzed once the validation process is complete.

References

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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. A paper summarizing these results is in preparation.

References

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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 emphases 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 (forthcoming) 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. It is currently being reviewed by OMB under the Paperwork Reduction Act. Assuming a timely approval, the survey will be implemented during 2017.

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Estimating Economic Values for Saltwater Sport Fishing in Alaska Using Stated Preference Data

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Knowing how anglers value their fishing opportunities is a fundamental building block of sound marine policy, especially for stocks for which there is conflict over allocation between different uses (e.g., allocation between recreational and commercial uses). This study reports on the results from an analysis of stated preference choice experiment data related to how recreational saltwater anglers value their catches and the regulations governing Pacific halibut *Hippoglossus stenolepis*, Chinook salmon *Oncorhynchus tshawytscha*, and coho salmon *O. kisutch* off the coast of Alaska.

The data used in the analysis are from a national mail survey conducted during 2007 of people who purchased sport fishing licenses in Alaska in 2006. The survey was developed with input collected through several focus groups and cognitive interviews with Alaska anglers, as well as from fishery managers. Each survey included several stated preference choice experiment questions, which ask respondents to choose between not fishing and two hypothetical fishing trip options that differ in the species targeted, length of the trip, fishing location, trip cost, and catch-related characteristics (including the expected catch and harvest restrictions). Responses to these questions are analyzed using random utility maximization-based econometric models. The model results are then used to estimate the economic value, or willingness to pay, non-resident and Alaska resident anglers place on saltwater boat fishing trips in Alaska and assess their response to changes in characteristics of fishing trips.

The results show that Alaska resident anglers had mean trip values ranging from \$246 to \$444, while non-residents had much higher values (\$2,007 to \$2,639), likely reflecting that their trips are both less common and considerably more expensive to take. Non-residents generally had significant positive values for increases in number of fish caught, bag limit, and fish size, while Alaska residents valued size and bag limit changes but not catch increases. The economic values are also discussed in the context of allocation issues, particularly as they relate to the sport fishing and commercial fishing sectors for Pacific halibut. A comparison of the marginal value estimates of Pacific halibut in the two sectors suggests that the current allocation is not economically efficient, as the marginal value in the sport sector is higher than in the directed halibut fishery in the commercial sector. Importantly, the results are not able to provide an estimate of how much allocation in each sector would result in the most efficient allocation, which requires additional data and analysis to fully estimate the supply and demand for Pacific halibut in each sector. The results from this study have been published in the *North American Journal of Fisheries Management*.

Since the data support a model specification that differentiates between values for fish that are caught and kept, caught and released (due to a bag limit restriction), and only potentially caught (fish in excess of the number caught but within the bag limit), additional work has been conducted to derive the value of these types of fishing trips. The estimated models indicate these different catch variables are important and anglers view them distinctly, generally valuing the fish they keep the highest and those they are required to release, or potentially catch, less. The marginal values anglers place on catch and release fish and potential fish were generally positive. And as a result, among resident anglers at least, this contributed to mean trip values for salmon catch-and-release fishing trips being larger than trips where the anglers catch their limits, suggesting that trips where anglers do not catch their limits are valuable. Alaska residents were willing to pay more for catch and keep halibut trips. Importantly, however, the mean trip values associated with catch-and-release only trips and trips where anglers harvested fish were not statistically different in any comparison. In addition, as illustrated above, differentiating between different types of fishing and estimating separate values for each type can influence the calculations of the marginal value of a fish often desired in policy evaluation. The paper (Lew and Larson 2014) summarizing these results have been published in *Fisheries Research*.

In addition, analyses are proceeding using data from the Alaska saltwater sport fishing survey conducted during 2012 that collected information on fishing behavior and preferences from people who purchased sport fishing licenses in Alaska in 2011. The stated preference choice experiment questions in that survey capture angler preferences for regulatory tools that were not in place when the previous survey was conducted (e.g., maximum size limits on Pacific halibut). Some results from the analysis of these data were presented at the 2013 North American Association of Fisheries Economists Biennial Forum and at the NMFS Recreational Fisheries Data and Model Needs Workshop, and were published in *Marine Policy* (Lew and Larson 2015). The Lew and Larson (2015) 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 forthcoming in *Marine Fisheries Review*.

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Geospatial Aspects of Non-Market Values for Threatened and Endangered Marine Species Protection

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An issue that arises in applying non-market values in policy settings is defining the extent of the economic jurisdiction – the area that includes all people who hold values – for a good or service. In this research, we estimate non-market values for recovering several threatened and endangered marine species in the U.S. and assess the geospatial distribution across the U.S. In two papers (Wallmo and Lew 2015, 2016), we compare estimates for households in the nine Census regions, as well as for the entire nation. We statistically compare species values between the regional samples to help determine the extent of and variation in the economic jurisdiction for endangered species recovery.

In related work, we more closely examine spatial distribution of individual willingness to pay values using tools from geographical analysis (Johnston et al. 2015). The paper demonstrates a suite of analytic methods that may be used to characterize otherwise undetectable spatial heterogeneity in stated preference willingness to pay (WTP). We emphasize flexible methods applicable to large scale analysis with diffuse policy impacts and uncertainty regarding the appropriate scales over which spatial patterns should be evaluated. Illustrated methods include spatial interpolation and multi-scale analysis of hot/cold spots using local indicators of spatial association. An application to threatened and endangered marine species illustrates the empirical findings that emerge. Relevant findings include previously unobserved, large scale clustering of non-use WTP estimates that appears at multiple scales of analysis.

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Models of Fisher and Fishery Response to Changes in Management, Markets, and the Environment

Hidden Flexibility: Institutions, Incentives, and the Hidden Margins of Selectivity in Fishing

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In 2008, participants in the non-pollock "Amendment 80" groundfish trawl fisheries were given exclusive harvesting quota privileges through their participation in cooperatives to a share of their primary target species – ending the previous common property system for all but a small number of vessels that opted out of the program.

The degree to which selectivity in fisheries is malleable to changes in incentive structures is critical for policy design. We examine data for the Amendment 80 fishery before and after a transition from management under common-pool quotas to a fishery cooperative and note a substantial shift in post-cooperative catch from bycatch and toward valuable target species. We examine the margins used to affect catch composition, finding that large and fine-scale spatial decision making and avoidance of night fishing were critical. We argue that the poor incentives for selectivity in many systems may obscure significant flexibility in multispecies production technologies. This manuscript was published in 2015 in *Land Economics*. As of October 2016, a related manuscript is also in press in *Marine Resource Economics.*

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Strong connections, loose coupling: the influence of the Bering Sea ecosystem on commercial fisheries and subsistence harvests in Alaska

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Human-environment connections are the subject of much study, and the details of those connections are crucial factors in effective environmental management. In a large, interdisciplinary study of the eastern Bering Sea ecosystem involving disciplines from physical oceanography to anthropology, one of the research teams examined commercial fisheries and another looked at subsistence harvests by Alaska Natives. Commercial fisheries and subsistence harvests are extensive, demonstrating strong connections between the ecosystem and the humans who use it. At the same time, however, both research teams concluded that the influence of ecosystem conditions on the outcomes of human activities was weaker than anticipated. Likely explanations of this apparently loose coupling include the ability of fishers and hunters to adjust to variable conditions, and the role of social systems and management in moderating the direct effects of changes in the ecosystem. We propose a new conceptual model for future studies that incorporates a greater range of social factors and their dynamics, in addition to similarly detailed examinations of the ecosystem itself.

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The Economic Impacts of Technological Change in North Pacific Fisheries

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Technological advancements have had a significant impact on fishing fleets and their behavior. Technology has expanded both the range of fish stocks we are able to target and the efficiency with which we capture, process, and bring products to market. Technology induced changes in the feasibility and efficiency of fishing can impact the composition and behavior the fishing fleet. Fissel and Gilbert (2014) provide a formal bioeconomic model with technological change showing that marked technology advances can explain over-capitalization as a natural fleet behavior for profit maximizing fishermen when total catch and effort are unconstrained and the technological advancements are known. Extending this analysis to North Pacific fisheries requires research on the theory of technological change in TAC-based and catch share management regimes as well as statistical methods for identifying unknown technological events as this data hasn't been historically collected. Fissel, Gilbert and LaRiviere (2013) extends the theory of technological change to by considering the incentive to adopt new technologies under in an open-access resource setting, finding that low stock levels in particular increase adoption incentives. This ongoing project develops the theory and methods necessary to analyze technological change in North Pacific fisheries through two in-progress manuscripts. Fissel (2013) adapts statistical methods for identifying marked changes in financial times series to the fisheries context using both simulation and empirics to show and validate the methods. North Pacific fisheries are considered with these methods as a case where technological change is unknown. This manuscript is expected to be completed in 2015. Future research on this project will use the results from these papers to analyze the impact of technological advancement in North Pacific fisheries with particular attention toward the impact of on-board computers.

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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.

Evaluating the Effectiveness of Rolling Hotspot Closures for Salmon Bycatch Reduction in the Bering Sea Pollock Fishery

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Bycatch is commonly noted as a primary problem of fisheries management and has been a recurrent management concern in the North Pacific. Bycatch levels of chum and Chinook salmon rose substantially beginning early in the last decade, with chum bycatch peaking in 2005 and Chinook bycatch reaching a record high in 2007 before bycatch of both species declined. Prior to 2011, in the Bering Sea pollock fishery, Chinook and chum salmon bycatch reduction measures consisted principally of area closures, although a Chinook salmon bycatch hard cap with individual bycatch allocations went into effect beginning 2011 which would close the fishery if the cap were reached.

Since the mid-1990s, area closures aimed at bycatch reduction have consisted of both large long-term Salmon Savings Area closures and short-term rolling hotspot (RHS) closures. Significant areas of the pollock fishing grounds have been closed at some point in all years between 1995 and 2011. Currently, the North Pacific Fishery Management Council (NPFMC) is considering several measures to further reduce Chinook and chum bycatch, including evaluating means to improve industry-imposed RHS closures. In this paper, we quantify the reduction in bycatch following the implementation of actual RHS closures. We also briefly discuss the hard cap and incentive plan agreements (IPAs) that were put in place in 2011 to reduce Chinook salmon bycatch. This work is part of on-going NPFMC consideration of salmon bycatch reduction measures and will also be submitted as a manuscript to a scientific journal.

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 draft manuscript is under internal peer review at AFSC and will soon be submitted to peer-reviewed journal.

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 2ÂřC that persists into the summer) that Pacific cod avoid. The cold pool is larger in years characterized by a large and persistent sea ice extent. Finally, climate conditions and sea ice may have lagged effects on harvesters’ revenue through their effect on recruitment, survival, total biomass, and the distribution of size and age classes. Different sizes of cod are processed into products destined for district markets. The availability and location of different size classes of cod, as well as the demand for these products, affects expected revenue and harvesters’ decisions about where to fish.

Understanding the relationship between fishing location and climate variables is essential in predicting the effects of future warming on the Pacific cod fishery. Seasonal sea ice is projected to decrease by 40% by 2050, which will have implications for the location and timing of fishing in the Bering Sea

Pacific cod longline fishery. Our research indicates that warmer years have resulted in lower catch rates and greater travel costs, a pattern which we anticipate will continue in future warmer years. This manuscript is being revised and will be submitted to a scientific journal in December 2016.

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.

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 is forthcoming in *PLOS ONE* and an additional manuscript will be submitted to a peer-reviewed journal.

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Models with Interactions Across Species

Optimal Multi-species Harvesting in Ecologically and Economically Interdependent Fisheries

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Single-species management of multi-species fisheries ignores ecological interactions in addition to important economic interactions to the detriment of the health of the ecosystem, the stocks of fish species, and fishery profits. This study uses a model to maximize the net present value from a multispecies groundfish fishery in the Bering Sea where species interact ecologically in the ecosystem, and economically through vessels' multi-product harvesting technology, switching gear types, and interactions in output markets. Numerical optimization techniques are used to determine the optimal harvest quota of each species over time. This study highlights the need to incorporate both ecological and economic interactions that occur between species in an ecosystem.

This study uses the arrowtooth flounder, Pacific cod, and walleye pollock fisheries in the Bering Sea/Aleutian Islands region off Alaska as a case study and finds the net present value of the three-species fishery is over $20.7 billion dollars in the multispecies model, over $5 billion dollars more than the net present value of the single species model. This is a function of the interdependence among species that affects other species growth. Because arrowtooth negatively impacts the growth of cod and pollock, substantially increasing the harvest of arrowtooth to decrease its stock is optimal in the multispecies model as it leads to increased growth and therefore greater potential harvests of cod and pollock. The single species model does not incorporate the feedback among species, and therefore assumes each species is unaffected by the stock rise or collapse of the others. The vessels in this fishery are also shown to exhibit cost anti-complementarities among species, which implies that harvesting multiple species jointly is more costly than catching them independently. As approaches for ecosystem-based fisheries management are developed, the results demonstrate the importance of focusing not only on the economically valuable species interact, but also on some non-harvested species, as they can affect the productivity and availability of higher value species. A paper describing this project was published in *Environmental and Resource Economics* (Kasperski 2015).

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Optimal Multispecies Harvesting in the Presence of a Nuisance Species

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The need for ecosystem based fisheries management is well recognized, but substantial obstacles remain in implementing these approaches given our current understanding of the biological complexities of the ecosystem and the economic complexities surrounding resource use. This study develops a multispecies bioeconomic model that incorporates ecological and economic interactions to estimate the optimal catch and stock size for each species in the presence of a nuisance species. The nuisance species lowers the value of the fishery by negatively affecting the growth of the other species in the ecosystem, and has little harvest value of its own. This study empirically estimates multispecies surplus production growth functions for each species and uses these parameters to explore the impact of a nuisance species on the management of this ecosystem. Multiproduct cost functions are estimated for each gear type in addition to a count data model to predict the optimal number of trips each vessel takes. These functions are used, along with the estimated stock dynamics equations, to determine the optimal multispecies quotas and subsidy on the harvest of the nuisance species to maximize the total value of this three species fishery.

This study uses the arrowtooth flounder, Pacific cod, and walleye pollock fisheries in the Bering Sea/Aleutian Islands region off Alaska as a case study and finds the net present value of the fishery is decreased from $20.7 billion to $8.5 billion dollars by ignoring arrowtooth's role as a nuisance species on the growth of Pacific cod and walleye pollock. The optimal subsidy on the harvest of arrowtooth summed over all years is $35 million dollars, which increases the net present value by $273 million dollars, after accounting for the subsidy. As arrowtooth flounder is a low value species and has a large negative impact on the growth of cod and pollock, it is optimal to substantially increase the harvesting of arrowtooth, lowering its population which results in increased growth and harvesting in the two profitable fisheries. Ignoring the role of the nuisance species results in a substantially less productive and lower value fishery than if all three species are managed optimally. This study highlights the role of both biological and technological interactions in multispecies or ecosystem approaches for management, as well as the importance of incorporating the impacts non-harvested species can have on the optimal harvesting policies in an ecosystem. The paper describing these results was published in *Marine Policy.*

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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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Most regional economic models developed for North Pacific fisheries are designed to depict either the whole state (i.e., Alaska) or an administrative region (e.g., the Southeast region). While these models are designed to calculate the impacts of fishery management actions on relatively large regions, they may not as accurately represent impacts on smaller, fishing-dependent areas such as boroughs, census areas or "fishing communities". Therefore, results from these large models may be less useful for fishery managers, policy makers and other parties interested in illustrating impacts on specific communities, especially ones with very unique economic structures. No existing study has yet developed models designed to estimate impacts on individual fishing-dependent communities in Alaska.

To develop borough and census area (BCA)-level models, we, as a first step, completed collection of regional economic data for six BCAs comprising the Southwest Alaska region. We did this because the seafood industry data from IMPLAN is generally not reliable. We conducted (i) vessel surveys where we collected information on expenditures and employment from fish harvesting vessels, (ii) informal interviews with shoreside processors for similar information, and (iii) informal interviews with local businesses for data on their sales to seafood industries. In addition to this information, we also obtained data on the geographical distribution of vessel expenditures through the vessel surveys.

These data combined with the basic regional economic structure for each BCA from IMPLAN will be used to develop regional economic models such as social accounting matrix (SAM) and/or computable general equilibrium (CGE) models for each of the fishing-dependent BCAs in the Southwest region. The models will be able to calculate BCA-level impacts of fishery management issues. With information collected on the location of input purchases, we will also be able to estimate impacts transmitted to the remainder of Alaska and to West Coast states. The resulting models will provide more accurate and targeted measures of impacts for fishery managers, policy makers and other parties interested in understanding the effects of fishery policies and other environmental shocks (such as climate change) on fishing dependent communities in Alaska.

For the next step, we recently published a request for proposals (RFP) in order to find the most qualified contractor(s) who can assemble the data set (i.e., SAMs), and develop the regional economic models including both single region and multi-regional models.

Estimating the Economic Impact of Non-resident Anglers' Saltwater Sportfishing Harvest Restrictions in Alaska: a Multi-regional CGE Analysis

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Most previous studies of economic impacts related to recreational fishing use a single-region economic impact model, such as social accounting matrix (SAM) model or computable general equilibrium model (CGE). However, the limitation of the single-region model is that it fails to capture the economic impacts occurring outside of the region where the initial policy shock is given. In this study, we use a multi-regional CGE (MRCGE) model to calculate the multi-regional economic impacts of various harvest limits imposed on several important recreational fishing species in Alaska waters targeted by non-resident Alaska anglers. In so doing, we use a stated preference model of saltwater sportfishing participation to estimate changes in participation arising from changes in harvest limits for Pacific halibut (*Hippoglossus stenoleptis*), chinook salmon (*Oncorhynchus tshawytscha*), and coho salmon (*Oncorhynchus kisutch*). We then use a MRCGE model to calculate the economic impacts of these bag limit changes that occur in Alaska, West Coast, and the Rest of the US. Preliminary results indicate that the economic impacts occurring in the three regions depend on the assumption regarding how the changes in non-resident anglers' spending from changes in the bag limits are spent in the three regions. The MRCGE model has been refined, and a manuscript presenting the model and results has been submitted to a journal.

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.

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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 close to $2 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 2013), 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.

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Social Baseline of the Gulf of Alaska Groundfish Trawl Fishery: Results of the 2014 Social Survey

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The North Pacific Fishery Management Council (NPFMC) is considering the implementation of a new bycatch management program for the Gulf of Alaska (GOA) groundfish trawl fishery. Any change in how the fishery is managed will likely affect the people and communities participating in the fishery. In anticipation of such changes, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) Alaska Fisheries Science Center developed and implemented a survey to collect baseline information about the social dimensions of the fishery in 2014. Data were collected before program implementation in order to provide a baseline description of the industry as well as allow for analysis of changes the bycatch management program may bring for individuals and communities once implemented. A similar data collection is planned to occur in the year prior to program implementation in order to capture social changes in the fishery occurring during program development and to provide a second comparison baseline prior to implementation. Having a detailed baseline description will allow for a greater understanding of the social impacts the program may have on the individuals and communities affected by the new management program. When combined with data to be collected in planned post-program implementation follow-up surveys, this information will inform changes in the social characteristics over time and assist in a more comprehensive program evaluation and more informed consideration of potential post-implementation modifications of the program, if needed.

A survey instrument was developed to gather data on the social dimensions of the fishery. The survey was available in-person with field researchers in Kodiak, Seattle, King Cove, and Sand Point or for participants to take online, or over the phone. We conducted the survey with participants in the GOA groundfish trawl fishery, including vessel owners, vessel operators, crew aboard groundfish vessels, catcher/processor owners, catcher/processor crew, shoreside and inshore floating processors, tender owners and operators, and other individuals who are stakeholders in the trawl fishery including any businesses that are directly tied to the groundfish trawl industry through the supply of commercial items to include, but not limited to gear suppliers, fuel suppliers, and equipment suppliers. Overall, approximately 50% (n = 1,569) of people directly involved in the GOA groundfish trawl fishery participated in the survey.

The results of the survey highlight the differences in the people, sectors, and communities engaged in the fishery. For example, an average, CV owners were found to be 57.2 years old while skippers were 49.2 and crew were 37.8 years old on average. Additionally, participants reported that a significant amount of their spouses or partners participate in the fishing industry in some way. This suggests that the effects of management changes may extend beyond direct fishery participants. There is a wide range of number of years respondents have been participating in commercial fishing or processing. CV owners started working on average at 16 years old and have 39.8 years of experience. CV skippers started working at 17.8 years old and have 30 years of experience. CV crew started working at 18.5 years old and have 18.4 years of experience. Additionally, the majority of respondents only have one job and are therefore very tied to fishing.

A NOAA Tech Memo summarizes the project and results.

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Perceptions of Measures to Affect Active Participation, Lease Rates and Crew Compensation in the Bering Sea/Aleutian Islands Crab Fisheries

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In 2010 the North Pacific Fishery Management Council (NPFMC) completed a 5-year review of the Bering Sea and Aleutian Islands (BSAI) Crab Rationalization Program. The review highlighted a suite of social concerns that have emerged in the fishery since the management change. The central issues perceived by the NPFMC were that lease rates are being charged against crew pay, the difficulty for skippers and crew to purchase quota shares, and concerns about quota ownership by people or entities that do not have a financial stake in a vessel. The NPFMC initiated discussion and analyses on these issues and ultimately decided to encourage the crab fleet to address the issues through voluntary measures. The crab cooperatives developed measures to address the NPFMC's concerns, which were implemented in 2013. The measures include the Right of First Offer (ROFO) program, which gives skippers and crew an initial opportunity to purchase quota shares, and a voluntary lease rate cap for two of the eight crab fisheries. The National Marine Fisheries Service's Alaska Fisheries Science Center developed a study in 2014 to gather perspectives on the cooperative measures from fishery participants.

This study involved interviews with a diverse group of participants in the BSAI crab fisheries where their perceptions on measures to affect access to quota shares, active participation, and lease rates were discussed. A total of 220 individuals across 6 participant categories shared their perspectives. These individuals contributed to a response rate of 25.9% of the total population of participants in these fisheries; however, the overall response rate excluding crew was 45.1%, representing individuals from 87.2% of the active vessels in the BSAI crab fisheries in 2012.

Overall, the individuals that were interviewed spoke to many reasons why skippers and crewmembers are not, as a majority, purchasing quota shares. The reasons relate to the price of quota shares, the lack of availability of shares, a lack of knowledge to navigate the system, and misgivings about the time commitment to pay off an investment and remain committed to the fisheries. These perceptions and opinions are ultimately affecting the lack of use of the ROFO program. Several interviewees related the lack of availability back to the minimal active participation requirements of the program. The minimal active participation requirements in the program have allowed an extensive leasing culture in the fishery and the specific goals of the lease rate cap are not widely understood by interview participants. There is considerable sentiment among those who were interviewed that compliance with the caps is at best less than complete. In general, many interviewees held negative views of the leasing market and were distrusting of their fellow participants likelihood of long-term compliance with a voluntary measure.

This study is an important step forward in incorporating the views of participants in the BSAI crab fisheries into the management of those fisheries. It provides an important complement to the fisheries' economic data collection program and provides context for the quantitative data available on the operation of the fisheries. More importantly, it provides a voice to the people involved in the fishery and brings to light information about how those individuals understand and experience issues that have been a central discussion topic at the NPFMC over recent years. Specifically, the results of this study highlight underlying issues in the crab fisheries that seem to be driving the perceived issues with access to quota shares, lease rates, and active participation; issues that are not addressed by the current voluntary cooperative measures. Additionally, it suggests areas for future research that will ultimately better inform managers about how to more effectively address these social goals.

A NOAA Tech Memo summarizing the project and results was completed in 2015 (Himes-Cornell, 2015).

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Tools to Explore Alaska Fishing Communities

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Community profiles have been produced for fishing communities throughout the state of Alaska in order to meet the requirements of National Standard 8 of the Magnuson-Stevens Act and provide a necessary component of the social impact assessment process for fisheries management actions. These profiles provide detailed information on elements of each fishing community, including location, demographics, history, infrastructure, governance, facilities, and involvement in state and federal fisheries targeting commercial, recreational and subsistence resources. A total of 196 communities from around Alaska were profiled as part of this effort.

However, these profiles are static and require manual updates as more recent data become available. In order to address this in a more effective way, social scientists in the AFSC Economic and Social Science Research Program have developed two web-based tools to provide the public with information on communities in Alaska: fisheries data maps and community snapshots. There are three distinct fisheries data maps providing a time series on community participation in commercial, recreational, and subsistence fishing. The community snapshots take the pulse of Alaskan fishing communities using information about their fishing involvement and demographic characteristics. Each snapshot provides information on:

- What commercial species are landed and processed in the community;
- The number of crew licenses held by residents;
- The characteristics of fishing vessels based in the community;
- Processing capacity

- Participation in recreational fishing (including both charter businesses and individual anglers);
- Subsistence harvesting dependence;
- Demographic attributes of the community (including educational attainment, occupations by industry, unemployment, median household income, poverty, median age, sex by age, ethnicity and race, and language and marginalization);
- Social vulnerability indices (These indices represent social factors that can shape either an individual or community's ability to adapt to change. These factors exist within all communities regardless of the importance of fishing. The indices include: Poverty, Population Composition, Personal Disruption, and Housing Disruption.); and
- Fishing engagement and reliance indices (These indices portray the importance or level of dependence of commercial or recreational fishing to coastal communities. The indices include: Commercial Engagement, Commercial Reliance, Recreational Engagement and Recreational Reliance

These web-based tools are updated as new data become available and currently include the years in parentheses below.

To access the community profiles; go to: *http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/CPU.php*

To access the *NEW* community snapshots (available for years 2000-2011); go to:

http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communitysnapshots/main.php

To access the commercial fisheries data maps (available for years 2000-2014); go to: *http://www.afsc.noaa.gov/maps/ESSR/commercial/default.htm*

To access the recreational fisheries data maps (available for years 1998-2014); go to: *http://www.afsc.noaa.gov/maps/ESSR/recreation/default.htm*

To access the subsistence fisheries data maps (available for years 2000-2008); go to: *http://www.afsc.noaa.gov/maps/ESSR/subsistence/default.htm*

Developing Comparable Socio-economic Indices of Fishing Community Vulnerability and Resilience for the Contiguous US and Alaska

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The ability to understand the vulnerability of fishing communities is critical to understanding how regulatory change will be absorbed into multifaceted communities that exist within a larger coastal economy. Creating social indices of vulnerability for fishing communities provides a pragmatic approach toward standardizing data and analysis to assess some of the long term effects of management actions. Over the past several years, social scientists working in NOAA Fisheries' Regional Offices and Science Centers have been engaged in the development of indices for evaluating aspects of fishing community vulnerability and resilience to be used in the assessment of the social impacts of proposed fishery management plans and actions (Colburn and Jepson, 2012; Himes-Cornell and Kasperski, 2015). These indices are standardized across geographies, and quantify conditions which contribute to, or detract from, the ability of a community to react positively towards change. National-level indicators for all U.S. coastal communities can be found using the "Explore the Indicator Map" link from the main NMFS social indicators webpage here: *http://www.st.nmfs.noaa.gov/humandimensions/social-indicators/*.

The Alaska Fisheries Science Center (AFSC) has compiled socio-economic and fisheries data for over 300 communities in Alaska and developed developed indices specific to Alaska communities (Himes-Cornell and Kasperski, 2016) using the same methodology as Jepson and Colburn (2013). To the extent feasible, the same sources of data are being used in order to allow comparability between regions. However, comparisons indicated that resource, structural and infrastructural differences between the NE and SE and Alaska require modifications of each of the indices to make them strictly comparable. The analysis used for Alaska was modified to reflect these changes. The data are being analyzed using principal components factor analysis (PCFA), which allows us to separate out the most important socio-economic and fisheries related factors associated with community vulnerability and resilience in Alaska within a statistical framework.

These indices are intended to improve the analytical rigor of fisheries Social Impact Assessments, through adherence to National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act, and Executive Order 12898 on Environmental Justice in components of Environmental Impact Statements. Given the often short time frame in which such analyses are conducted, an advantage to this approach is that the majority of the data used to construct these indices are readily accessible secondary data and can be compiled quickly to create measures of social vulnerability and to update community profiles.

Although the indices are useful in providing an inexpensive, quick, and reliable way of assessing potential vulnerabilities, they often lack external reliability. Establishing validity on a community level is required to ensure indices are grounded in reality and not merely products of the data used to create them. However, achieving this requires an unrealistic amount of ethnographic fieldwork once time and budget constraints are considered. To address this, a rapid and streamlined groundtruthing methodology was developed to confirm external validity from a set of 13 sample communities selected based on shared characteristics and logistic feasibility (Himes Cornell, et al. 2016). This qualitative data was used to test the construct validity of the quantitative well-being indices. Specifically, this methodology used a test of convergent validity: in theory, the quantitative indices should be highly correlated with the qualitative measure. This comparison helps us understand how well the estimated well-being indices represent real-world conditions observed by researchers. Study findings suggest that some index components exhibit a high degree of construct validity based on high correlations between the quantitative and qualitative measures, while other components will require refinement prior to their application in fisheries decision-making. Further, the results provides substantial evidence for the importance of groundtruthing quantitative indices so they may be better calibrated to reflect the communities they seek to measure.

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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Catch Shares Programs and Quota Markets

What Lessons Do Non-Fisheries Tradable Permit Programs Have for the Alaska Halibut Catch Sharing Plan?

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To address long-standing allocation conflicts between the Pacific halibut commercial fishing sector and recreational charter (for-hire) sector in Alaska, an Alaska halibut catch sharing plan (CSP) was implemented in 2014 that has a provision allowing the leasing of commercial individual fishing quota to recreational charter businesses. This one-way inter-sectoral trading allows for the charter sector to increase its share of the total allowable catch while compensating commercial fishermen. In this work, we examine the literature on non-fisheries tradable permit programs (TPPs) that have similarities to the Alaska halibut CSP program. Several successful TPPs are discussed, including ones from emissions trading programs, water quality trading programs, water markets, and transferable development rights programs. They are then evaluated in terms of their similarities and differences to the Alaska CSP program. Characteristics not part of the current CSP that other TPPs have used and that may increase the likelihood for the CSP to be effective in achieving its primary goals (if they are implemented) are identified, such as allowing more flexible transfers (e.g., internal transfers), intertemporal banking, cooperative structures, and multi-year leasing. The paper (Call and Lew 2015) has been published in *Marine Policy.*

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Understanding Charter Halibut Permit Holders’ Preferences, Attitudes, and Behavior Under the Alaska Halibut Catch Sharing Plan

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The Alaska charter boat sector has undergone significant change in recent years due, at least in part, to regulatory changes in the management of the Pacific halibut sport fishery. To control growth of the charter sector in the primary recreational charter boat fishing areas off Alaska, a limited entry program was implemented in 2011 (75 Federal Register 554). In addition, in the past several years, charter vessel operators in Southeast Alaska (International Pacific Halibut Commission [IPHC] Area 2C) and Southcentral Alaska (Area 3A) have been subject to harvest controls that impose both size and bag limits on the catch of Pacific halibut on guided fishing trips, with these limits being more restrictive than the regulations for non-guided trips (e.g., 78 Federal Register 16425). Most recently, a Halibut Catch Sharing Plan (CSP) was implemented during 2014 that formalizes the process (a) of allocating catch between the commercial and charter sector and (b) for evaluating changes to harvest restrictions (78 FR 75843). Importantly, the CSP allows leasing of commercial halibut individual fishing quota (IFQ) by eligible charter businesses. Leased halibut IFQ (called guided angler fish, or GAF) could then be used by charter businesses to relax harvest restrictions for their angler clients, since GAF fish would not be subject to the charter sector-specific size and bag limits that may be imposed—though the non-charter sector size and bag limit restrictions (currently two fish of any size per day) would still apply to charter anglers individually.

Under the initial rules for the IFQ leasing program, henceforth the GAF leasing program, several restrictions are placed on the use of GAF, including the following:

1. **Single-season use**. GAF must be used before the end of the season for which it is leased, with automatic returns if the GAF is unused by a certain date (15 days before the end of the commercial fishing season).

2. **No transfers.** GAF can't be transferred between CHP holders during the season.

The restrictions listed above are features that are sometimes relaxed in other IFQ (or, more generally, tradable permit) programs to increase flexibility for participants. Recent research has shown that the restrictions imposed on transfers within IFQ markets can have significant effects on economic efficiency and other goals (e.g., Kroetz et al. 2015).

To inform decision makers about the likely impacts of relaxing program features such as those above, as well as other programs that may be considered by the North Pacific Fishery Management Council (Council), AFSC developed and implemented a survey that collects data from eligible participants in the IFQ leasing market to determine their attitudes towards, and behavior in, the lease market and attitudes and preferences towards alternative programs. The survey was developed during 2013 and 2014 with input from staff from the Council, NMFS Alaska Region, and ADF&G, and was qualitatively pretested with members from the target population (Alaska charter halibut permit holders). It was implemented in 2015, and the data are summarized in a NOAA Technical Memorandum (Lew et al. 2016).

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U.S. Catch Share Markets: A Review of Characteristics and Data Availability

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A growing number of U.S. fisheries are managed with catch share systems, which allocate exclusive shares of the total allowable catch from a fish stock to individuals, cooperatives, communities, or other entities. All of these catch share programs allow transferability of catch privileges in some form. Information on these transfers, particularly prices, can be valuable to fishery managers and to fishery participants and other stakeholders. We document the availability and quality of data on transfers of catch privileges in fourteen U.S. catch share programs, including programs in every U.S. region except the Pacific Islands. The catch share programs reviewed include several individual fishing quota (IFQ) programs as well as a number of programs that allocate catch privileges to selfâĂŘorganized cooperatives. We provide a short synopsis of each catch share program and quota market including a short description of the fishery, the management system, and the rules for transferring quota share(QS) and quota pounds (QP). Each synopsis also includes a description of the information collected on QS and QP transfers and an evaluation of the availability and quality of QS and QP price information and other useful information that can be derived from transfer data. We do not attempt to evaluate the efficiency of any of the catch share markets, nor provide inâĂŘdepth analysis of market data, but we do provide some evaluation of the potential to use catch share market data to provide useful information to stakeholders and managers. We make recommendations on how to improve the design of catch share systems and associated data collection systems to facilitate effective catch share markets, collection of catch share market data, and better use of information from catch share markets.

A manuscript describing this project has been published as a NOAA Tech Memo (Holland et al. 2014) and a shorter journal article was published in *Marine Policy* (Holland et al. 2015).

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Productivity Change in U.S. Catch Share Fisheries

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In fisheries, productivity refers to the relationship between the quantity of fish produced and the quantity of inputs used to harvest fish. We are concerned with "multi-factor" productivity since fish are caught using multiple inputs such as capital (e.g. fishing vessels), crew, fuel, ice, bait, etc. A change in multi-factor productivity (MFP) measures changes in outputs and inputs between two time periods. MFP may improve either by harvesting more fish with the same amount of inputs or by harvesting the same amount of fish using fewer inputs. By ending the "race to fish" catch share programs may be expected to lead to improved productivity through the ability to better plan harvesting activities to change the mix of outputs and/or make better use of capital and other inputs. Productivity gains may also be obtained through the transfer of quota from less to more efficient vessels.

Annual MFP was estimated for a total of 20 catch share programs or sub-components of catch share programs using the Lowe index. Of the 20 programs, 13 included pre-catch share baseline conditions. In 10 of 13 cases, MFP improved during the first three years after program implementation. These productivity gains were maintained in all six catch share programs that have been in existence since at least 2007, and MFP continued to substantially improve in five of six longer-term programs after the first three years of program implementation.

Ideally MFP would be estimated using full information on inputs including capital, labor, energy, materials, and services. In 11 of the 20 fisheries evaluated in this report available data were limited to capital and labor. Analysis of the 9 programs that included energy and the 5 programs that also included materials found that energy made a larger contribution to estimated MFP as compared to capital and labor alone or to specifications including only capital, labor, and materials. This suggests that new data collection or new methods to estimate fuel use may be a priority in improving estimation of MFP in future studies.

The biomass index plays an important role in characterizing changes in MFP in catch share programs, as biomass changes may affect the catchability of fish and thus harvesting productivity. However, obtaining biomass data was a time consuming process, and in some cases, required a stock-by-stock evaluation of the reliability of the biomass information that was available. In most instances, biomass adjusted and biomass unadjusted measures of MFP were consistent in terms of productivity change relative to baseline conditions although, unadjusted MFP underestimates productivity change when biomass is declining and overestimates productivity change when biomass is increasing. The magnitude of the difference between unadjusted and adjusted MFP increases with the magnitude of the biomass trend. If the biomass trend is sufficiently large, then biomass unadjusted MFP may provide a false impression of change in MFP. This means that obtaining reliable biomass data will be important in any future updates to MFP in catch share fisheries conducted by NMFS.

A manuscript describing this project was published as a NOAA Tech Memo (Walden et al. 2014) and a shorter journal article was published in *Marine Policy* (Thunberg et al. 2015).

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The Impact of Access Restrictions on Fishery Income Diversification of US West Coast Fishermen

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Access to most fisheries on the US West Coast was essentially open prior to the mid-1970s when state licenses were first limited for salmon fisheries. Subsequently, licenses to most fisheries on the West Coast have been limited, and the numbers of licenses in many fisheries have been reduced with buyback programs. More recently, catch share programs, which dedicate exclusive shares of catch to individuals or cooperatives, have been introduced in several sectors of the federally managed Pacific groundfish fishery. As access to fisheries has become more restricted, revenue diversification of West Coast fishing vessels has generally declined. This is a source of concern, since diversification has been shown to reduce year-to-year variation in revenue and thus financial risk (Kasperski and Holland, 2013). However, catch share programs may create more security and stability in vessels' landings which may offset effects of less diversification.

Our results show that vessels that entered West Coast fisheries later are, on average, less diversified than those which entered earlier, but diversification declined even for the fleet of vessels active since 1981. Diversification declined further following implementation of catch share programs on the West Coast. However, year-to-year variation in revenue decreased post-catch share for the majority of vessels, including those who exited the catch share fisheries, and in most of the catch share fisheries, a majority of vessels received increases in average revenues in the years following the catch share implementation. Overall, our results suggest that there may be a tradeoff between the efficiency gains enabled by restricting access and the risk reduction benefits associated with greater diversification.

A manuscript describing this project is currently in press at *Coastal Management* (Holland and Kasperski, 2016).

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C. AFSC ECONOMIC AND SOCIAL SCIENCES RESEARCH PROGRAM PUBLICATIONS FOR FULL-TIME STAFF (NAMES IN BOLD) IN FY16

Under Internal Review

Seung, C., and **D. Lew.** "A Multi-Regional Approach for Estimating the Economic Impact of Harvest Restrictions on Saltwater Sport Fishing in Alaska."

Most previous studies of economic impacts from outdoor recreation in general, and recreational fishing in particular, use a single-region economic impact model such as a social accounting matrix (SAM) model or computable general equilibrium model (CGE). A primary limitation of single-region models is that they ignore the economic impacts occurring outside of the modeled region, thus implicitly assuming that economic impacts outside of the single region do not matter. To relax this strong assumption, we use a multi-regional CGE (MRCGE) model to calculate the economic impacts across multiple regions resulting from various harvest limits imposed on several important recreational fishing species in Alaska waters targeted by non-Alaska anglers. To this end, we use a stated preference model of saltwater sport fishing participation to estimate changes in participation arising from changes in harvest limits for Pacific halibut (*Hippoglossus stenoleptis*), Chinook salmon (*Oncorhynchus tshawytscha*), and coho salmon (*Oncorhynchus kisutch*). We then use a MRCGE model to calculate the economic impacts of bag limit changes that occur in three regions – Alaska, the U.S. West Coast, and the Rest of the U.S.

Whitehead, J., and **D. Lew**. "Estimating Recreation Benefits through Joint Estimation of Revealed and Stated Preference Discrete Choice Data."

We develop econometric models to jointly estimate revealed preference (RP) and stated preference (SP) models of recreational fishing behavior and preferences using survey data from the 2007 Alaska Saltwater Sportfishing Economic Survey. The RP data are from site choice survey questions, and the SP data are from a discrete choice experiment. Random utility models using only the RP data may be more likely to estimate the effect of cost on site selection well, but catch per day estimates may not reflect the benefits of the trip as perceived by anglers. The SP models may be more likely to estimate the effects of trip characteristics well, but less attention may be paid to the cost variable due to attribute non-attendance. The combination and joint estimation of RP and SP data seeks to exploit the contrasting strengths of both. We find that there are significant gains in econometric efficiency, and differences between RP and SP willingness to pay estimates are mitigated by joint estimation. The nested logit "trick" model fails to account for the panel nature of the data and is less preferred to the mixed logit error components model that accounts for panel data and scale differences. NaÃŕve scaled, mixed logit, and generalized multinomial logit models produced similar results to a generalized multinomial logit model that accounts for scale differences in RP and SP data. Willingness to pay estimates do not differ across these models but are greater than those in the mixed logit error components model.

In press

Busch, S., R. Griffis, J. Link, K. Abrams, J. Baker, R. Brainard, M. Ford, J. Hare, **A. Himes-Cornell**, A. Hollowed, K. Osgood, N. Mantua, S. McClatchie, M. McClure, M. Nelson, M. Rust, Vincent Saba, M. Sigler, S. Sykora-Bodie, C. Toole, E. Thunberg, and R. Waples (In press). Climate science strategy for the US National Marine Fisheries Service. Accepted at *Marine Policy*.

Changes to our climate and oceans are already affecting living marine resources (LMRs) and the people, businesses, and economies that depend on them. As a result, the U.S. National Marine Fisheries Service (NMFS) has developed a Climate Science Strategy (CSS) to increase the production and use of the climate-related information necessary to fulfill its LMR stewardship mission for fisheries management and protected species conservation. The CSS establishes seven objectives: (1) determine appropriate, climate-informed reference points; (2) identify robust strategies for managing LMRs under changing climate conditions; (3) design decision processes that are robust to climate-change scenarios; (4) predict future states of ecosystems, LMRs, and LMR-dependent human communities; (5) determine the mechanisms of climate-change

related effects on ecosystems, LMRs, and LMR-dependent human communities; (6) track trends in ecosystems, LMRs, and LMR-dependent human communities and provide early warning of change; and (7) build and maintain the science infrastructure required to fulfill NMFS mandates under changing climate conditions. These objectives provide a nationally consistent approach to addressing climate-LMR science needs that supports informed decision-making and effective implementation of the NMFS legislative mandates in each region. Near term actions that will address all objectives include:

(1) conducting climate vulnerability analyses in each region for all LMRs; (2) establishing and strengthening ecosystem indicators and status reports in all regions; and (3) developing a capacity to conduct management strategy evaluations of climate-related impacts on management targets, priorities, and goals. Implementation of the Strategy over the next few years and beyond is critical for effective fulfillment of the NMFS mission and mandates in a changing climate.

Dalton, M., Lee, J. Alaska fisheries and global trade: king crab, *Paralithodes camtschaticus*; sockeye salmon, *Oncorhynchus nerka*, and walleye pollock, *Gadus chalcogrammus*. In press. *Marine Fisheries Review*.

Wholesale revenues for seafood products from Alaska red king crab, *Paralithodes camtschaticus;* sockeye salmon, *Oncorhynchus nerka,* and walleye pollock, *Gadus chalcogrammus,* fisheries in Alaska were greater than $2 billion dollars in 2012 and more than half of this amount came from exports. Globally, Alaska king crab competes with Russian king crab, and market prices are highly variable. Alaska walleye pollock producers also compete with Russia, though prices are less variable than king crab. The U.S. imports large amounts of farmed Atlantic salmon, *Salmo salar,* from Canada. In exchange, Canada was the top export destination for Alaska sockeye salmon in 2012 and number two (after Japan) for Alaska king crab. Wholesale prices for Alaska sockeye followed import prices of farmed Atlantic salmon from Canada until 2008, and then increased relative to import prices.

Haynie, A.C. and H.P. Huntington. 2016. "Strong connections, loose coupling: The influence of the Bering Sea ecosystem on commercial fisheries and subsistence harvests in Alaska." In press. *Ecology and Society*.

Human-environment connections are the subject of much study and the details of those connections are crucial factors in effective environmental management. In a large, interdisciplinary study of the eastern Bering Sea ecosystem involving disciplines from physical oceanography to anthropology, one of the research teams examined commercial fisheries and another looked at subsistence harvests by Alaska Natives. Commercial fisheries and subsistence harvests are extensive, demonstrating strong connections between the ecosystem and the humans who use it. At the same time, however, both research teams concluded that the influence of ecosystem conditions on the outcomes of human activities was less than anticipated. Likely explanations of this apparently loose coupling include the ability of fishers and hunters to adjust to variable conditions and the role of social systems and management in moderating the direct impacts of changes in the ecosystem. We propose a new conceptual model for future studies that incorporates a greater range of social factors and their dynamics, in addition to similarly detailed examinations of the ecosystem itself.

Holland, D.S. and **S. Kasperski**. 2016. "The Impact of Access Restrictions on Fishery Income Diversification of US West Coast Fishermen". *In Press at Coastal Management*. .

Access to most fisheries on the US West Coast was essentially open prior to the mid-1970s when state licenses were first limited for salmon fisheries. Subsequently, licenses to most fisheries on the West Coast have been limited, and the numbers of licenses in many fisheries have been reduced with buyback programs. More recently, catch share programs, which dedicate exclusive shares of catch to individuals or cooperatives, have been introduced in several sectors of the federally managed Pacific groundfish fishery. As access to fisheries has become more restricted, revenue diversification of West Coast fishing vessels has generally declined. This is a source of concern, since diversification has been shown to reduce year-to-year variation in revenue and thus financial risk. However, catch share programs may create more security and stability in vessels' landings which may offset effects of less diversification. Nevertheless, there may be a tradeoff between the efficiency gains enabled by restricting access and risk reduction benefits associated with greater diversification.

Lew, D., and D. Larson. "Stated Preferences of Alaska Resident Saltwater Anglers for Contemporary Regulatory Policies." Forthcoming in *Marine Fisheries Review*.

Over the last several years, there have been substantial changes to the harvest regulations governing the Pacific halibut, *Hippoglossus stenolepis*, fishery off Alaska, notably in the recreational charter boat fishing sector. One change has involved anglers fishing from charter (for hire) boats being subject to increasingly restrictive harvest regulations that do not apply to other anglers. This article analyzes how the economic values that Alaska resident anglers place on charter and private boat fishing is affected by these regulations, which consist of bag and size limits. This information can be helpful to fishery managers in assessing the trade-offs in economic benefits associated with different regulatory tools used to manage angler harvest levels. Using stated preference data from a 2012 survey, we estimate panel rank-ordered mixed logit models to estimate the economic value, or willingness to pay (WTP), Alaska resident anglers place on boat-based saltwater fishing trips in the two principal regions in which saltwater fishing occur, Southeast Alaska and Southcentral Alaska. The results indicate that Alaska resident anglers have strong preferences for private boat fishing in both regions, with mean values ranging from $172 to over $2,000 per trip, depending upon the species targeted, the regulations, and which region the fishing occurred. Our analysis also suggests that Alaska resident anglers place much less value on charter boat fishing trips for halibut in Southcentral Alaska that are subject to the kinds of restrictive bag and harvest restrictions seen in recent years.

Reimer, M., J.K. Abbott, and **A. Haynie**. 2016. "Empirical Models of the Fishery Production Process: Conflating Technology with Incentives?" In press. *Marine Resource Economics*.

Conventional empirical models of the fishing production process 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.

Ren, X., Weitzel, M., O'Neill, B.C., Lawrence, P., Meiyappan, P., Levis S., Balistreri, E., **Dalton, M.** Avoided economic impacts of climate change on agriculture: integrating a land surface model (CLM) with a global economic model (iPETS). In press. *Climatic Change*.

Crop yields are vulnerable to climate change. We assess the global impacts of climate change on agricultural systems under two climate projections (RCP8.5 and RCP4.5) to 14 quantify the difference in impacts if climate change was reduced.We also employ two different socioeconomic pathways (SSP3 and SSP5) to assess the sensitivity of results to the underlying socioeconomic conditions. The integrated-Population-Economy-Technology-Science (iPETS) model, a global integrated assessment model for projecting future energy use, land use and emissions, is used in conjunction with the Community Earth System Model (CESM), and particularly its land surface component, the Community Land Model (CLM), to evaluate climate change impacts on agriculture. iPETS results are produced at the level of nine world regions for the period 2005–2100. We employ climate impacts on crop yield derived from CLM, driven by CESM simulations of the two RCPs. These yield effects are applied within iPETS, imposed on baseline and mitigation scenarios for SSP3 and SSP5 that are consistent with the RCPs. We find that the reduced level of warming in RCP4.5 (relative to RCP8.5) can have either positive or negative effects on the economy since crop yield either increases or decreases with climate change depending on assumptions about CO2 fertilization. Yields are up to 12% lower, and crop prices are up to +15 % higher, in RCP4.5 relative to RCP8.5 if CO2 fertilization is included, whereas yields are up to 22 % higher, and crop prices up to 22% lower, if it is not. We also find that in the mitigation scenarios (RCP4.5), crop prices are substantially affected by mitigation actions as well as by climate impacts. For the scenarios we evaluated, the development pathway (SSP3 vs SSP5) has a larger impact on outcomes than climate (RCP4.5 vs RCP8.5), by a factor of 3 for crop prices, 11 for total cropland use, and 35 for GDP on global average.

Szymkowiak, M. and **A. Himes-Cornell** (*In press*). Do active participation measures help fishermen retain fishing privileges? Accepted at *Coastal Management.*

In numerous fisheries management programs, managers have implemented measures to ensure that the benefits of the fishery accrue to those who are actively fishing. Although active participation measures are common in fisheries management, there has been limited research on these measures. This study highlights the variety of objectives that motivate the development of active participation measures and how they have been implemented. We examine the application of these measures in four case study fisheries management programs – the Alaska Halibut and Sablefish Individual Fishing Quota, the Pacific Coast Sablefish Permit Stacking, the Bering Sea and Aleutian Islands Crab Rationalization, and the Alaska State Limited Entry programs – and, based on the experiences in these programs, provide recommendations for instituting active participation measures in other management programs.

Wallmo, K., K. D. Bisack, **D. K. Lew**, D. E. Squires. The Economics of Protected Marine Species: Concepts in Research and Management. Accepted in *Frontiers in Marine Science*.

This brief editorial provides an introduction and description of the special issue of *Frontiers in Marine Science*, which is also being distributed as an e-book, that focuses on topics related to the economics of protected marine species.

Published

Cardenas, S., and **D. Lew**. 2016. "Factors Influencing Willingness to Donate to Marine Endangered Species Recovery in the Galapagos National Park, Ecuador." *Frontiers in Marine Science* 3:60.

Willingness to donate (WTD) money for the conservation of endangered species may depend on numerous factors. In this paper, we analyze data from a survey given to tourists visiting Ecuador's Galapagos National Park and Marine Reserve to investigate determinants of their WTD towards the conservation of two marine endangered species-the scalloped hammerhead shark (*Sphyrna lewini*) and the green sea turtle (*Chelonia mydas*). Specifically, we use regression analysis to analyze the influence of attitudes and beliefs toward species conservation, levels of concern for specific species, recreational motivations, and past donation patterns on WTD, while also controlling for individual characteristics such as age, gender, place of residence, and other demographics. Additionally, we evaluate the sensitivity of WTD to the species being protected by conservation efforts. Our results demonstrate that specific concern about the species, beliefs about donating to the protection program, and past donation behavior significantly influence the intention to donate money towards the recovery of the two marine endangered species. The likelihood of donating to green sea turtle conservation efforts is marginally higher than for hammerhead sharks, possibly due to its more charismatic nature. In contrast, visitors who are more willing to donate for shark conservation appear to be those with a strong desire to see them in the wild. The results provide useful information on the heterogeneity of tourist preferences towards donating to species conservation efforts, which has broad implications for resource agencies seeking ways to fund conservation actions.

Farrow, K., A. Brinson, K. Wallmo, and **D. Lew**. 2016. "Environmental Attitudes in the Aftermath of the Gulf Oil Spill." *Ocean and Coastal Management* 119: 128-134.

In the 1960s and 1970's, prominent environmental disasters seemed to mobilize the U.S. public, and many key environmental laws were subsequently enacted. Theories surrounding public opinion formation, however, generally regard single events as unlikely to impact attitudes in a major way. Given the conflicting evidence provided by anecdotal accounts and public opinion theory, we explore whether the Deepwater Horizon oil spill (Gulf Oil Spill) impacted public concern for the environment in the United States. In this study we use data from a national-level survey implemented before and after the Gulf Oil Spill to examine pre- and post-spill environmental attitudes as measured by a subset of the New Ecological Paradigm scale. We find that there is insufficient evidence to suggest that the recent Gulf Oil Spill had a significant impact on environmental attitudes, a result consistent with theories concerning the influence of individual events on public opinion. Additional findings imply that some types of messages are likely to be more effective than others in public communications about the environment.

Fissel, B., R. Felthoven, B. Garber-Yonts, J. Calvin, A. Wink, S. Warpinski, G. Everidge, D. Lesh, B. Ryznar, J. Lee. 2016. "Wholesale Market Profiles for Alaska groundfish and crab species" 134 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv.

This comprehensive series of wholesale market profiles examines federally managed groundfish and crab species caught in Alaska commercial fisheries. Each profile summarizes the fishery and provides in-depth information of wholesale production volume and value, product mix supply chain, competing supply, and key markets.

Fissel, B., **R. Felthoven**, **S. Kasperski**, and C. O'Donnell. 2015. "Decomposing Productivity and Efficiency Changes in the Alaska Head and Gut Factory Trawl Fleet". *Marine Policy* 62: 337-346.

Fishing fleets are subject to numerous factors that affect economic performance, making identification and attribution of such impacts difficult. This paper separately identifies the effects of changing input and output prices, fishery management, and quota allocations on total factor productivity using a Lowe Index. Indices account for technical change and decompose efficiency estimates into its technical, environmental, and scale-mix components. This results in measures that reflect shifts in the production frontier, and movements by vessels toward and around the frontier, to capture economies of scale and mix after a policy shift to a catch share program that includes fishing cooperatives and a limited access fishery. The difference between cooperative and limited access vessels is exploited to compare the changes in economic performance between the groups after the introduction of the shift to catch shares and cooperative management, which allowed the vessels to improve the timing and coordination across multi-species fisheries and to decrease incidental catch of quota-limited bycatch species that had closed the target fisheries prematurely in the past. Results indicate that total factor productivity increased significantly after the move to a catch share program, largely due to increases in technical change that shifted out the production frontier of the fishery.

Himes-Cornell, A. 2015. Industry Perceptions of Measures to Affect Access to Quota Shares, Active Participation, and Lease Rates in the Bering Sea and Aleutian Islands Crab Fisheries. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-304, 82 p.

The National Marine Fisheries Service's Alaska Fisheries Science Center developed a study in 2014 to gather perspectives on the cooperative measures from fishery participants. This study involved interviews with a diverse group of participants in the BSAI crab fisheries where their perceptions on measures to affect access to quota shares, active participation, and lease rates were discussed. A total of 220 individuals across 6 participant categories shared their perspectives. These individuals contributed to a response rate of 25.9% of the total population of participants in these fisheries; however, the overall response rate excluding crew was 45.1%, representing individuals from 87.2% of the active vessels in the BSAI crab fisheries in 2012. Overall, the individuals that were interviewed spoke to many reasons why skippers and crewmembers are not, as a majority, purchasing quota shares. The reasons relate to the price of quota shares, the lack of availability of shares, a lack of knowledge to navigate the system, and misgivings about the time commitment to pay off an investment and remain committed to the fisheries. These perceptions and opinions are ultimately affecting the lack of use of the ROFO program.

This study is an important step forward in incorporating the views of participants in the BSAI crab fisheries into the management of those fisheries. It provides an important complement to the fisheries' economic data collection program and provides context for the quantitative data available on the operation of the fisheries. More importantly, it provides a voice to the people involved in the fishery and brings to light information about how those individuals understand and experience issues that have been a central discussion topic at the NPFMC over recent years. Specifically, the results of this study highlight underlying issues in the crab fisheries that seem to be driving the perceived issues with access to quota shares, lease rates, and active participation; issues that are not addressed by the current voluntary cooperative measures.

Himes-Cornell, A. and **S. Kasperski**. 2016. "Using Socio-Economic and Fisheries Involvement Indices to Better Understand Alaska Fishing Community Well-being." *Coastal Management* 44(1): 36-70.

Over recent years, fisheries managers have been going through a paradigm shift to prioritize ecosystem-based management. With this comes an increasing need to better understand the impacts of fisheries management decisions on the social well-being and sustainability of fishing communities. This paper summarizes research aimed at using secondary data to develop socio-economic and fisheries involvement indices to measure objective fishing community well-being in Alaska. Data from more than 300 communities in Alaska were used to create a database of socio-economic and fisheries involvement indices of objective well-being and adaptability for Alaska communities dependent on marine resources. Each index was developed using a principal components factor analysis to assess the relative position of each community compared to all other communities in Alaska. We find that creating performance measures, such as the indices presented here, provides a useful way to track the status of socio-economic conditions and fisheries involvement by communities over time.

Himes-Cornell, A., **S. Kasperski**, K. Kent, C. Maguire, M. Downs, S. Weidlich, and S. Russell. 2015. Social baseline of the Gulf of Alaska groundfish trawl fishery: Results of the 2014 social survey. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-303, 98 p. plus Appendices.

The North Pacific Fishery Management Council (NPFMC) is considering the implementation of a new bycatch management program for the Gulf of Alaska (GOA) groundfish trawl fishery. The Alaska Fisheries Science Center has developed and implemented a survey to collect baseline information about the social dimensions of the fishery. Data were collected before program implementation in order to provide a baseline description of the industry as well as allow for analysis of changes the bycatch management program may bring for individuals and communities once implemented. Having a detailed baseline description will allow for a greater understanding of the social impacts the program may have on the individuals and communities affected by the new management program. The results of the survey highlight the differences in the people, sectors, and communities engaged in the fishery. For example, an average, CV owners were found to be 57.2 years old while skippers were 49.2 and crew were 37.8 years old on average. Additionally, participants reported that a significant amount of their spouses or partners participate in the fishing industry in some way. This suggests that the effects of management changes may extend beyond direct fishery participants. The current survey effort serves as a baseline for the social characteristics of the GOA groundfish trawl fishery. This survey serves as one of the first of its kind in terms of providing a social baseline in advance of a specific change in Alaskan fisheries management. The intention is that the data provided here will assist the NPFMC in its development the new bycatch management program in the GOA groundfish trawl fishery and in its assessment of the impacts of the program on fishing communities and sectors that have historically participated in the fishery.

Himes-Cornell, A., C. Maguire, **S. Kasperski**, K. Hoelting, and R. Pollnac. 2016. "Understanding vulnerability in Alaska fishing communities: A validation methodology for rapid assessment of well-being indices". *Ocean and Coastal Management* 124: 53-65.

The National Oceanic and Atmospheric Administration's Alaska Fisheries Science Center is developing a set of quantitative social and fisheries indices related to well-being that provide measures of distinct theoretical elements of community vulnerability. These indices can be used to identify communities likely to be affected by specific social-ecological perturbations as well as factors influencing communities' sustained participation in fishing activities. In addition to describing development of these quantitative indices, this paper presents a rapid ethnographic assessment methodology that can enhance the evidential validity of the indices, also referred to as groundtruthing. The validation method is used as an initial assessment of construct validity (agreement between quantitative and qualitative measures), construct reliability (consistency across researchers), and external validity (consistency across communities). We selected 13 fishing communities to represent distinct community types generated from a cluster analysis of observable community characteristics. Field observations from these communities were then used to develop an independent, qualitative comparison measure of well-being. This qualitative data was used to test the construct validity of the quantitative 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 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. The method presented can be viewed as a first step in the validation process, where we identify which indices and constructs need refinement. Following this, we suggest additional steps to further our groundtruthing efforts, thus creating an iterative validation process.

Kasperski, S. 2016. Optimal Multispecies Harvesting in the Presence of a Nuisance Species. *Marine Policy* 64: 55-63.

Current knowledge of the complex relationships within ecological and economic systems make operationalizing ecosystem approaches within fisheries management difficult. As these approaches are developed, it is important to include non-target species that affect the productivity (as prey) and availability (as predators) of targeted species. This study develops a multispecies bioeconomic model that incorporates ecological and economic interactions to determine the optimal harvest of each species in the presence of a "nuisance" species, which lowers the value of the fishery by negatively affecting the growth of the other species in the ecosystem, and has little harvest value of its own. The populations of walleye pollock, Pacific cod, and arrowtooth flounder (a nuisance species) in the Bering Sea/Aleutian Islands region of Alaska are used as a case study. Vessel-and gear-specific profit functions with multi-output production technologies are used, along with estimated multispecies stock dynamics equations, to determine the optimal multispecies quotas and subsidy on the harvest of the nuisance species to maximize the value of this fishery. Ignoring the nuisance species results in a substantially less productive and lower value fishery than optimal joint management. This study highlights the importance of incorporating the impact of non-targeted species in ecosystem-based fisheries management.

K. Kent and **A. Himes-Cornell**. 2016. "Making Landfall: Linkages Between Fishing Communities and Support Services." *Coastal Management* 44(4): 279-294.

The relationship between the fishing industry and the fisheries-related support service sector creates economic benefits for communities through the strong linkages between fishermen and their land-based suppliers and the induced or multiplier effects from fisheries revenue. The support service sector is embedded within fishing communities where the impacts of fisheries management changes are perpetuated. This article examines the potential for such impacts by evaluating the diversity of fishing gear use, ex-vessel revenue, presence of processing plants, public moorage, and haul-out or tidal grids, and the number of vessels in a community, in relation to the availability of support services in communities in Alaska. The results show that the presence of a processor and haul-out facilities in a community significantly affects the number of support service businesses; however, there is not a strong association with the number of vessels or ex-vessel revenue. One hypothesis is that fishermen often travel to other communities to obtain services. We evaluate this hypothesis using social network analysis to evaluate transfers of revenue for fishery-related goods and services. Ultimately, this informs the exploration of the importance of support service businesses and fishery-support infrastructure to the continued well-being of fishing communities.

Lew, D., D. Putman, and D. Larson. 2016. "Attitudes and Preferences Toward Pacific Halibut Management Alternatives in the Saltwater Sport Fishing Charter Sector in Alaska: Results from a Survey of Charter Halibut Permit Holders." U.S. Dept of Commerce, NOAA Technical Memorandum NMFS-AFSC-326, 58 p.

Management of marine recreational fishing for Pacific halibut (*Hippoglossus stenolepis*) off Alaska has changed considerably in recent years due to concerns over stock declines and allocation issues. Since 2007, increasingly restrictive limits have been placed on Pacific halibut fishing by charter boat anglers, and a limited entry program was established in 2011 to curb the growth of the charter sector. In 2014, the Alaska Halibut Catch Sharing Plan (CSP) was implemented. It formalized the process for both (a) determining allocation of halibut between the commercial and recreational charter sectors and (b) initiating changes to harvest restrictions on charter fishing. One provision in the CSP allows Alaska saltwater sport fishing charter businesses that hold charter halibut permits (CHP) to lease pounds of commercial individual fishing quota (IFQ), which get converted into guided angler fish (GAF). These GAF can be used by charter businesses to offer their clients harvesting opportunities that are less restrictive in terms of the number and size of fish they catch and keep on a charter fishing trip.

This report describes and summarizes the results from a survey of CHP holders (charter businesses) conducted during 2015 that collected information on CHP holders' attitudes and preferences toward Pacific halibut management in Alaska and preferences and behavior related to the GAF lease market, including values they place on GAF/leased IFQ under different sets of user or transactional restrictions. The mail survey was administered during 2015 to all CHP holders (565 charter businesses) and involved multiple mailings and a telephone contact. The survey response rate was 48% (271 completed surveys).

The survey results suggest that CHP holders generally had a negative view of the CSP and the GAF leasing program, with the majority believing that the GAF leasing program negatively impacts their business. Only a small percentage of respondents had participated in the program during 2014. Among those who had not leased GAF, the costs to lease GAF and generally opposing the GAF leasing program were cited by the most CHP holders as the primary reason for not participating in the program. About 84% of respondents did not plan to lease GAF in 2015 either. The majority of respondents also felt that relaxing restrictions on how GAF could be used (lease terms and transferability) were not likely to be helpful to their business. Respondents were also asked about their knowledge of, and attitudes toward, the Catch Accountability Through Compensated Halibut (CATCH) Proposal, which aims to create a recreational quota entity that can buy and sell commercial halibut IFQ. About 32% were not at all familiar with the CATCH Proposal, and over three-quarters of respondents indicated that they were not supportive of funding the proposal through a fee based on the number of endorsements held by CHP holders or a charter halibut tax per fish based on charter logbook records. Instead, the favored funding mechanism in terms of support was a charter halibut stamp, which would be purchased directly by charter anglers (70% were at least a little supportive). Respondents were split on whose responsibility (angler clients, charter businesses, or both) it was to fund the CATCH proposal, but the majority indicated that they did not feel the cost should be borne solely by charter businesses (about 68%).

There were several differences between responses from CHP holders in International Pacific Halibut Commission (IPHC) regulatory Areas 2C (Southeast Alaska) and 3A (Southcentral Alaska). Specifically, Area 3A respondents viewed the CSP, the GAF leasing program, and how the current CSP would affect their businesses more negatively than those in Area 2C. They also differed in terms of their support for the CATCH Proposal, with Area 3A respondents being less supportive on average than Area 2C respondents. Area 2C and 3A respondents also seemed to feel differently about how supportive they would be of alternatives programs, such as a GAF ownership program (that would allow individual charter businesses to buy and sell commercial fishing quota as GAF) and GAF leasing programs that were more flexible than the current program. In general, Area 2C respondents were a little more supportive than Area 3A respondents of these alternative programs. However, Area 2C and 3A respondents were similar in their statements about whose responsibility they felt it was to pay for the CATCH Proposal (in terms of charter anglers, charter businesses, or both) and their beliefs about how effective it would be if implemented.

Lew, D., and K. Wallmo. 2017. "Temporal Stability of Stated Preferences for Endangered Species Protection in Choice Experiments." *Ecological Economics* 131: 87-97.

Benefit transfer methods rely on past models and results, so 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). We use data from two identical CE surveys on different samples from the same population that occurred 17 months apart (Spring 2009 and Fall 2010) to estimate and compare mean WTP and preference parameters associated with threatened and endangered marine species protection. Our 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.

Pons, M., Branch, T. A., Melnychuk, M. C., Jensen, O. P., Brodziak, J., Fromentin, J. M., Harley, S. J., **Haynie, A. C.**, Kell, L. T., Maunder, M. N., Parma, A. M., Restrepo, V. R., Sharma, R., Ahrens, R. and Hilborn, R. 2016, "Effects of biological, economic and management factors on tuna and billfish stock status. *Fish and Fisheries.* doi:10.1111/faf.12163.

Commercial tunas and billfishes (swordfish, marlins and sailfish) provide considerable catches and income in both developed and developing countries. These stocks vary in status from lightly exploited to rebuilding to severely depleted. Previous studies suggested that this variability could result from differences in life-history characteristics and economic incentives, but differences in exploitation histories and management measures also have a strong effect on current stock status. Although the status (biomass and fishing mortality rate) of major tuna and billfish stocks is well documented, the effect of these diverse factors on current stock status and the effect of management measures in rebuilding stocks have not been analysed at the global level. Here, we show that, particularly for tunas, stocks were more depleted if they had high commercial value, were long-lived species, had small pre-fishing biomass and were subject to intense fishing pressure for a long time. In addition, implementing and enforcing total allowable catches (TACs) had the strongest positive influence on rebuilding overfished tuna and billfish stocks. Other control rules such as minimum size regulations or seasonal closures were also important in reducing fishing pressure, but stocks under TAC implementations showed the fastest increase of biomass. Lessons learned from this study can be applied in managing large industrial fisheries around the world. In particular, tuna regional fisheries management organizations should consider the relative effectiveness of management measures observed in this study for rebuilding depleted large pelagic stocks.

Punt, A.E., Foy, R.J., **Dalton, M.G.**, Long, C., Swiney, K.M. 2016. Effects of long-term exposure to ocean acidification conditions on future southern Tanner crab (Chionoecetes bairdi) fisheries management. *ICES Journal of Marine Science* 73: 849-864.

Demographic models of pre- and post-recruitment population dynamics were developed to account for the effects of ocean acidification on biological parameters that affect southern Tanner crab (Chionoecetes bairdi) larval hatching success and larval and juvenile survival. Projections of stock biomass based on these linked models were used to calculate biological and economic reference points on which fisheries management advice is based and thus provide fisheries managers with strategic advice on the likely long-term consequences of ocean acidification. The models utilized information for southern Tanner crab in the eastern Bering Sea. This information included the monitoring data on which conventional size-structured stock assessments are based, as well as the functional relationships that determine survival based on experiments that evaluated the consequences of ocean acidification over the next 100–200 years on crab larval hatching success, larval survival, and the survival of juvenile crab. The results highlighted that juvenile survival had the largest effect (20% decrease over 75 years) on biological and economic reference points, while hatching success, particularly if density dependence occurs after hatching, and larval survival have smaller effects (,10% decrease). Catch and profits would be expected to decrease by .50% in 20 years if natural mortality is affected by ocean acidification. Additional laboratory data on oocyte and embryo development leads to large changes in biological reference points depending on the timing of ocean acidification effects relative to natural mortality. The results highlight the need for experiments to evaluate the longer term physiological effects of ocean acidification on multiple life history stages and to measure indices that directly inform population dynamics models to evaluate future management scenarios.

Seung, C., M. **Dalton**, A. Punt, D. Poljak, and R. Foy. 2015. "Economic Impacts of Changes in an Alaska Crab Fishery from Ocean Acidification" *Climate Change Economics* 6(4): 1550017 (35 pages). *http://dx.doi.org/10.1142/S2010007815500177*

A dynamic computable general equilibrium (CGE) model is linked to a bioeconomic model for the Bristol Bay red king crab (BBRKC) fishery to analyze regional economic impacts of ocean acidification (OA)-induced changes in fishery yields. Yield projections based on two alternative forms (linear versus nonlinear) of OA effects on the survival of juvenile BBRKC are compared to a baseline without OA effects. Results demonstrate considerable uncertainty in yields, and show that economic impacts are sensitive to the form of OA effects, and to changes in the world price of BBRKC.

Seung, C. and J. Ianelli. 2016. "Regional economic impacts of climate change: a computable general equilibrium analysis for an Alaska fishery" *Natural Resource Modeling.* Vol 29 (2): 289-333. doi: 10.1111/nrm.12092

We compute the effects on the Alaska economy of reduced pollock harvests from rising sea surface temperature using a regional dynamic computable general equilibrium model coupled with a stochastic stock-yield projection model for eastern Bering Sea walleye pollock. We show that the effects of decreased pollock harvest are offset to some extent by increased pollock price, and that fuel costs and the world demand for the fish, as well as the reduced supply of the fish from rising sea surface temperature, are also important factors that determine the economic and welfare effects.

Seung, C. 2016. "Identifying channels of economic impacts: An inter-regional structural path analysis for Alaska fisheries" *Marine Policy* 66: 39-49.

Alaska fisheries have strong spillover effects on economies of other states (especially the state of Washington) due to their dependence on imports from these other states. Several studies attempt to develop inter-regional or multi-regional economic impact models to investigate these spillover effects, and calculate the multipliers for Alaska fisheries. However, these multipliers measure only total economic impacts, failing to provide fishery managers with the information on how and along what channels these total economic impacts are generated and transmitted throughout the regions. This paper uses an inter-regional structural path analysis (IRSPA) to identify the various channels (paths) through which the economic impacts of an initial shock to a seafood sector are transmitted, amplified, and spilled over to other regions, within an inter-regional social accounting matrix (IRSAM) framework for two US regions – Alaska and the rest of US (RUS).

Seung, C., B. Muse, and E. Waters. 2016. "Net Economic Impacts of Recent Alaska Salmon Fishery Failures and Federal Relief" *North American Journal of Fisheries Management* 36:351–362.

Chinook Salmon *Oncorhynchus tshawytscha* runs in several areas of Alaska have recently fallen well below expected levels. Using a social accounting matrix (SAM) model, this study calculated the net regional impacts on employment and income of the commercial salmon fishery failures stemming from these small runs, taking into account the effects of the federal fishery disaster funds received by commercial fishermen. The results indicate that federal relief funds reduced the adverse economic impacts but that the distribution of these funds to permit owners alone was not sufficient to compensate for the losses by other stakeholders. This study also shows that a SAM-type model is useful for policymakers in deciding how federal funds should be distributed among the various stakeholders affected by fishery failures.

Szymkowiak, M. and **A. Himes-Cornell**. 2015. "Towards individual-owned and owner-operated fleets in the Alaska Halibut and Sablefish IFQ program". *Maritime Studies* 14:19. doi:10.1186/s40152-015-0037-6

Although numerous IFQ programs include active participation measures intended to retain or transition fishing privileges to active fishermen, there has been limited research on the efficacy of these measures. This study addresses this gap by examining the impacts of active participation measures in the Alaska halibut and sablefish IFQ program, which were intended to provide for an ultimate transition of the catcher vessel fleets in these fisheries to becoming fully individual-owned and owner-operated. This paper shows that the effectiveness of these measures has been mixed and constrained by apparently strong incentives for many initial recipients of quota shares to effectively lease their annual IFQ allocations (through the use of hired skippers) rather than to sell their quota shares. Perhaps most problematic is the emergence of a class of wholly absentee quota shareholders, who hold only nominal interest in the vessel upon which their IFQ is fished, do not share in the risk of fishing, and continue to profit from the fishery while residing far away from the actual fishing grounds. There is also anecdotal evidence of differing cultural contexts for hired skipper use and second-generation entry between the Seattle and Alaska-based fleets in the Alaska halibut and sablefish fisheries. Wherein acting as a hired skipper may be analogous to an apprenticeship that facilitates quota share acquisition in the Seattle fleet, Alaskan hired skippers may be more analogous to strict lessees, who ultimately compete for quota shares in a market that includes initial recipients and second-generation shareholders both of whom were gifted quota shares.

Thunberg, E., J. Walden, J. Agar, **R. Felthoven**, A. Harley, **S. Kasperski**, **J. Lee**, T. Lee, A. Mamula, J. Stephen, and A. Strelcheck. 2015. "Measuring Changes in Multi-Factor Productivity in U.S. Catch Share Fisheries". *Marine Policy* 62: 294-301.

By ending the "race to fish" catch share programs may be expected to lead to improved productivity at the fishery level by retiring redundant capital and by allowing fishing firms to become more technically efficient in their harvesting activities by, among other things, changing the composition of inputs and outputs. Yet, there have been relatively few empirical studies of productivity changes in catch share fisheries and no comprehensive treatment of a cross-section of programs using a common measure of productivity change. In this study estimates of multi-factor productivity change for 20 catch share fisheries in the U.S. using a Lowe index are provided. With few exceptions, productivity increased relative to baseline conditions during the first three years of catch share program implementation. For five of six of the most established catch share programs, these initial productivity gains have been maintained or have continued to improve.

Walden, J., **B. Fissel**, D. Squires, and N. Vestergaard. 2015. "Productivity Changes in Commercial Fisheries: An Introduction to the special issue". *Marine Policy* 62: 289-293.

Productivity is a key economic indicator that measures the relationship between inputs used to produce a product, and the amount of product produced. Productivity change measures how productivity has changed through time. In traditional land based industries, these two economic metrics have been extensively measured and studied. Until recently, this has not been true for commercial fishing fleets. This article provides an overview of productivity as an economic performance metric, and highlights specific studies of productivity change in commercial fisheries during the past 50 years. It concludes with an introduction to the articles contained in this special edition.

Wallmo, K., and **D. Lew**. 2016. "A Comparison of Regional and National Values for Recovering Threatened and Endangered Marine Species in the United States." *Journal of Environmental Management* 179: 38-46.

It is generally acknowledged that willingness-to-pay (WTP) estimates for environmental goods exhibit some degree of spatial variation. In a policy context, spatial variation in threatened and endangered species values is important to understand, as the benefit stream from policies affecting threatened and endangered species may vary locally, regionally, or among certain population segments. In this paper we present WTP estimates for eight different threatened and endangered marine species estimated from a stated preference choice experiment. WTP is estimated at two different spatial scales: (a) a random sample of over 5,000 U.S. households and (b) geographically embedded samples (relative to the U.S. household sample) of nine U.S. Census regions. We conduct region-to-region and region-to-nation statistical comparisons to determine whether species values differ among regions and between each region and the entire U.S. Our results show limited spatial variation between national values and values estimated from regionally embedded samples, and differences are only found for three of the eight species. More variation exists between regions, and for all species there is a significant difference in at least one region-to-region comparison. Given that policy analyses involving threatened and endangered marine species can often be regional in scope (e.g., ecosystem management) or may disparately affect different regions, our results should be of high interest to the marine management community.

Submitted in FY16

Pienaar, E., **D. Lew**, and K. Wallmo. "Intention to Pay for the Protection of Threatened and Endangered Marine Species: Implications for Conservation Program Design."

We investigate motivations for people's intention to contribute towards increased protection of eight threatened and endangered marine species in the United States, using factor analysis and ordered response analysis. We find that the odds that people will be willing to pay towards species conservation depends on how conservation programs are funded, which species are being targeted for conservation, individuals' knowledge of and prior interaction with these species, awareness of need, awareness of responsibility, altruism, environmental concern, and contextual forces. For conservation programs to be effective, they should use a twofold messaging strategy. Individuals who are predisposed to contribute to conservation are likely to be incentivized by messages that focus on charismatic species and reinforce altruistic motives, and ethical beliefs. Individuals with more fiscally conservative viewpoints are more likely to respond to messages about how conservation complements their political beliefs and improves economic conditions or their quality of life. Communication strategies related to conservation should not overwhelm the audience with species information.

Seung, C. 2016. A Multi-regional Economic Impact Analysis of Alaska Salmon Fishery Failures. In review.

Recently, the harvest of Chinook salmon (*Oncorhynchus tshawytscha*) in some areas of Alaska was severely curtailed due to a significant reduction in the salmon runs. This generated adverse economic impacts in the areas. Unlike previous studies of impacts of changes in fisheries, which often rely on single-region economic impact models, we use a multi-regional social accounting matrix (MRSAM) model of three US regions – Alaska, West Coast, and the rest of US – to calculate the multi-regional economic impacts of the Chinook salmon fishery failures, considering the countervailing effects of federal disaster funds paid to commercial salmon fishermen. To estimate the negative effects of the reduced salmon harvest, we use "adjusted demand-driven MRSAM model", which avoids the double-counting problem encountered when a demand-driven model is used to compute the effects of exogenous output change, and overcomes the weakness of Ghosh (1958) approach in estimating the forward-linkage effects. To calculate the positive effects of federal relief payments, we use a Leontief demand-driven MRSAM model. Results indicate that the salmon fishery failures have significant adverse economic impacts including both intra-regional (Alaska) and inter-regional (West Coast and the rest of US) impacts, and that the disaster relief mitigates only a small portion of the adverse impacts.

Dalton, M., B. Fissel. 2016. "A Unified Framework for Calculating Aggregate Commodity Prices from a Census Dataset." In review.

Economic data collection from commodities producers in the U.S. typically consists of revenues and quantities. While the data collected are a census of the population, features of the population such as prices, must be calculated. Different linear aggregation procedures are used to calculate prices, such as ratio-based calculations (e.g., ratio-of-means, mean-of-ratios), or estimation by ordinary least squares. There are non-trivial difference in the prices calculated depending on the procedure. This paper proposes a unified framework for considering the tradeoffs inherent in the different methods commonly employed.

Colburn, L.L., M. Jepson, **A. Himes-Cornell**, **S. Kasperski**, K. Norman. Community Participation in U.S. Catch Share Fisheries. *Under Review as a NMFS Technical Memorandum.*

A guiding principle of the NOAA Catch Share Policy is to track the performance of programs to monitor whether they are achieving their goals and objectives. Brinson and Thunberg (2013 and 2016) have developed performance metrics to assess the economic performance of U.S. catch share programs. For non-economic social analysis, a challenge was to determine appropriate metrics that could be used to monitor community dependence on catch share species as it relates to community well-being, regardless of program design differences. Recently developed indicators of fishing community well-being (Jepson and Colburn 2013), including measures of fishing dependence, social vulnerability and gentrification pressure vulnerability for communities in each program, were used along with program metrics for specific species or species groups. The indicators included here were chosen to provide a comparison over time of the communities participating in a particular catch share program.This report examines the trends for four community catch share performance indicators over time from a baseline period three years prior to program implementation through 2013. These trends are examined across multiple U.S. catch share programs, including those applied to U.S. fisheries on the East and West Coast, and in Alaska.