

Economic Data Collection Program
Catcher-Processor Report (2009-2016)

Amanda Warlick, Erin Steiner, Lisa Pfeiffer, Marie Guldin, Ashley Vizek

National Marine Fisheries Service

Northwest Fisheries Science Center¹

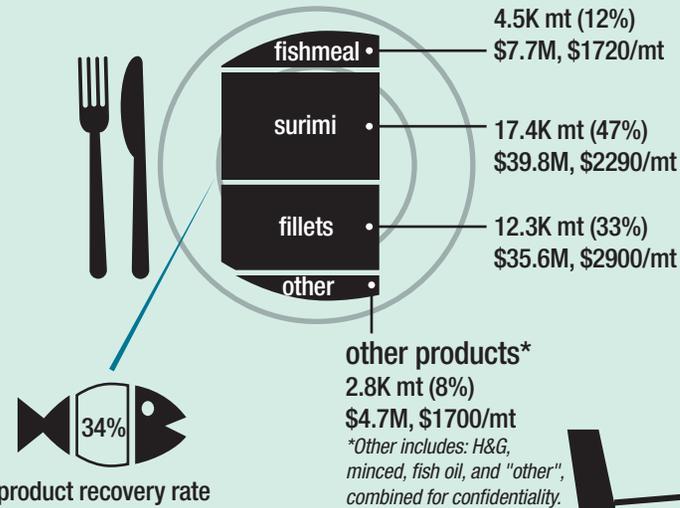
May 16, 2019

¹ For questions or comments, please contact the EDC Program at nwfsc.edc@noaa.gov.

2016 Economic Data Collection (EDC) West Coast Groundfish Catch Share Program

CATCHER-PROCESSOR

PACIFIC WHITING FLEET-WIDE PRODUCTION SUMMARY



ECONOMIC SUMMARY*

Vessel Average

\$9.7M revenue
\$4.4M variable costs
\$5.3M variable cost net revenue
\$1.4M fixed costs
\$3.9M total cost net revenue

\$69.3K variable cost net revenue per day

Fleet-wide Totals

9 vessels
\$87.7M revenue
\$48.0M variable cost net revenue
\$35.5M total cost net revenue

FISHERY PARTICIPATION

	Days at Sea
Average days fishing, processing, and steaming on the West Coast	74
Average days steaming to and from Alaska	25
Average days in Alaska	146

ALASKA PARTICIPATION

Number of vessels operating in Alaska: 9
Fleet-wide Alaska catch: 411.0K mt

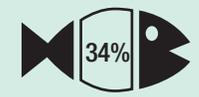
WC DELIVERY PORTS

of vessels offloading in each port

- Bellingham (4)
- Seattle (2)
- Tacoma (3)

4.1K mt annual production per vessel
(All catcher-processors report Seattle as their home port.)

product recovery rate



TOTAL CATCH & PRODUCTION

Fleet-wide West Coast catch: 108.8K mt

Harvest & Vessel Lengths**

Whiting Allocation

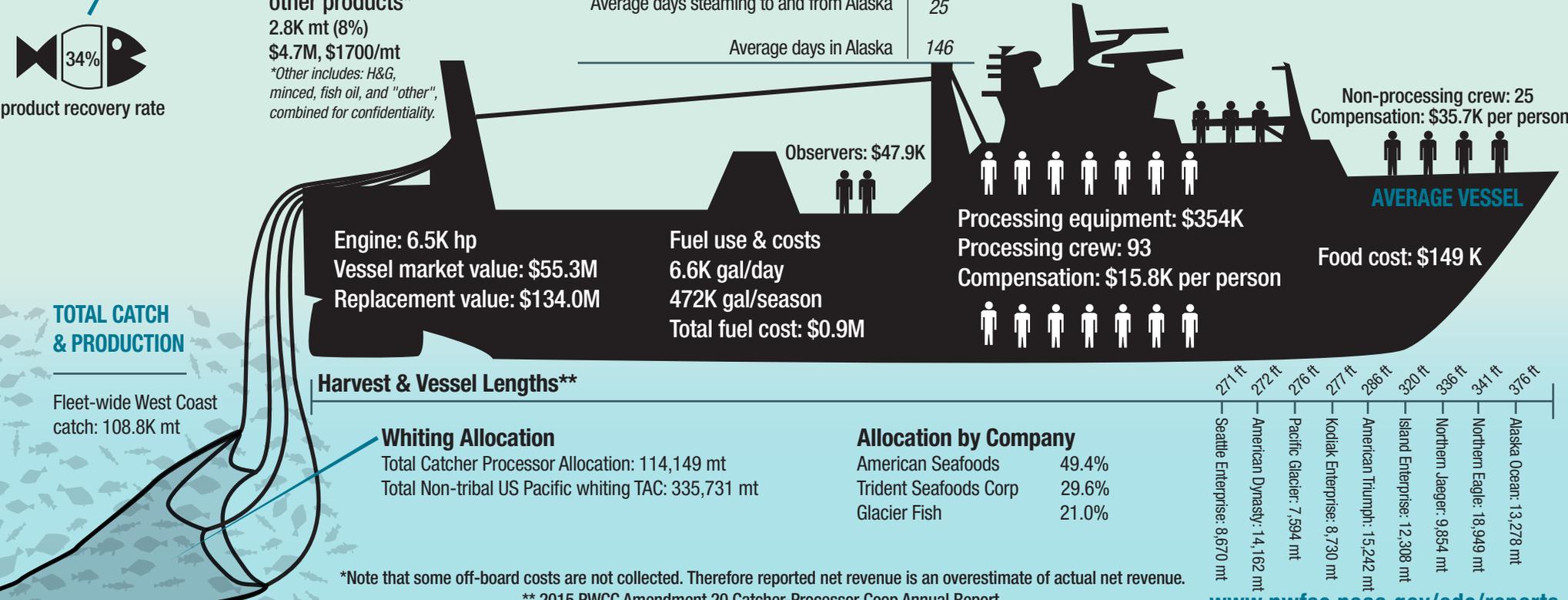
Total Catcher Processor Allocation: 114,149 mt
Total Non-tribal US Pacific whiting TAC: 335,731 mt

Allocation by Company

American Seafoods	49.4%
Trident Seafoods Corp	29.6%
Glacier Fish	21.0%

*Note that some off-board costs are not collected. Therefore reported net revenue is an overestimate of actual net revenue.

** 2015 PWCC Amendment 20 Catcher-Processor Coop Annual Report.



Catcher-Processor Sector: 2016 Highlights¹

In 2016, the West Coast at-sea catcher-processor fleet consisted of nine catcher-processors owned by three companies that harvest Pacific whiting on the West Coast.

- The catcher-processor fleet generated \$114.3 million in income and supported 1,640 jobs from Pacific whiting caught in the catch share program.
- Catcher-processor vessels spent an average of 74 days fishing, processing, and steaming in the West Coast whiting fishery in 2016, higher than the average from 2011-2015 (51).
- The fleet spent about 29% of its time operating in the West Coast whiting fishery, the highest since the implementation of catch shares. Otherwise, they were targeting pollock in Alaska.
- West Coast catcher-processors delivered to three ports: Bellingham, Seattle, and Tacoma. All nine vessels listed Seattle as their home port.
- Fillet and surimi production made up 86% of the total production value. Fillets received an average price of \$2,900 per metric ton, followed by surimi and fishmeal at \$2,290 and \$1,720 per metric ton, respectively.
- Approximately 93 processing and 25 non-processing crewmembers worked on each catcher-processor vessel while operating on the West Coast, similar to the average number since the implementation of catch shares.
- In 2016, average compensation per processing crewmember was \$15,800, a 52% increase from 2015. Average compensation for non-processing crewmembers was about \$35,700 in 2016, a 12% increase from 2015.
- Vessels generated an average revenue of \$9.75 million and spent \$5.81 million in fixed and variable costs, leading to an average total cost net revenue of approximately \$3.94 million per vessel for the year.
- Vessels earned a total cost net revenue of \$863 per metric ton produced, a 2% increase from 2015. Total cost net revenue per metric ton has increased 3 fold from baseline years to 2011-2016.

¹ Values reported in inflation-adjusted 2016 dollars. The pre-catch share baseline period is defined as the years 2009 and 2010. Despite having had historically low TAC in 2009 and 2010, these years are used as the baseline due to the burden on participants of requesting additional years of data.

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We thank the Pacific Fishery Management Council and advisory bodies for their valuable comments on the EDC reports and data.

Finally, we thank the members of the West Coast fishing industry who met with us to discuss the development and implementation of data collection processes. We appreciate the time and effort of each participant that will continue to help improve the program in the coming years.

Report Introduction

About the Report

The US West Coast groundfish fishery takes place off the coasts of Washington, Oregon and California, and comprises over 90 different species of fish. Fish are harvested both commercially and recreationally. The commercial fishery has four components: limited entry with a trawl endorsement, limited entry with a fixed gear endorsement, open access, and tribal. In January 2011, the West Coast Limited Entry groundfish trawl fishery transitioned to the West Coast groundfish trawl catch share program. The catch share program consists of cooperatives for the at-sea mothership (including catcher vessels and motherships) and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet.²

The Economic Data Collection (EDC) Program is a mandatory component of the West Coast groundfish trawl catch share program, collecting information annually from all catch share participants: catcher-processors, catcher vessels, motherships, first receivers, and shorebased processors. The EDC information is used to monitor the economic effects of the catch share program, and consists of data on operating costs, revenues, and vessel and processing facility characteristics.

This report summarizes information collected from the West Coast catcher-processor fleet. The EDC reports are also produced for the other sectors, and currently cover the years 2009 to 2016. The 2009 and 2010 data were collected in 2011 to provide a baseline of pre-catch share information. There is a one-year lag in collecting the EDC data to allow companies to close their accounting books. Thus, 2016 data were collected from May to September 2017. The EDC reports are updated annually to disseminate the data and contextualize its interpretation. The reports also serve as a catalyst for feedback on the data collected and its analysis. The scope of these reports continues to expand and the methods are refined with each publication.

The report is composed of three major sections. The first section, Catcher-Processor Overview (beginning on page 8), is an in-depth summary that contains descriptive analyses focusing on activities during 2016. The second section, Catcher-Processor Data Summaries (beginning on page 25), provides tables of all of the data collected from 2009 to 2016, with a detailed discussion of the methods used to summarize the data. The third section, Catcher-Processor Data Analysis (beginning on page 49), contains information about cost disaggregation and calculations of net revenue and economic performance. The data that form the basis for this report are confidential and must be aggregated or not shown so that individual responses are protected. More information about EDC Program administration, the EDC forms, data quality controls, data processing, and safeguarding confidential information can be found in the EDC Administration and Operations Report.³

² Information about the Catch Share Program is available at http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

³ Economic Data Collection Program, Administration and Operations Report available at: <http://www.nwfsc.noaa.gov/edc>.

Background - Economic Data Collection and West Coast Groundfish Trawl Catch Share Program

The economic benefits of the West Coast groundfish trawl fishery and the distribution of these benefits were expected to change under the West Coast groundfish trawl catch share program. To monitor these changes, the Pacific Fishery Management Council (PFMC) proposed the implementation of the mandatory collection of economic data. Using data collected from industry participants, the EDC Program monitors whether the goals of the catch share program have been met.

Many of the PFMC's goals for the catch share program are economic in nature. These goals include: provide for a viable, profitable, and efficient groundfish fishery; increase operational flexibility; minimize adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical; promote measurable economic and employment benefits through the harvesting, processing, distribution, and support sectors of the industry; provide quality product for the consumer; and, increase safety in the fishery.

The EDC Program is also intended to help meet the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requirement to determine whether a catch share program is meeting its goals, and whether there are any necessary modifications of the program to meet those goals. The data submitted to and analyzed by the EDC Program were fundamental to the formal 5-year review of the catch share program required under the MSA, finalized in early 2018.

Monitoring the economic effects of a catch share program requires a variety of economic data and analyses. The primary effects of a catch share program can be captured in two broad types of economic analysis: 1) economic performance measures, and 2) regional economic impact analysis. Both of these require information on the costs and earnings of harvesters and processors.

Economic performance measures include: costs, earnings, and profitability (net revenue); economic efficiency; capacity measures; economic stability; net benefits to society; distribution of net benefits; product quality; functioning of the quota market; incentives to reduce bycatch; market power; and, spillover effects in other fisheries. Some of these measures are presented in this report, while others would require more specific and involved analysis using EDC data.

Regional economic impact analysis measures the effects of the program on regional economies. The catch share program will likely affect different regional economies in different ways. Regional economic modeling involves tracking the expenditures of all businesses, households, and institutions within a given geographic region to arrive at the effects on income and employment. On the West Coast, the Northwest Fishery Science Center's IO-PAC model⁴ is used to estimate regional economic impacts using data from both the EDC survey forms and the voluntary cost earnings survey as model inputs.⁵

⁴ Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

⁵ For more information on cost earnings survey data collection process, see the Administration and Operations Report Draft Report (May 2016).

OVERVIEW

Management Context

In January 2011, the West Coast Limited Entry Groundfish Trawl fishery transitioned to the West Coast Groundfish Trawl Catch Share Program. The catch share program consists of an individual fishing quota (IFQ) program for the shorebased trawl fleet and cooperatives for the mothership (including catcher vessels and motherships) and catcher-processor fleets. Catcher-processors are vessels that both catch and process fish on-board. The At-sea Pacific whiting fishery also includes motherships, which are factory vessels that only process fish at sea, and catcher vessels that deliver to motherships. In 2016, the catcher-processor sector generated \$114.3 million in income and supported 1,640 jobs from Pacific whiting caught in the catch share program.¹

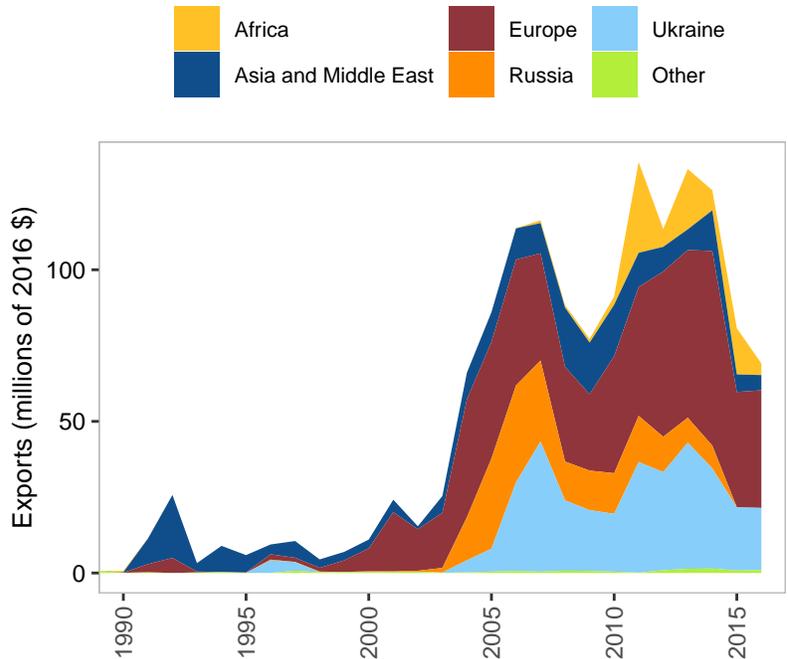


Figure 1: Total exports of fresh and frozen Pacific whiting (including mothership, catcher-processor, and shoreside production) from the U.S. by recipient region (millions of 2016 \$).

The domestic Pacific whiting fishery grew rapidly in the 1990s after the United States banned foreign vessels from processing Pacific whiting harvested off the West Coast. With the development of more efficient processes to transform Pacific whiting into surimi (a product popular in Asia) and certification from the Marine Stewardship Council (MSC)² in 2009, demand in the international market continued to rise throughout the 2000s and the Pacific whiting fishery subsequently transformed into one of the largest fisheries by volume in the United States.

¹ Values calculated using the NWFSC IO-PAC model (Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.)

² The MSC certification indicates that the West Coast Pacific whiting fishery has met the standard for “good management practices to safeguard jobs, secure fish stocks for the future and to help to protect the marine environment.” This certification has opened new markets, largely in the European Union, for Pacific whiting.

In 2016, approximately 36,600 metric tons of Pacific whiting worth just over \$69 million were exported from the United States,³ which was comparable to 2015 but lower than 2011-2014 (Figure 1). Since 2000, most of these exports went to the European Union, followed by Russia and Ukraine. In August 2014, Russia implemented trade sanctions against Europe and the United States banning imports of many seafood products, which could have led to decreased demand for whiting exports. To date, it is unknown when these sanctions will be lifted.

The catcher-processor fleet on the West Coast has operated as a cooperative since 1997, when the Pacific Whiting Conservation Cooperative (PWCC) was formed. The PWCC includes all catcher-processor vessels that participate in the Pacific whiting fishery on the West Coast. The primary function of the PWCC is to coordinate harvesting efforts across the fleet. While the catch share program dramatically changed the structure of the shoreside and mothership Pacific whiting sectors, the catcher-processor sector had already been operating as a cooperative and therefore experienced fewer changes with the implementation of catch shares.

The PFMC and the National Marine Fisheries Service (NMFS) are responsible for managing the U.S. fishery for the coastal stock of Pacific whiting through a bilateral agreement between the United States and Canada, known as the Pacific Whiting Treaty. The United States and Canada signed an agreement in 2003 (which became law in 2007) that allocates a set percentage of the harvest quota to American and Canadian harvesters. The United States is allocated 73.88% and Canada the remaining 26.12%. Managers mainly use annual harvest quotas to regulate the coast-wide catch of Pacific whiting. Regulations prohibit at-sea processing south of the Oregon-California border.

The catcher-processor sector receives 34% of the U.S. allocation, and the mothership and shoreside sectors are allocated 24% and 42%, respectively. Towards the end of the season, NMFS often redistributes unfished tribal allocation among the three commercial sectors accord-

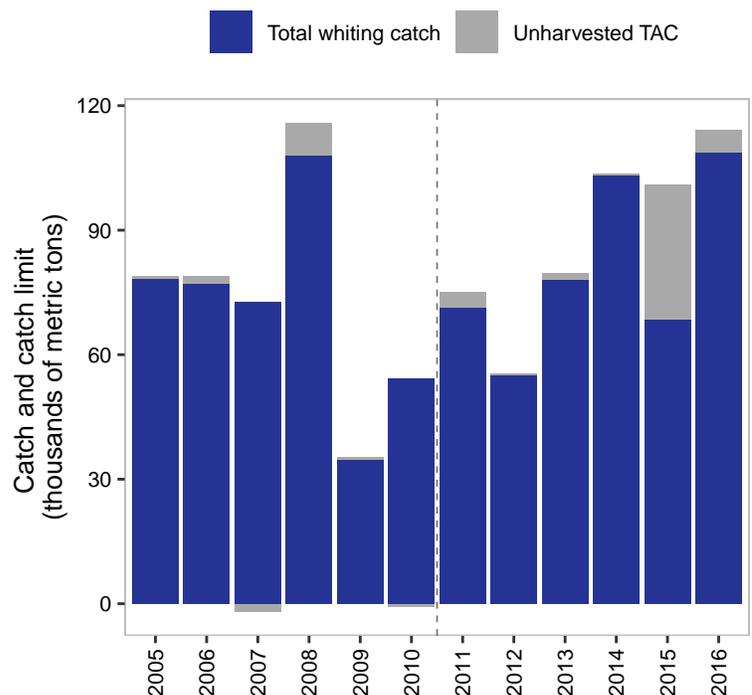


Figure 2: Catcher-processor Pacific whiting catch limits, including any reapportionments among sectors that may have occurred during the season, and unharvested allocation (thousands of metric tons). Dashed line represents the beginning of the catch share program.

³ NMFS Science and Technology Commercial Fisheries Statistics, <http://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/index>.

ing to the same proportions. Commercial allocation may also be redistributed between sectors. For example, in 2008, catcher-processors received an additional 36,724 metric tons of whiting allocation over the original catch limit from surplus in the shorebased and mothership sectors.⁴

Total allowable catch (TAC) has varied substantially during the EDC collections from 2009 to 2016.⁵ After several seasons of large Pacific whiting harvests from 2006-2008, managers lowered the catch limit substantially in 2009, then raised it each year with the exception of 2012 and 2015 (Figure 2). In 2016, the catcher-processor sector was allocated 114,000 metric tons of Pacific whiting; about 13,300 metric tons more than the allocation in 2015 (Figure 2). The average catch per vessel was 12,100 metric tons in 2016, about 4,480 metric tons more than in 2015, and 4,110 metric tons more than the baseline period in 2009 and 2010.

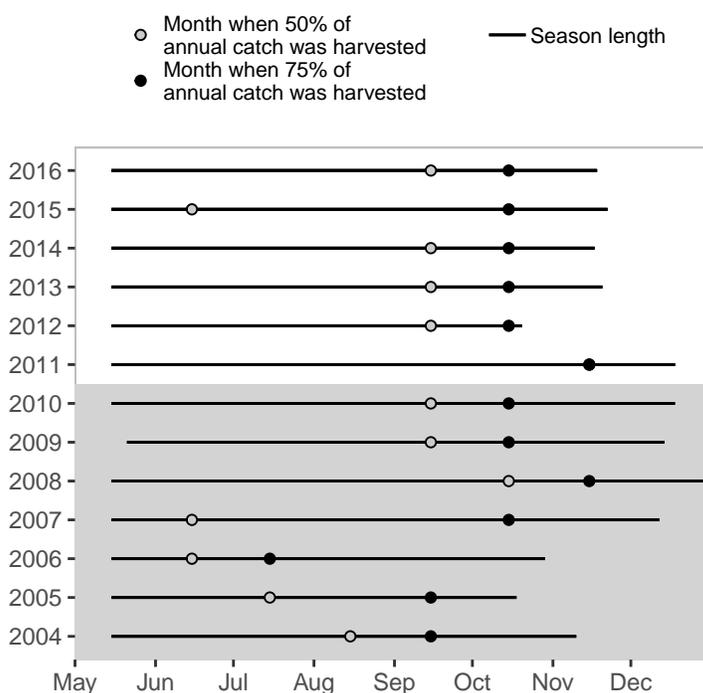


Figure 3: Season length for the catcher-processor whiting fishery, with horizontal lines representing when the first and last whiting was caught. The open and closed circles represent the month when 50% and 75% of the annual catch was caught, respectively. The shaded region represents the period prior to the implementation of catch shares.

The fleet-wide amount of unharvested sector TAC is driven by a combination of factors including bycatch quota constraints, market demand, ex-vessel prices, participation in non-catch share fisheries, and prevailing ocean conditions that influence the aggregation or “catchability” of target species. From 2005-2014, catcher-processors used at least 93% of their TAC. In 2015, catch attainment was low largely due to anomalous ocean conditions,⁶ and only 68% of the TAC was harvested. In 2016, harvest rates rose again to 95%.

In addition to receiving an allocation of Pacific whiting, the catcher-processor sector is also allocated quota for bycatch species. In 2016, the catcher-processor sector was allocated 170.0 metric tons of widow rockfish, 10.2 metric tons of Pacific ocean perch, 9.4 metric tons of dark-

⁴ For allocation and season catch summaries going back through 2005, see http://www.westcoast.fisheries.noaa.gov/fisheries/management/whiting/whiting_reports_and_rulemakings.html.

⁵ PFMC, <http://www.pcouncil.org/groundfish/stock-assessments/by-species/pacific-whiting-hake/>.

⁶ A large mass of warm water (known as “The Blob”) combined with El Niño conditions throughout 2015 caused complex, ecosystem-level changes that likely impacted the timing and availability of fish aggregations for certain target species in the catch share program. Therefore, net revenues, fuel costs, time spent steaming, and participation in other fisheries may be different in 2015 compared to other years.

blotched rockfish, and 8.2 metric tons of canary rockfish.⁷ Vessels caught 30% of the allocated Pacific ocean perch, 66% of the widow rockfish, 37% of darkblotched rockfish, and 1% of allocated canary rockfish in 2016.⁸ The Pacific whiting fishery on the West Coast has had a low average bycatch rate in recent years, amounting to less than 1% of the total Pacific whiting catch.

The PWCC also engages in voluntary bycatch avoidance initiatives as part of an effort to reduce the incidental catch of species of concern, such as the Endangered Species Act listed Pacific salmon and overfished rockfish. The catcher-processor fleet caught about 3.2 prohibited and protected fish per every 100 metric tons of Pacific whiting in 2016, most of which were Chinook salmon.⁹

NMFS has established mandatory rebuilding plans that limit bycatch of rebuilding species, which include cowcod and yelloweye rockfish as of 2018. In 2011, widow rockfish was taken off the overfished list.¹⁰ As a result, the annual catch limit for widow rockfish was raised starting in 2013. Similarly, canary rockfish was taken off the overfished list in 2015,¹¹ and the coast-wide annual catch limit has increased for both widow rockfish and canary rockfish in recent years. Pacific ocean perch, bocaccio, and darkblotched rockfish were declared rebuilt in 2017.^{12,13,14}

Catcher-Processor Sector Description

In 2016, the catcher-processor fleet consisted of nine vessels owned by three companies that harvest Pacific whiting, also known as Pacific hake (*Merluccius productus*) on the West Coast. Catcher-processors are large vessels, with those participating in the catch share program in 2016 having an average length of 304 feet and fuel capacity of 268,000 gallons. In 2016, the West Coast catcher-processor fleet harvested approximately 25% of all West Coast fish, an increase from 20% in 2015 and 19% in 2014. The catcher-processor fleet accounted for 38% of all fish caught in the catch share program and 40% of the Pacific whiting in 2016. West Coast catcher-processors deliver Pacific whiting to three Washington state ports: Blaine/Bellingham, Seattle, and Tacoma.

⁷ Biennial Specifications and Management Measures; Inseason Adjustments, <https://www.gpo.gov/fdsys/pkg/FR-2016-09-01/pdf/2016-21091.pdf>.

⁸ Pacific Whiting Conservation Coop Am 20 Catcher/Processor Cooperative Annual Report 2016: http://www.pcouncil.org/wp-content/uploads/2017/03/Sup_IR2_2017_PWCC_Rpt_re2016_Apr2017BB.pdf.

⁹ 2016 Pacific whiting fishery summary: http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/groundfish/whiting/2016-summary.pdf.

¹⁰ NMFS 2011. Status of the widow rockfish resource in 2011: http://www.pcouncil.org/wp-content/uploads/Widow_2011_Assessment.pdf.

¹¹ NMFS 2015. Status of canary rockfish in the CA current in 2015: http://www.pcouncil.org/wp-content/uploads/2015/05/D8_Att1_Canary_2015_FULL-E-Only_JUN2015BB.pdf.

¹² Draft Stock assessment update: Status of Bocaccio in the Conception, Monterey and Eureka INPFC areas for 2017. http://www.pcouncil.org/wp-content/uploads/2017/05/F4_Att3_2017_Bocaccio_Assessment_DraftFull_Version_Electronic_Only_Jun2017BB.pdf

¹³ Status of the darkblotched rockfish resource off the continental U.S. Pacific Coast in 2017. http://www.pcouncil.org/wp-content/uploads/2017/05/F4_Att4_DBRK_2017_Assessment_Update_Full-ElectronicOnly_Jun2017BB.pdf

¹⁴ Status of the Pacific ocean perch along the U.S. West Coast in 2017. http://www.pcouncil.org/wp-content/uploads/2017/10/F4_Att1_Full-E-only_PacificOceanPerch2017_Assessment_NOV2017BB.pdf

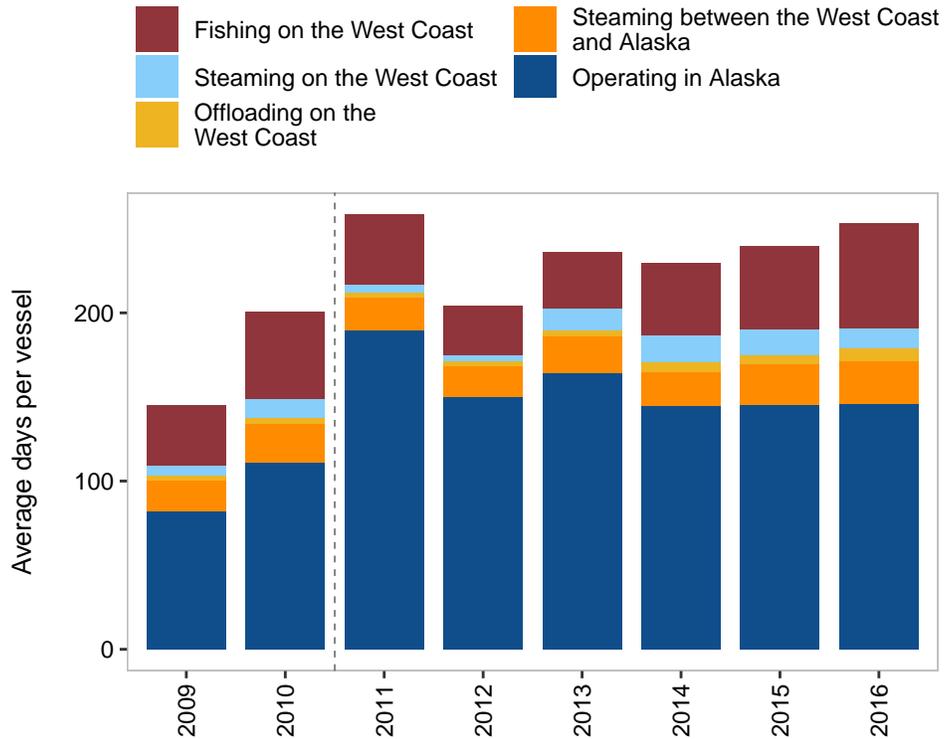


Figure 4: Average number of days spent in each activity per catcher-processor vessel. Dashed line represents the beginning of the catch share program.

The West Coast Pacific whiting season is open from May 15 through December. Since 2009, each season has been at least five months long (extending into October) (Figure 3). In 2009 just before the implementation of the catch share program, the Council recommended sector-specific bycatch quota allocations for the at-sea sectors, which resolved competition for constraining bycatch species catches. This improved operational flexibility, particularly for the mothership sector that was not already operating under a cooperative.

Catcher-processor vessels spent an average of 74 days engaged in fishing activities on the West Coast in 2016, up from 65 days in 2015 and higher than any other year since the beginning of EDC surveys, likely due to the increasing time needed to harvest higher Pacific whiting TACs (Figure 4). Catcher-processors also participate in Alaskan fisheries and in fact spend the majority of their time targeting pollock in the Bering Sea and Aleutian Islands. In 2016, the average catcher-processor spent 25 days steaming between the West Coast and Alaska (Figure 4). A summary of catcher-processor fleet activity is available in Catcher-Processor Data Summaries, Table 2.2.

Economic Indicators

The EDC Program tracks economic indicators by compiling information submitted by participants about expenses and revenue and how those figures change over time. All values reported here in the Overview section are in inflation-adjusted 2016 dollars. Pre-catch share data for the 2009 and 2010 operating years were submitted in 2011 and have been averaged to calculate “baseline” conditions within the fishery to which subsequent years of data can be compared. Despite having had historically low TAC

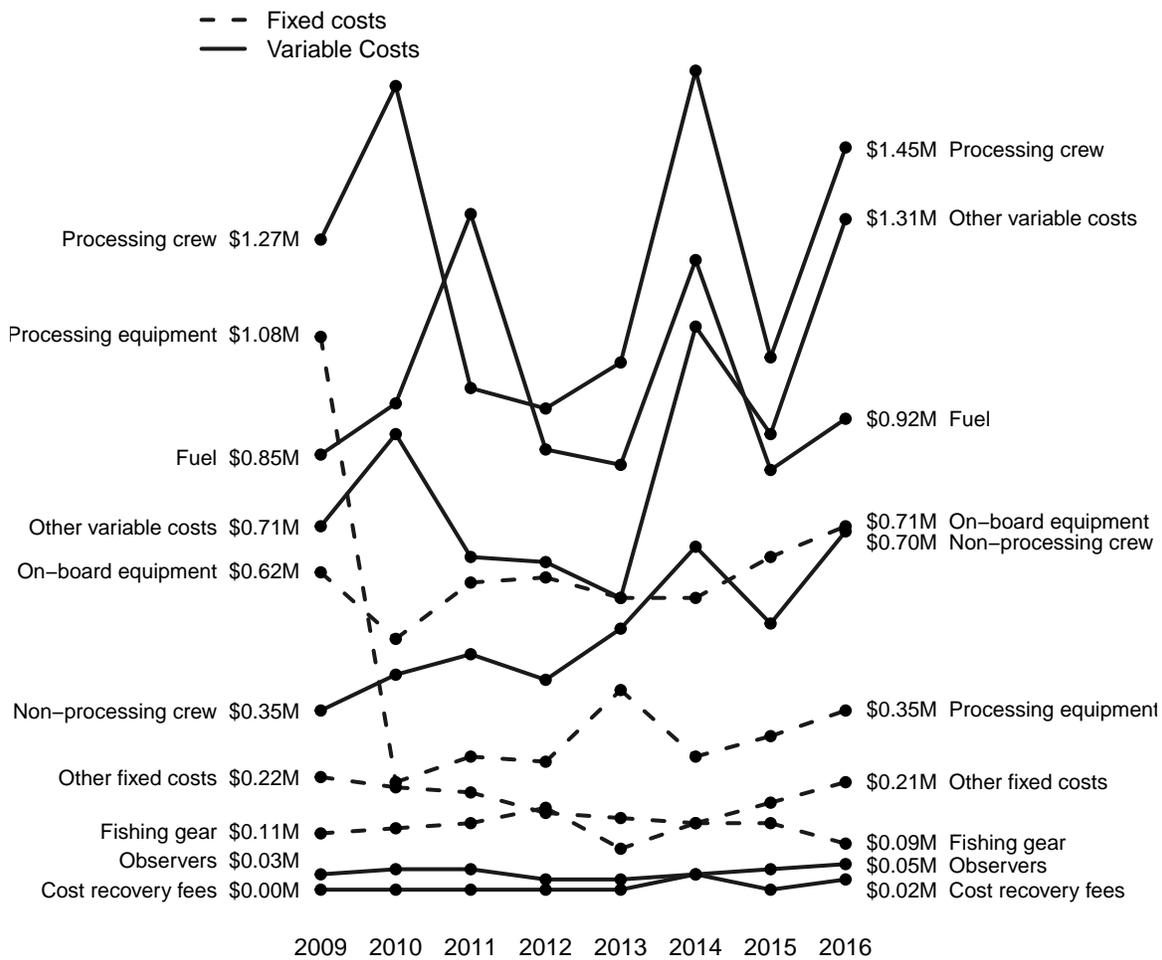


Figure 5: Average fixed (dashed line) and variable costs (solid line) per vessel (millions of 2016 \$).

in 2009 and 2010, these years are used as the baseline due to the burden on participants of requesting additional years of data.

Variable Costs

Vessel costs are separated into two categories: variable costs and fixed costs. Variable costs are the majority of a vessel's total expenditures and include fuel, crew compensation, food, additives, packaging and materials, observer coverage, and cost recovery fees. Variable costs vary with the level of fishery participation and averaged approximately \$4.42 million per vessel in 2016, similar to 2014 and notably higher than 2015 when catch attainment was low (see Catcher-Processor Data Summaries, Table 8.1). The largest categories of variable costs are processing crew compensation (amounting to \$1.45 million in 2016), fuel (\$921,000), and non-processing crew compensation (\$697,000) (Figure 5).

In 2016, an average of 93 processing crewmembers (including line workers, fishmeal crew, quality control, technicians, cleanup, factory managers, combis, and mechanics) and 25 non-processing crewmembers (including the captain, deckhands, wheelhouse, galley, and engineers) worked on each catcher-processor

vessel in the West Coast whiting fishery. Processing crewmember compensation can be influenced by the quantity and quality of processed product that is produced.

Average compensation for processing crewmembers was higher during pre-catch share years (\$15,500) compared to 2011-2016 (\$12,500). In the years since the implementation of catch shares, average compensation per processing crewmember was highest in 2014 (\$16,300), dropped to \$10,400 in 2015, and then rose back up to \$15,800 in 2016. Processing crewmember compensation per day decreased from \$295 during baseline years to \$212 in 2016. Annual compensation per non-processing crewmember was lowest in 2009 (\$14,300) and highest in 2016 (\$35,700), representing a 110% increase compared to baseline conditions. Unlike for processing crewmembers, non-production crewmember compensation per day increased from \$324 during baseline years to \$479 in 2016.

Average daily fuel use while operating on the West Coast remained relatively constant from 2009-2013 and then decreased by 12% to approximately 6,620 gallons per day in recent years. Fuel and lubrication comprise one of the largest cost categories for the fleet on the West Coast, with total costs varying with fuel prices. The Pacific States Marine Fisheries Commission tracks historical marine fuel prices, which in Washington state have ranged from \$1.73 in February of 2016 to a high of \$4.10 in April of 2012.¹⁵ The average cost reported by vessels for fuel expenses on the West Coast has increased by 11% from baseline conditions since the implementation of catch shares. In 2014, catcher-processors reported that they no longer burn fish oil for fuel but instead sell it (Catcher-Processor Data Summaries, Tables 5.2 and 7.1).

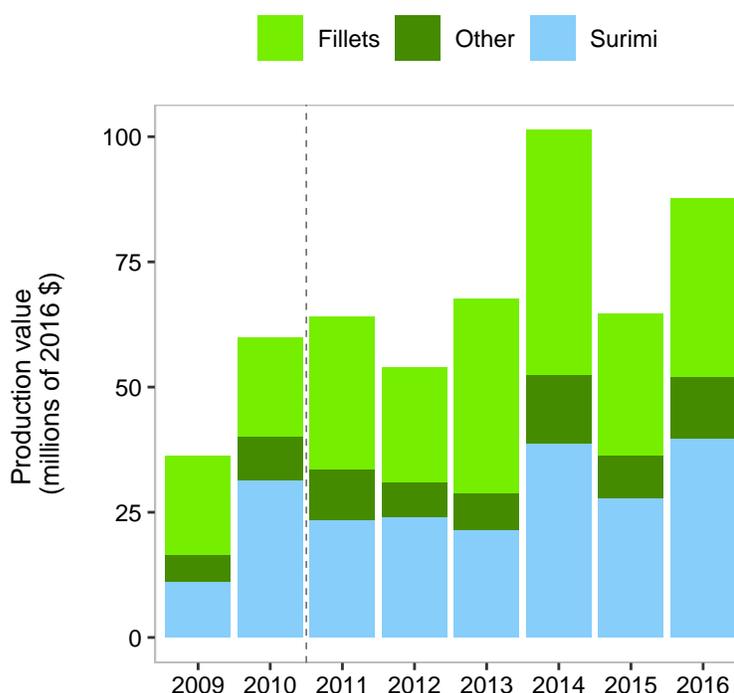


Figure 6: Fleet-wide production value by product type (millions of 2016 \$). The Other category includes fish oil, fishmeal, headed and gutted, minced, roe, and other, these categories are combined to protect confidential data. Dashed line represents the beginning of the catch share program.

Observer coverage on catcher-processors dates back to the MSA, first passed in 1976. Catcher-processors, like the rest of the processing fleet, continued to have observers on board while operating in

¹⁵ PSMFC 2017. West Coast and AK Marine Fuel Prices Annual Report, <https://www.psmfc.org//efin/docs/2016FuelPriceReport.pdf>.

the West Coast Pacific whiting fishery after the implementation of the catch share program. Average observer coverage costs per vessel for catcher-processors was approximately \$37,800 during baseline years, dropped to \$22,900 in 2012, and has risen each year, amounting to \$47,900 per vessel in 2016.

The MSA requires that NMFS compute and collect cost recovery fees from participants of limited access privilege programs, such as catch shares, to recover additional government costs attributable to the private sector use of a public resource. Cost recovery fees were implemented for the West Coast groundfish fishery in 2014 and are calculated yearly, not to exceed 3% of ex-vessel value.¹⁶ Cost recovery fees collected from catcher-processors in 2015 were reduced to \$0 due to over-payment in 2014, and amounted to \$149,200 across the fleet and \$16,580 per vessel in 2016.

Fixed Costs

Catcher-processor vessel fixed costs include capitalized expenditures and expenses on vessel and on-board equipment, fishing gear, and processing equipment. In general, these do not vary as directly with fishing effort compared with variable costs.¹⁷ Average total expenditures on vessel and on-board equipment, fishing gear, and processing equipment were higher during the baseline period (\$539,000) compared to 2011-2015 (\$453,000), rising again to \$563,000 in 2016. In 2016, the average West Coast portion of other fixed costs, including insurance and moorage, was higher than other years since the implementation of catch shares and amounted to \$236,000, similar to baseline conditions.

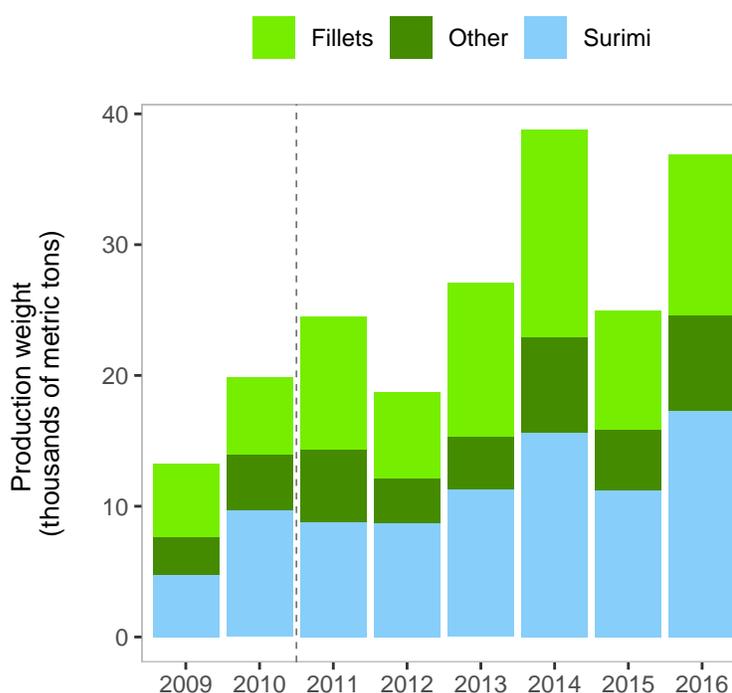


Figure 7: Fleet-wide production weight by product type (thousands of metric tons). The Other category includes fish oil, fishmeal, headed and gutted, minced, roe, and other, these categories are combined to protect confidential data. Dashed line represents the beginning of the catch share program.

¹⁶ For more information on cost recovery fees, see the Compliance Guide at http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/groundfish/public_notices/cost-recovery-compliance-guide.pdf.

¹⁷ All of the average fixed costs collected, and the breakout for fixed costs on the West Coast, are reported in Catcher-Processor Data Summaries Section 9.1.

Revenue

Earnings sources on the EDC survey form include the total value received for processed product, sale or lease of catcher-processor-endorsed permits, sale or lease of co-op shares, chartering, and insurance settlements, though participants have only reported fish production revenue to date. This report summarizes total and average production values by product, per vessel, and per metric ton. Overall, production value often reflects changes in TAC. The total fleet-wide production value of Pacific whiting was \$87.7 million in 2016, the second highest since the beginning of data collection (Figure 6). The average fleet-wide production value increased by 52% compared to the baseline period. The average production value of Pacific whiting per vessel was \$9.75 million in 2016, the second highest since the beginning of data collection, though average production values were still higher during baseline years (\$8.62 million) compared to the average since 2011 (\$8.14 million).

Fillet and surimi production made up 86% of the total production value (Figure 6) and 80% of the total production weight (Figure 7) in 2016, which has changed very little since the beginning of data collection. Other product types include fishmeal, minced, headed and gutted, and fish oil. In 2016, fillets received an average price of \$2,900 per metric ton, followed by surimi and fishmeal at \$2,290 and \$1,720 per metric ton, respectively (Figure 8).

The product recovery rate (total weight of production divided by total weight of fish caught) was 0.33 in 2016, the lowest since the beginning of data collection, though similar to 2011-2012. On average, the product recovery was slightly higher in baseline years (0.36) compared to 2011-2016 (0.35).

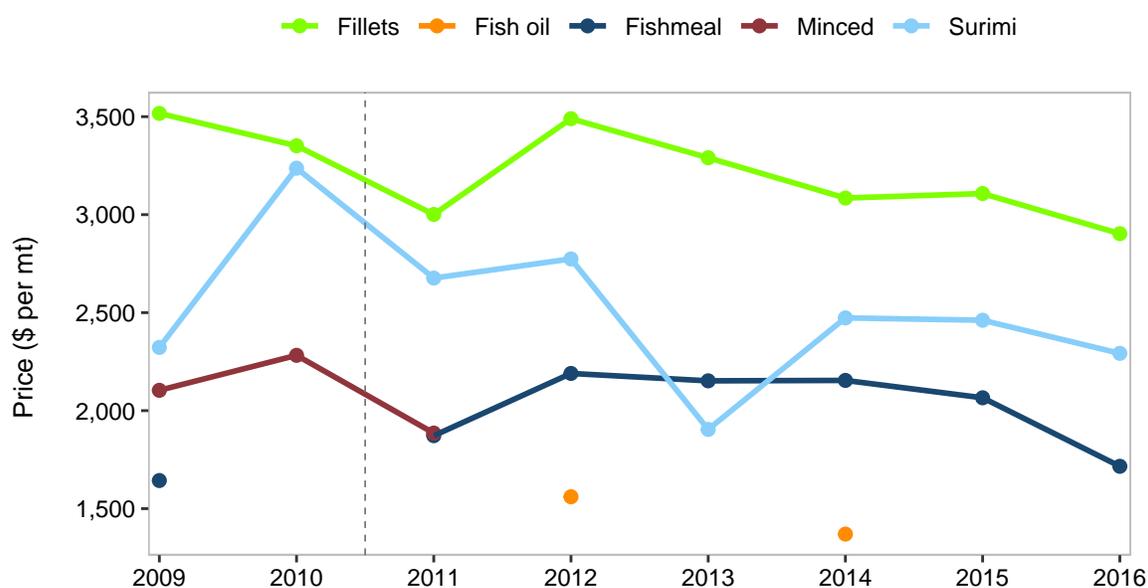


Figure 8: Average price by product type (2016 \$). Some values are suppressed to protect confidential information. Product types such as minced, fishmeal, and fish oil delineated here were combined in Figures 6 and 7. Dashed line represents the beginning of the catch share program.

Net Revenue

The EDC Program measures the net economic benefits of the catch share program by reporting two types of net revenue. The first is variable cost net revenue, which is revenue minus variable costs. The second is total cost net revenue, which is revenue minus both variable and fixed costs.¹⁸ To provide a complete picture of the changes that have occurred, net revenue figures are presented at two scales. Figure 9 shows the fleet-wide revenue, total costs, and net revenue for the fishery, while Figure 10 shows the average revenue, costs, and net revenue per vessel. Fleet-wide net revenue represents the total value generated by the fishery, while average net revenue shows the value generated by a typical vessel. Both figures only include revenues and costs associated with the catch share program. It is important to note that the EDC forms aim to capture only costs that are directly related to vessel fishing operations, and not costs that are related to activities or equipment off the vessel. Therefore, the net revenue reported here is an overestimate of the true net revenue.¹⁹

Fleet-wide revenue has kept pace with increasing costs, having grown by 82% from baseline conditions to 2016. In 2016, catcher-processors generated a total fleet-wide revenue of \$87.7 million and spent about \$52.3 million in fixed and variable costs, leading to a total cost net revenue of approximately \$35.5 million for the year, second only to that in 2014 (\$49.5 million) (Figure 9). Fleet-wide total cost net revenue has increased by 47% from the baseline years and by 50% from 2015 when catch attainment was low. On a per-vessel level, catcher-processors generated an average revenue of \$9.75 million per vessel and spent \$5.81 million in fixed and variable costs, leading to a net revenue of approximately \$3.94 million per vessel for the year, representing a 50% increase from 2015 and a 11% increase from baseline conditions.

Many of the above patterns in costs and revenue are also evident in daily and production revenue rates. Daily production revenue per vessel was highest in 2014 (\$191,000), decreased to \$114,000 in 2015, and rose to \$129,000 in 2016. Likewise, after taking costs into consideration, the daily total cost net revenue per vessel increased by 24% from 2015 to 2016.

Production value per metric ton of whiting produced was higher during baseline years (\$2,910) compared to 2011-2016 (\$2,580), and reached a low of \$2,370 in 2016. However, when costs are accounted for, catcher-processors have earned higher total cost net revenues per metric ton since the implementation of catch shares (\$907) compared to baseline years (\$345), representing an increase of 163% (see Data Summaries, Table 11.3). This indicates that costs as a proportion of revenue per metric ton have decreased.

¹⁸ See Figure 5 for a categorization of fixed and variable costs.

¹⁹ See Catcher-Processor Data Summaries Section 8: Costs, and Section 10: Net Revenue and Economic Profit for a complete discussion of variable costs, fixed costs, and the calculation of net revenue.

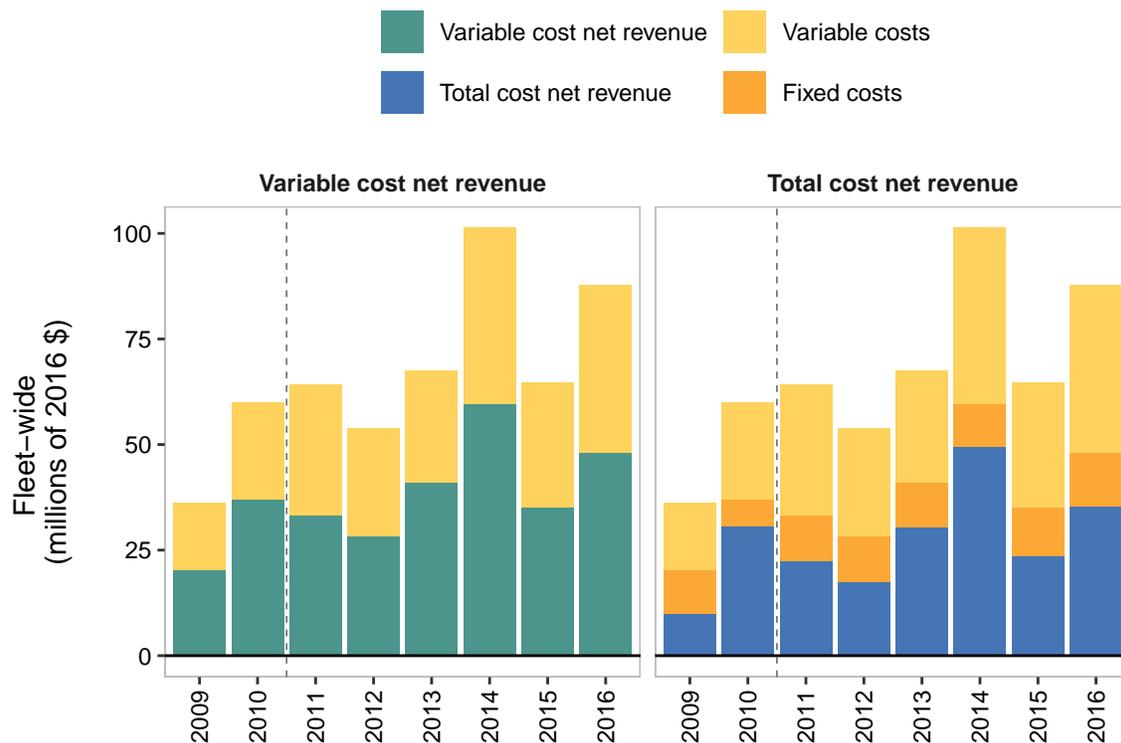


Figure 9: Fleet-wide variable cost net revenue (revenue minus variable costs) (left) and total cost net revenue (revenue minus variable costs and fixed costs) (right) (millions of 2016 \$). Dashed line represents the beginning of the catch share program.

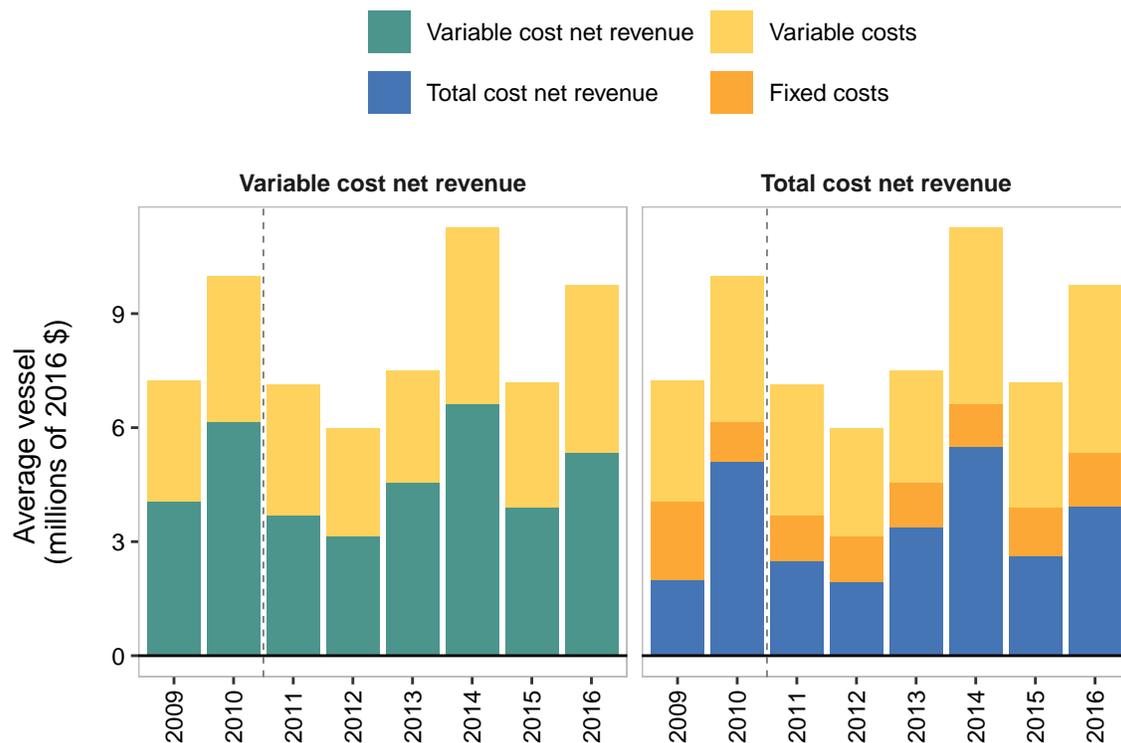


Figure 10: Average variable cost net revenue (revenue minus variable costs) (left) and total cost net revenue (revenue minus variable costs and fixed costs) (right) (millions of 2016 \$). Dashed line represents the beginning of the catch share program.

Catcher-Processor Report

CATCHER-PROCESSOR REPORT

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Catcher-Processor Data Summaries

1 Introduction

1.1 Background

The US West Coast groundfish fishery takes place off the coasts of Washington, Oregon and California, and comprises over 90 different species of fish. Fish are harvested both commercially and recreationally. The commercial fishery has four components: limited entry with a trawl endorsement, limited entry with a fixed gear endorsement, open access, and tribal. In January 2011, the West Coast Limited Entry groundfish trawl fishery transitioned to the West Coast groundfish trawl catch share program. The catch share program consists of cooperatives for the at-sea mothership (including catcher vessels and motherships) and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet.¹

The Economic Data Collection (EDC) Program² was implemented as part of these new regulations to monitor the economic effects of the catch share program. Annual economic data submissions are required from all fishery participants: catcher vessels, motherships, catcher-processors, and first receivers and shorebased processors §50 CFR 660.114. Baseline, pre-catch share data were submitted in 2011 for the 2009 and 2010 operating years. Data for the first year the fishery operated under the catch share program (2011) were submitted in 2012, and the 2016 data submitted for this report were collected in 2017.

The EDC Program has enhanced the quantity and quality of economic information available for analysis, and for the management of the West Coast groundfish trawl fishery. While costs and earnings data are

¹ Information about the Catch Share Program is available at <http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish.catch.shares/>.

² Additional information on the EDC Program, including the EDC data collection forms can be found at <http://www.nwfsc.noaa.gov/edc>.

available for shorebased catcher vessels starting in 2004,³ this is the first data collection series for the catcher-processor fleet. This report summarizes the 2009-2016 EDC catcher-processor survey data, and with its companion reports covering the other sectors, is the fifth in the series of reports. The scope of these reports continues to expand and the methods are refined with each publication.

The catcher-processor fleet on the West Coast has operated as a cooperative since 1997, when the Pacific Whiting Conservation Cooperative (PWCC) was formed. The PWCC includes all catcher-processor vessels that currently participate in the Pacific whiting fishery on the West Coast. The primary function of the PWCC is to coordinate harvesting efforts across the fleet. While the 2011 catch share program dramatically changed the structure of the Pacific whiting shoreside and mothership sectors, the catcher-processor sector experienced fewer changes and has continued to operate as a single cooperative.

1.2 Understanding the report

The data provided in the summary tables throughout the report are for all vessels that fished on the West Coast during the survey year, unless otherwise noted. Unlike the Overview, all numbers reported in the Data Summaries are generated from the raw responses received from participants and, therefore, are in nominal dollars.

All data submitted via the EDC Program are confidential under 402(b) of the 2007 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, et seq.) and under NOAA Administrative Order 216-100.⁴ In order to protect these data, a rule of three and a rule of 90-10 are implemented. The rule of three requires a response from at least three companies in order to show a summary statistic. The 90-10 rule requires that no single company's value comprise over 90 percent of the value displayed. In the case of the West Coast whiting catcher-processor fleet, there are only three companies and therefore statistics are only shown in the tables if there was at least one vessel from each catcher-processor company reporting a positive value. The tables show a '***' for data points where there were less than three companies reporting the information, and/or if one company's responses accounted for greater than 90 percent of the average value. Zeroes are shown if all entities reported zeroes. More information about how confidential data are protected in the EDC Program can be found in the Administration and Operations Report. Simple means are reported for statistics that denote the performance of an average entity (*i.e.*, net revenue) while weighted means are reported for statistics that describe characteristics of the fishery (*i.e.*, ex-vessel prices, markup, recovery rates, etc.). Additionally, "—" is used to denote fields where the question was not asked on the form in that survey year.

In order to track and assess the variation of data submitted by participants across any given variable or statistic, these reports include the coefficient of variation (CV) of the mean. The stacked dots included

³ Lian, C.E. 2010. West Coast limited entry groundfish trawl cost earnings survey protocols and results for 2004. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-107, 35 p.

⁴ For more information about form administration, please see the Administration and Operations Report Report.

in the data tables provide information about the coefficient of variation (CV) of the mean. We use the following scoring:

- represents $CV < 0.5$,
- represents $0.5 \leq CV < 1.0$,
- represents $1.0 \leq CV < 2.0$, and
- represents $2.0 \leq CV$. For 2009-2016, none of the CVs exceeded 2.83.

Each year, the EDC Program reviews the survey forms and revises questions for improved clarity while maintaining as much consistency as possible. The 2009 and 2010 EDC catcher-processor forms asked if the participant harvested or processed any fish during that calendar year, and those who answered “No” were not required to respond to any further questions. This option was removed on the 2011 form and every participant was required to complete the form in its entirety. The only other change to the forms from 2009-2010 to 2011 pertained to offload locations, with “Tacoma” substituted for “Westport, Hoquiam” in response to input on the 2009 and 2010 surveys. In 2012, a space was added for participants to provide the total round weight harvested in West Coast fisheries in addition to that harvested in Alaska/Other, in order to more accurately calculate the proportion of West Coast landings. In 2013 a new question was added, “Provide the total number of individuals who worked for you”. Respondents provide the total number of processing crew and the total number of non-processing crew. These data provide an upper bound of the total number of people employed by the sector.

1.3 Purpose of the report

This report, like the other four EDC reports,⁵ has multiple objectives. The first is to provide basic economic data summaries that can be used for a variety of purposes associated with fishery management. Since much of the data collected are confidential under the 2007 reauthorization of the MSA, the data are summarized as averages or totals for each question on the EDC forms. Thus summarized, the reports make the data available to the public for both research and informational purposes.

Second, the reports provide information that can be used to examine the performance of the catch share program in terms of whether and to what degree the goals of the program are being met. It is expected that additional modeling will provide increased detail about program impacts. These reports and underlying data and analyses served as the basis for the 5-year review of the catch share program

⁵ In addition to the catcher-processor report, there are four companion reports:

- Economic Data Collection Program, Administration and Operations Report (May 2016)
- Economic Data Collection Program, Mothership Report 2009-2016 (2018)
- Economic Data Collection Program, Catcher Vessel Report 2009-2016 (2018)
- Economic Data Collection Program, First Receiver and Shorebased Processor Report 2009-2016 (2018)

mandated by the MSA and finalized in 2018, as well as the NMFS National Catch Shares Performance Indicators.

Third, the reports serve as the basis for economic models that are used as part of the PFMC biennial specification process for groundfish management. These models include the IO-PAC model,⁶ as well as estimates of revenue, costs, and net revenue.

Lastly, and perhaps most importantly, the data reports are expected to serve as a useful catalyst for feedback on the data collected and its analysis.

The Administration and Operations Report describes the EDC Program administration and fielding of the surveys, the EDC forms, data quality controls and quality checks and data processing, and safeguarding confidential information. The other EDC reports provide basic data summaries of the catcher vessel, mothership, and first receiver and shorebased processor forms.

1.4 Catcher-processor form administration

Completion of EDC forms is mandatory for participants in the catch share program. Survey participants are identified using contact information provided by the Northwest Regional Permit Office. The regulations for defining who is required to complete an EDC form differs between 2009 and 2010 data collection and all annual/ongoing data collections for 2011 onward. For the 2009-2010 period, all owners, lessees, and charterers of a catcher-processor vessel that harvested whiting in 2009 or 2010 as recorded in the NMFS NORPAC database §660.114(b)(3)(i) were required to complete an EDC form. For 2011 and beyond, all owners, lessees, and charterers of a catcher-processor vessel registered to a C/P-endorsed limited entry trawl permit at any time are required to complete an EDC form §660.114(b)(3)(ii). For permit owners, a C/P-endorsed limited entry trawl permit application will not be considered complete until the required EDC form for the permit owner associated with that permit is submitted, as specified at §660.25(b)(4)(i). For a vessel owner, participation in the groundfish fishery (including, but not limited to, changes in vessel registration) will not be authorized until the required EDC form for that owner for that vessel is submitted, as specified, at §660.25(b)(4)(v). For a vessel lessee or charterer, participation in the groundfish fishery will not be authorized, until the required EDC form for their operation of that vessel is submitted.

A calendar year is used to determine which vessels meet the criteria. For example, in 2017, data were collected from all owners, lessees, and charters of a catcher-processor registered to a limited entry trawl permit with a C/P endorsement during 2016. The forms are fielded on this schedule in order to allow participants the time necessary to complete their taxes, which may contain information required on the EDC forms.

⁶ Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

If a form has missing information, or the information provided on the form is believed to be incorrect, EDC Program staff will attempt to contact the participant to correct the information. Data are validated and verified with external data sources whenever possible. These data sources include the Northwest Regional Permit Office and the At-Sea Hake Observer (A-SHOP) Program.

2 Vessel Participation on the West Coast and in Alaska

The catcher-processor fleet participates in fisheries on the West Coast and in Alaska. The number of vessels (9) that fished on the West Coast and in Alaska has remained constant since the implementation of the catch share program (Table 2.1). Table 2.2 provides the average days at sea by activity. Participants are instructed to count partial days as full days when reporting days at sea on the survey forms. Table 2.3 presents the average number of one way trips vessels made steaming between Alaska and the West Coast that year. In 2009, not all companies reported steaming trips and thus to preserve confidentiality we cannot report a value for that year.

Table 2.1: Number of vessels that fished on the West Coast and in Alaska. Number of vessels that fished on the West Coast and in Alaska. The value for 2009 is suppressed because not all companies had vessels that fished in Alaska in 2009.

Description	2009	2010	2011	2012	2013	2014	2015	2016
Operating on the West Coast	5	6	9	9	9	9	9	9
Fishing in Alaska	***	6	9	9	9	9	9	9

Table 2.2: Average days at sea. Average days at sea by activity on the West Coast and in Alaska for catcher-processor vessels (N = number of vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Operating on the West Coast	36:	5	52:	6	42:	9	29:	9	34:	9	43:	9	50:	9	62:	9
Steaming on the West Coast	6:	5	11:	6	5:	9	3:	9	13:	9	16:	9	15:	9	12:	9
Offloading on the West Coast	***	***	***	***	3:	9	3:	9	4:	9	6:	9	5:	9	7:	9
Steaming between West Coast and Alaska	***	***	23:	6	19:	9	18:	9	22:	9	20:	9	24:	9	25:	9
Fishing in Alaska	***	***	111:	6	190:	9	150:	9	164:	9	145:	9	145:	9	146:	9

Table 2.3: Average number of trips to Alaska. Average number of one-way trips between the West Coast and Alaska (N = number of vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
One-way trips to Alaska	***	***	3:	6	4:	9	3:	9	3:	9	4:	9	4:	9	4:	9

3 Delivery Locations

Participants report the percentage of all West Coast whiting products offloaded from the catcher-processor vessel at each major West Coast port. Table 3.1 lists the number of vessels delivering to each location. Some vessels delivered to more than one location in a given year.

Table 3.1: Delivery locations. Total number of vessels that offloaded in each location. Some vessels delivered to multiple locations in the same year.

Location	2009	2010	2011	2012	2013	2014	2015	2016
Astoria	0	0	0	0	0	0	0	0
Blaine/Bellingham	0	2	4	4	5	4	3	4
Coos Bay	0	0	0	0	0	0	0	0
Port Angeles	0	0	0	0	0	0	0	0
Seattle	3	3	2	2	1	4	2	2
Tacoma	2	3	3	3	3	3	3	3
At-sea	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0

4 Vessel Physical Characteristics

Physical vessel characteristics are shown below in Table 4.1. Survey participants are asked to provide basic information about the vessel and its physical characteristics, including market value, replacement value, vessel length, horsepower of main engines, and fuel capacity from the most recent marine survey. Marine surveys are done on a regular basis and are often required for insurance, financing, and other purposes.

Participants provide information about whether the vessel was hauled out (removed from the water for maintenance and repairs). Since 2009, a significant portion of all active fishing vessels have been hauled out in a given year (Table 4.2). This provides context that may be used to explain major costs associated with vessel repair and maintenance.

Table 4.1: Vessel characteristics. Average market value (millions of \$), replacement value (millions of \$), vessel length (feet), fuel capacity (thousands of gallons), and horsepower of main engines (thousands) (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Market value	60	5	58	6	55	9	55	9	55	9	55	9	55	9	55	9
Replacement value	92	5	87	6	86	9	86	9	90	9	90	9	134	9	134	9
Vessel length	301	5	281	6	304	9	304	9	306	9	306	9	304	9	304	9
Fuel capacity	265	5	208	6	275	9	267	9	269	9	270	9	268	9	268	9
Horsepower	7	5	6	6	7	9	6	9	7	9	7	9	6	9	6	9

Table 4.2: Number of vessels hauled out. Number (N) and percentage (%) of active vessels that were hauled out during the year.

Response	2009		2010		2011		2012		2013		2014		2015		2016	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	2	40%	3	50%	4	44%	2	22%	6	67%	3	33%	5	56%	3	33%
No	3	60%	3	50%	5	56%	7	78%	3	33%	6	67%	4	44%	6	67%

5 Vessel Fuel Use and Crew Size

5.1 Fuel use

Participants submit average fuel use per day (Table 5.1) and average fuel use per year (Table 5.2), for propulsion or other uses, when engaged in West Coast activities and steaming between the West Coast and Alaska. As stated above, not all companies have vessels that steam between the West Coast and Alaska every year, leading to values that are suppressed to maintain confidentiality.

Table 5.1: Average daily fuel use. Average daily fuel use (thousands of gallons) (N = number of vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Operating on the West Coast	7.7 [*]	5	7.2 [*]	6	7.7 [*]	9	7.6 [*]	9	7.6 [*]	9	6.7 [*]	9	6.7 [*]	9	6.6 [*]	9
Steaming between West Coast and Alaska	***	***	5.5 [*]	6	6.2 [*]	9	6.3 [*]	9	6.3 [*]	9	6.4 [*]	9	6.5 [*]	9	6.5 [*]	9

Table 5.2: Average annual fuel use. Average annual fuel use (thousands of gallons) (N = number of vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Total bunker fuel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total diesel	362 [†]	5	337 [†]	6	328 [†]	9	230 [†]	9	215 [†]	9	335 [†]	9	341 [†]	9	472 [†]	9
Total fish oil	***	***	***	***	***	***	***	***	***	0	0	0	0	0	0	0

5.2 Crew

Participants provide the number of processing and non-processing crewmembers on board at any one time when the vessel was operating in the West Coast whiting fishery during the year (Table 5.3). In 2013, the EDC form was revised to also collect information on the total number of individuals employed annually (Table 5.4). The total number of individuals employed across all vessels serves as an upper bound of the total number of individuals employed in the fishery. Processing crew includes line workers, fishmeal crew, quality control, technicians, cleanup, factory managers, combis, and mechanics who work on processing equipment. Non-processing crew includes the captain, deckhands, wheelhouse, galley, and engineers.

Table 5.3: Average crew size. Average number of non-processing and processing crew positions per vessel (N = number of EDC vessels with non-zero, non-NA responses).

Crew Type	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Non-processing	24.0	5	21.0	6	32.0	9	22.6	9	25.4	9	23.6	9	21.9	9	24.6	9
Processing	87.8	5	91.3	6	83.2	9	96.9	9	97.2	9	97.6	9	98.7	9	93.0	9

Table 5.4: Average number of individuals employed. Average total number of individuals employed in non-processing and processing crew positions per vessel throughout the year (N = number of EDC vessels with non-zero, non-NA responses).

Crew Type	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Non-processing crew	—	—	—	—	—	—	—	—	29	9	33	9	33	9	40	9
Processing crew	—	—	—	—	—	—	—	—	119	9	132	9	121	9	137	9

6 Whiting Harvest

Pacific whiting is managed through a bilateral agreement between the United States and Canada, known as the Pacific Whiting Treaty. The agreement allocates a percentage of the harvest quota to the United States. Once the U.S. allocation has been determined, it is then allocated between catcher-processor, mothership, shoreside, and tribal sectors.⁷ Data for the catcher-processor sector annual whiting harvest

⁷ The final annual allocations to the catcher-processor sector (adjusted for tribal reallocations) are taken from the annual *Pacific Whiting Fishery Summary*: http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/

(Table 6.1) are provided by the A-SHOP through the Pacific Fisheries Information Network (PacFIN) database. Average annual harvest on the West Coast and in Alaska are calculated using information from a question on the EDC form that asks participants to provide the total round weight of all fish harvested by the vessel in all fisheries during the year.

Table 6.1: Sector annual TAC and whiting harvest. Final catcher-processor Pacific whiting allocation, total whiting catch on the West Coast, and total catch including catch in Alaska (thousands of metric tons) (N = number of vessels with non-zero, non-NA responses).

Description	2009		2010		2011		2012		2013		2014		2015		2016	
	Total	N														
WC whiting allocation	35.4		53.4		75.1		55.6		79.6		103.5		100.9		114.1	
WC whiting catch	34.6	5	54.3	6	71.7	9	55.3	9	77.9	9	103.2	9	68.5	9	108.8	9
WC + AK catch	126.7	5	209.8	6	457.0	9	426.9	9	512.5	9	442.2	9	456.7	9	519.8	9

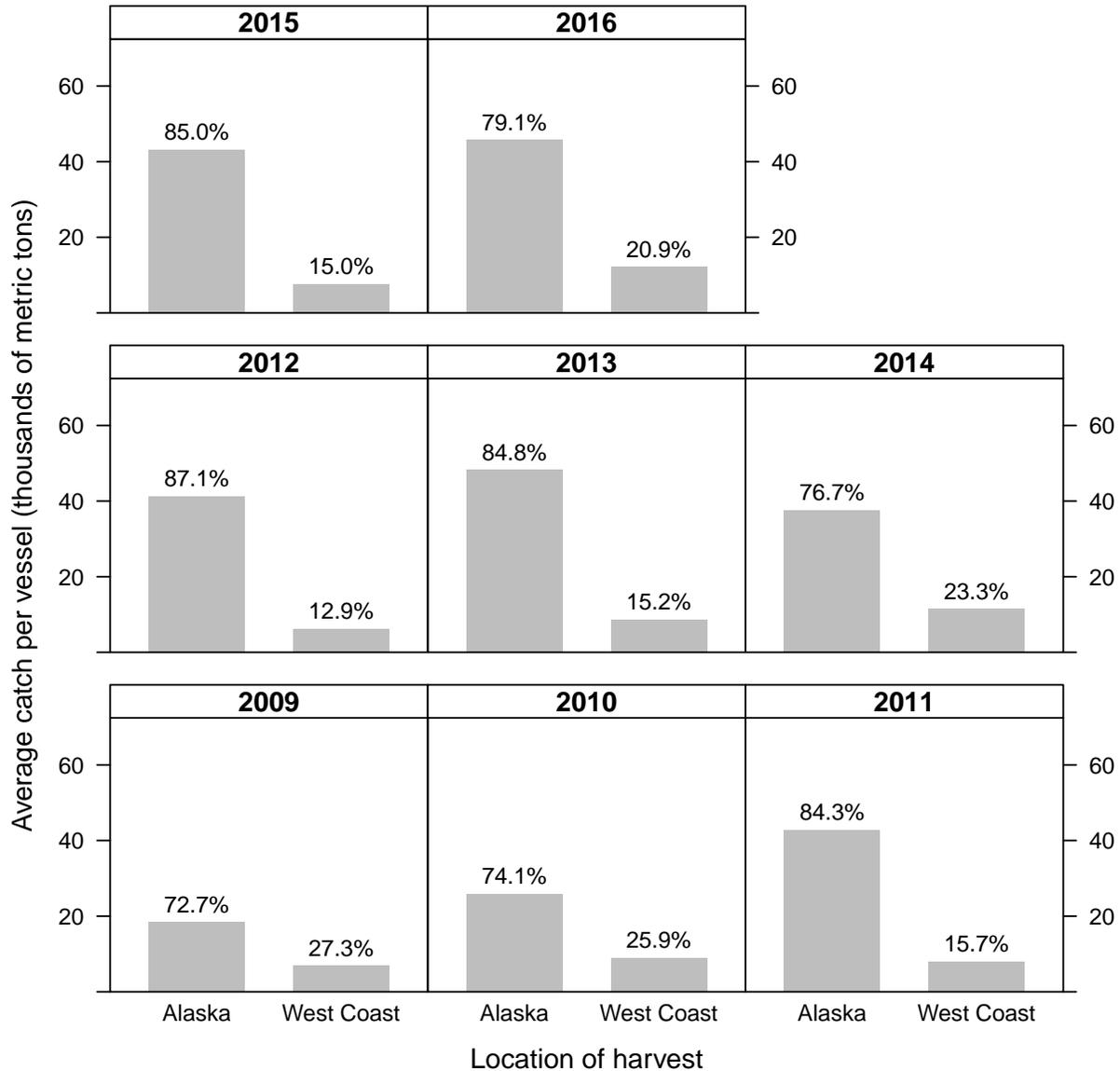


Figure 11: Average annual harvest on the West Coast and Alaska. Average annual harvest (thousands of metric tons) from 2009 to 2016 on the West Coast and in Alaska. Percentages above each bar indicate the portion of the total harvest caught by location.

7 Revenue

Earnings sources on the EDC survey form include the total value received for processed product, sale or lease of catcher-processor-endorsed permits, sale or lease of co-op shares, chartering, and insurance settlements, though participants have only reported fish production revenue to date. Tables 7.1 and 7.2 provide summary information on annual production in the West Coast whiting catcher-processor sector.

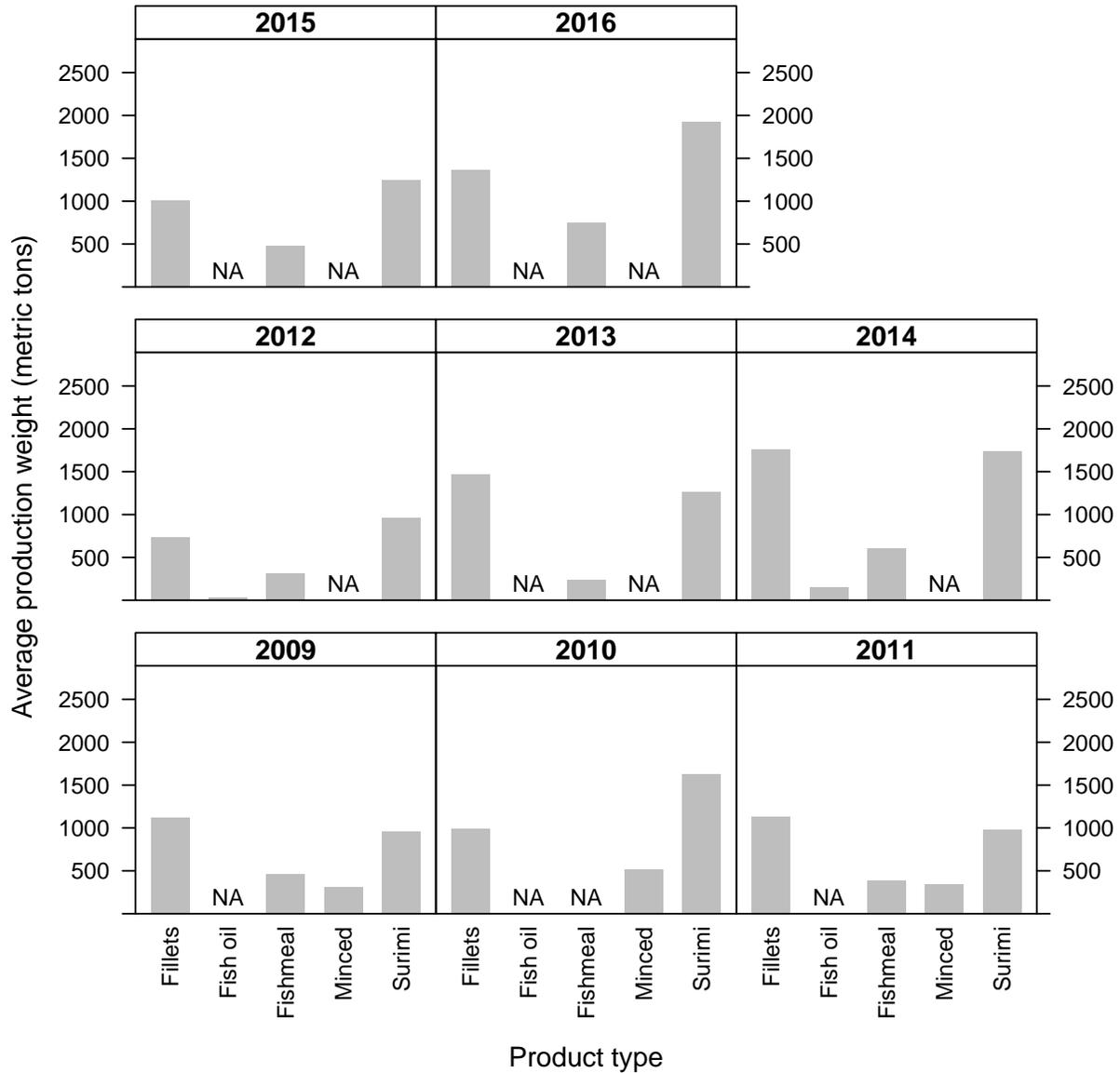


Figure 12: Whiting production weight by product type. Average production weight of Pacific whiting by product type per vessel (metric tons). “NA” is shown where data are confidential and product categories where values were confidential or reported as zero for all vessels for all years are not included.

Participants provide total weight and value of production by major product categories, including any post-season adjustments for products produced during the survey year. Not included in the value of production are any additional payments received to cover shipping, handling, or storage costs associated with the sale beyond the free-on-board (buyer assumes responsibility and liability for the product and pays shipping costs) port of discharge. Revenue values only include West Coast activities.

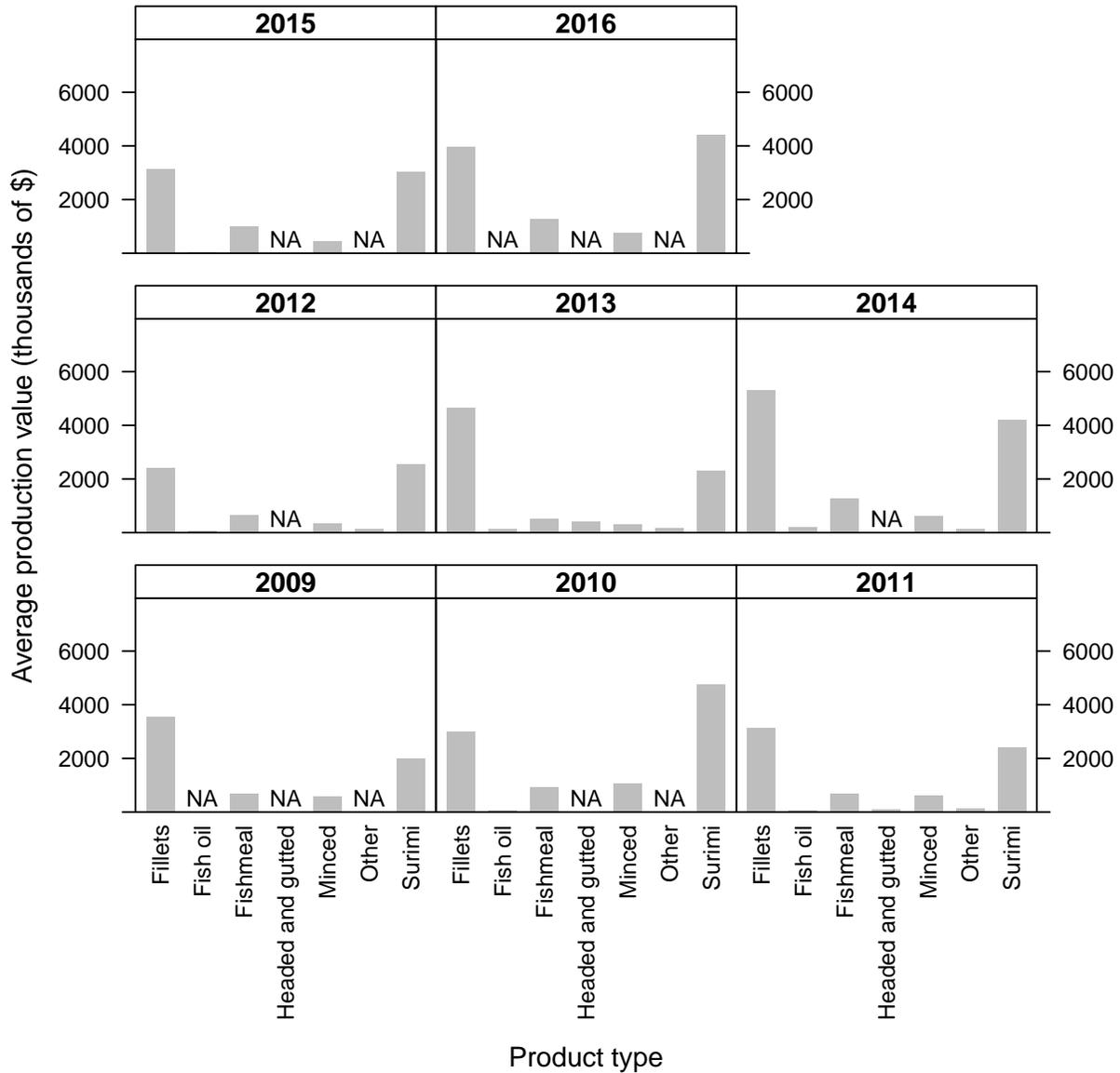


Figure 13: Whiting production value by product type. Average production value of Pacific whiting by product type and year (thousands of \$). “NA” is shown where data are confidential and product categories where values were confidential or reported as zero for all vessels for all years are not included.

Table 7.1: Whiting production weight by product type. Average production weight (metric tons) of Pacific whiting by product type per vessel (N = number of vessels with non-zero, non-NA responses).

Product	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Filletts	1,122:	5	987:	6	1,130:	9	732:	9	1,472:	8	1,761:	9	1,014:	9	1,362:	9
Fish oil	***	***	***	***	***	***	36:	7	***	***	147:	8	***	***	***	***
Fishmeal	454:	3	***	***	387:	6	316:	6	242:	6	601:	6	486:	6	746:	6
Headed and gutted	0	0	***	***	***	***	***	***	***	***	***	***	***	0	0	0
Minced	309:	4	511:	4	338:	7	***	***	***	***	***	***	***	***	***	***
Roe	0	0	***	***	0	0	0	0	0	0	0	0	0	0	0	0
Round	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stomachs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Surimi	953:	5	1,621:	6	975:	9	965:	9	1,258:	9	1,739:	9	1,250:	9	1,928:	9
Other	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Average total weight	2,648:	5	3,310:	6	2,722:	9	2,084:	9	3,012:	9	4,311:	9	2,776:	9	4,095:	9

Table 7.2: Whiting production value by product type. Average production value (thousands of \$) of Pacific whiting by product type per vessel (N = number of vessels with non-zero, non-NA responses).

Product	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N								
Filletts	\$3,540	5	\$3,002	6	\$3,142	9	\$2,412	9	\$4,652	8	\$5,317	9	\$3,116	9	\$3,953	9
Fish oil	***	***	***	***	***	***	\$53	7	***	***	\$197	8	***	***	***	***
Fishmeal	\$669	3	***	***	\$670	6	\$654	6	\$499	6	\$1,267	6	\$992	6	\$1,281	6
Headed and gutted	0	0	***	***	***	***	***	***	***	***	***	***	***	***	0	0
Minced	\$583	4	\$1,058	4	\$590	7	***	***	***	***	***	***	***	***	***	***
Roe	0	0	***	***	0	0	0	0	0	0	0	0	0	0	0	0
Round	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stomachs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Surimi	\$1,986	5	\$4,762	6	\$2,418	9	\$2,528	9	\$2,301	9	\$4,208	9	\$3,044	9	\$4,420	9
Other	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Average total value	\$6,502	5	\$9,059	6	\$6,602	9	\$5,657	9	\$7,210	9	\$11,020	9	\$7,121	9	\$9,749	9

8 Costs

This section describes the cost data that are collected on the EDC catcher-processor form, including variable costs, fixed costs, and total costs. For EDC Program analyses, costs are divided into two categories: variable costs and fixed costs. Variable costs vary with the level of fishery participation, and generally include items such as fuel and crew compensation. Fixed costs do not vary as directly with the level of fishery participation, and generally include items such as vessel capital improvements. The designation of a cost as variable or fixed depends on many factors, including the relevant time horizon and use of the data. While some costs would clearly be considered fixed (e.g., the purchase of a new engine), others are more difficult to categorize. For the purposes of this report, the costs listed in Table 8.1 are considered to be variable and costs listed in Tables 8.2, 8.3, 8.4, 9.1, and 9.2 are considered to be fixed.

Fishery participants provide both “capitalized expenditures” and “expenses” for vessel improvements and maintenance, fishing gear, and processing equipment because certain costs may be treated for tax accounting purposes as either capitalized or expensed. Capitalized expenditures are depreciated over a number of years whereas expensed items are fully deducted as a cost for the year in which they are incurred. In an effort to reduce the reporting burden and potential for errors, these data are collected as they are reported in the businesses’ accounting systems.

In order to conduct economic analyses for specific fisheries, it is important to have costs broken out by fishery (*i.e.*, West Coast whiting versus processing in Alaska). It may be feasible for participants to delineate costs at the fishery level for some items, but not for all expenses. During the development of the EDC survey form, a key issue was the determination of which costs could reasonably be broken out by fishery. Each cost item is assigned to one or more categories based on how they are commonly tracked by industry members: 1) used in West Coast fisheries only (West Coast Only); 2) used on the West Coast and in other fisheries (Shared); and 3) used in all fisheries (All) regardless of whether they are used on the West Coast. See below for further details on these methods.

Finally, there are a variety of costs that are associated with operating a catcher-processor vessel that are not requested on the form because it is difficult to determine the share of the cost associated with the vessel. These costs include items that can be used for activities other than fishing, or are too difficult to allocate to a particular vessel in a multi-vessel company. These expenses include office space, vehicles, storage of equipment, professional fees, and marketing. In general, the EDC form aims to capture costs that are directly related to vessel maintenance and fishing operations, and not costs that are related to activities or equipment off the vessel. For these reasons, the aggregated measures of costs (variable costs, fixed costs, and total costs) presented here underestimate the true costs of operating a business.

8.1 Variable costs

Variable costs were collected for all West Coast fishing activities only (Table 8.1). Variable costs are more directly related to fishing operations than fixed costs, and therefore it is possible for vessels to separate variable expenses for activities on the West Coast from other activities.

Table 8.1: Variable expenses. Average variable expenses for catcher-processors on the West Coast (thousands of \$) (N = number of vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Additives	\$218:	5	\$298:	6	\$143:	9	\$142:	9	\$159:	9	\$256:	9	\$149:	9	\$281:	9
Communication	\$16:	5	\$22:	6	\$17:	9	\$7:	9	\$12:	9	\$15:	9	\$13:	9	\$24:	9
Cost recovery fees	—	—	—	—	—	—	—	—	—	—	\$31:	9	—	0	\$17:	9
Food	\$88:	5	\$109:	6	\$109:	9	\$139:	9	\$88:	9	\$132:	9	\$102:	9	\$149:	9
Freight	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Fuel	\$758:	5	\$862:	6	\$1,225:	9	\$808:	9	\$801:	9	\$1,205:	9	\$816:	9	\$921:	9
MSC fees	***	***	***	***	***	***	0	0	0	0	***	***	***	***	0	0
Non-processing crew	\$314:	5	\$383:	6	\$426:	9	\$387:	9	\$487:	9	\$653:	9	\$515:	9	\$697:	9
Observers	\$31:	5	\$37:	6	\$36:	9	\$22:	9	\$22:	9	\$33:	9	\$38:	9	\$48:	9
Offloading	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Packing materials	\$205:	5	\$232:	6	\$242:	9	\$142:	9	\$123:	9	\$392:	9	\$232:	9	\$343:	9
Processing crew	\$1,140:	5	\$1,420:	6	\$908:	9	\$888:	9	\$988:	9	\$1,568:	9	\$1,025:	9	\$1,447:	9
Product insurance	***	***	***	***	\$13:	9	\$76:	9	\$82:	9	\$156:	9	\$248:	9	\$283:	9
Sea state monitoring	\$4:	5	\$4:	6	***	***	\$6:	9	\$3:	9	\$9:	9	\$10:	9	\$20:	6
Supplies	***	***	***	***	\$8:	9	***	***	***	***	***	***	\$26:	9	\$140:	9
Travel	***	***	***	***	***	***	\$15:	8	\$26:	9	\$34:	9	\$33:	9	\$33:	9
Average total	\$2,860:	5	\$3,483:	6	\$3,184:	9	\$2,672:	9	\$2,823:	9	\$4,532:	9	\$3,250:	9	\$4,417:	9

8.2 Fixed costs

Costs on vessel and on-board equipment, fishing gear, and processing equipment

Table 8.2 presents average annual capitalized expenditures. Survey participants are asked to provide capitalized expenditures for the survey year associated with the following categories:

- New and used vessel and on-board equipment: excludes processing equipment and fishing gear, includes all electronics, safety equipment, and machinery not used to harvest or process fish. Participants are asked to provide information for **All** fisheries regardless of where the vessel fished.
- Processing Equipment: excludes all equipment, machines, and buildings based primarily on shore, excludes any processing equipment that is not used at least partially in the West Coast whiting fishery, and includes on-board freezers, storage equipment, packing equipment, conveyors, and on-board cargo handling equipment. Participants are asked to separately report costs related to processing equipment **Shared** between the West Coast and other fisheries from those costs related to equipment used only on the **West Coast**.
- Fishing gear: Includes nets, cables, doors, and fishing machinery used in the West Coast whiting fishery, excludes any fishing gear that is not used at least partially in the West Coast whiting fishery. Participants are asked to separately report costs related to fishing gear **Shared** between the West Coast and other fisheries from those costs related to gear used only on the **West Coast**.

Participants are asked to delineate West Coast capitalized expenditures and expenses on fishing gear and processing equipment from shared expenses.

Table 8.2: Capitalized expenditures on gear and equipment. Average capitalized expenditures (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment (N = number of EDC vessels with non-zero, non-NA responses). Note that some expenditures were requested for (a) all fisheries the vessel participates in regardless of where the vessel fished (denoted by "All"), (b) West Coast whiting, Alaska, and other (denoted by "Shared"), and (c) for West Coast fisheries only (Washington, Oregon, and California, denoted by "WC").

Expenditure	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N								
Fishing gear (Shared)	\$97	5	***	***	***	***	\$537	9	***	***	\$440	9	\$515	8	\$236	8
Fishing gear (WC)	***	***	***	***	0	0	0	0	0	0	0	0	0	0	0	0
Processing equipment (Shared)	***	***	***	***	***	***	***	***	\$1,112	9	\$596	9	\$883	8	\$871	9
Processing equipment (WC)	0	0	***	***	0	0	0	0	0	0	0	0	0	0	0	0
Vessel and on-board equipment (All)	\$1,913	5	***	***	\$2,023	9	\$1,381	9	\$1,417	9	\$1,720	9	\$1,904	9	\$2,115	9
Average total	\$7,229	5	\$1,367	6	\$2,747	9	\$2,571	9	\$2,720	9	\$2,756	9	\$3,147	9	\$3,196	9

Table 8.3: Expenses on gear and equipment. Average repair and maintenance expenses (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment (N = number of vessels with non-zero, non-NA responses). Note that some expenses were requested for (a) all fisheries the vessel participates in regardless of where the vessel fished (denoted by "All"), (b) West Coast whiting, Alaska, and other (denoted by "Shared"), and (c) for West Coast fisheries only (Washington, Oregon, and California, denoted by "WC").

Expense	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Fishing gear (Shared)	\$280	5	\$197	6	\$359	9	\$368	9	\$246	9	\$222	9	\$356	9	\$307	9
Fishing gear (WC)	***	***	***	***	***	***	0	0	0	0	0	0	0	0	0	0
Processing equipment (Shared)	\$876	5	\$687	6	\$746	9	\$812	9	\$919	9	\$795	9	\$855	9	\$1,063	9
Vessel and on-board equipment (All)	\$1,160	5	\$1,166	6	\$1,664	9	\$1,654	9	\$1,533	9	\$1,318	9	\$1,708	9	\$1,788	9
Average total expenses	\$2,350	5	\$2,084	6	\$2,795	9	\$2,834	9	\$2,698	9	\$2,335	9	\$2,919	9	\$3,158	9

Other fixed costs

Participants also provide information about other fixed costs and vessel depreciation, which is summarized in Tables 8.4 and 8.5.

Table 8.4: Other fixed expenses. Average fixed costs (thousands of \$) on all other categories (N = number of vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Co-op fees	\$20	5	\$27	6	\$17	9	\$34	9	***	***	\$33	9	\$29	9	\$25	9
Insurance	\$890	5	\$813	6	\$900	9	\$523	9	\$486	9	\$488	9	\$723	9	\$859	9
Lease of vessel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moorage	\$184	5	\$221	6	\$155	9	\$260	9	\$274	9	\$189	9	\$270	9	\$288	9
Average total	\$1,095	5	\$1,061	6	\$1,072	9	\$818	9	\$782	9	\$710	9	\$1,022	9	\$1,173	9

Table 8.5: Depreciation. Average depreciation (millions of \$) taken during the survey year (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Depreciation	\$2.69	5	\$2.28	6	\$3.07	9	\$3.37	9	\$2.18	9	\$3.31	9	\$3.98	9	\$4.82	9

8.3 Quota and permit costs

The EDC form requests information on quota and permit expenses. No vessels reported lease or purchase of permits; however, vessels may have made end-of-season informal arrangements regarding leftover quota. This type of transfer is not captured by questions on the EDC form.

Catcher-Processor Data Analysis

To fully evaluate cost information and calculate net revenue for specific fisheries, NWFSC economists must do more than summarize data submitted by fishery participants. This section describes the methods used to calculate costs and net revenue for only West Coast fisheries.

9 Cost Disaggregation

This section describes the methods used to calculate costs and net revenue for participating in only West Coast fisheries. Some cost categories on the EDC forms are only incurred while participating in West Coast fisheries, while others include costs incurred while operating in Alaska. For some costs, it may be feasible for participants to break out or track costs at the fishery level. However, for some costs this is not possible. Therefore, cost disaggregation is required to estimate total costs and total cost net revenue on the West Coast. As part of the EDC development process, NWFSC staff met with participants to determine which cost categories could be reported for only West Coast fisheries and which could not, and therefore require further disaggregation. Each cost item is assigned to one or more categories based on how it is commonly tracked by industry members: 1) used on West Coast fisheries only (West Coast Only); 2) used on the West Coast and in other fisheries (Shared); and 3) used in all fisheries (All) regardless of whether they are used on the West Coast.

To disaggregate the West Coast and Alaska costs, we allocate costs proportional to the weight of fish purchased or harvested in each fishery. We calculate the ratio of total West Coast Pacific whiting weight (for all years the vessel supplied data) to the weight in all fisheries for the same time span:

$$\frac{\sum_y WT_n^{WestCoast}}{\sum_y WT_n^{AllFisheries}}$$

where n is an individual vessel summed over all years, y , that the vessel supplied data. Thus each vessel's ratio of costs being allocated to the West Coast is the same for all years. This method makes the proportion of costs allocated to the West Coast less sensitive to fluctuations in the TAC for West

Coast Pacific whiting and Alaska fisheries. Cost disaggregation was only necessary for fixed costs because vessels reported variable costs by fishery.

9.1 West Coast portion of fixed costs

Table 9.1: West Coast costs on gear and equipment. Capitalized expenditures and expenses on vessel and on-board equipment, fishing gear, and processing equipment incurred while participating in only West Coast fisheries (thousands of \$) (N = number of vessels with non-zero, non-NA responses).

Cost Category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Fishing gear	\$102.9	5	\$105.0	6	\$117.1	9	\$151.6	9	\$75.9	9	\$131.9	9	\$132.1	9	\$93.6	9
Processing equipment	\$973.0	5	\$189.3	6	\$238.1	9	\$237.2	9	\$375.7	9	\$251.4	9	\$298.9	9	\$354.1	9
Vessel and on-board equipment	\$559.1	5	\$446.5	6	\$557.3	9	\$579.1	9	\$542.8	9	\$554.7	9	\$638.2	9	\$708.2	9
Average total	\$1,635.0	5	\$740.8	6	\$912.5	9	\$967.9	9	\$994.5	9	\$938.0	9	\$1,069.2	9	\$1,156.0	9

Table 9.2: West Coast costs on insurance, moorage, fees, and leasing. Expenses on insurance, moorage, fees, and leasing on the West Coast (thousands of \$) (N = number of vessels with non-zero, non-NA responses).

Cost Category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N								
Co-op fees	\$20.0	5	\$27.3	6	\$16.8	9	\$34.3	9	***	***	\$33.0	9	\$28.8	9	\$25.4	9
Insurance expenses	\$161.5	5	\$140.1	6	\$151.5	9	\$94.1	9	\$86.6	9	\$91.5	9	\$124.1	9	\$156.4	9
Lease expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moorage expenses	\$35.5	5	\$37.3	6	\$28.4	9	\$46.4	9	\$49.2	9	\$37.4	9	\$47.9	9	\$54.5	9
Average total	\$217.1	5	\$204.7	6	\$196.8	9	\$174.8	9	\$156.7	9	\$162.0	9	\$200.7	9	\$236.2	9

9.2 Summary of West Coast portion of costs

Table 9.3: Summary of West Coast portion of costs. Average capitalized expenditures and expenses on vessel and on-board equipment, fishing gear, and processing equipment, other fixed costs, and all variable costs on the West Coast (millions of \$) (N = number of EDC vessels with non-zero, non-NA responses).

Cost category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Total costs on vessel and on-board equipment, fishing gear, and processing equipment	\$1.64	5	\$0.74	6	\$0.91	9	\$0.97	9	\$0.99	9	\$0.94	9	\$1.07	9	\$1.16	9
Total variable costs	\$2.86	5	\$3.48	6	\$3.18	9	\$2.67	9	\$2.82	9	\$4.53	9	\$3.25	9	\$4.42	9
Total other fixed costs	\$0.22	5	\$0.20	6	\$0.20	9	\$0.17	9	\$0.16	9	\$0.16	9	\$0.20	9	\$0.24	9
Average total	\$4.71	5	\$4.43	6	\$4.29	9	\$3.81	9	\$3.97	9	\$5.63	9	\$4.52	9	\$5.81	9

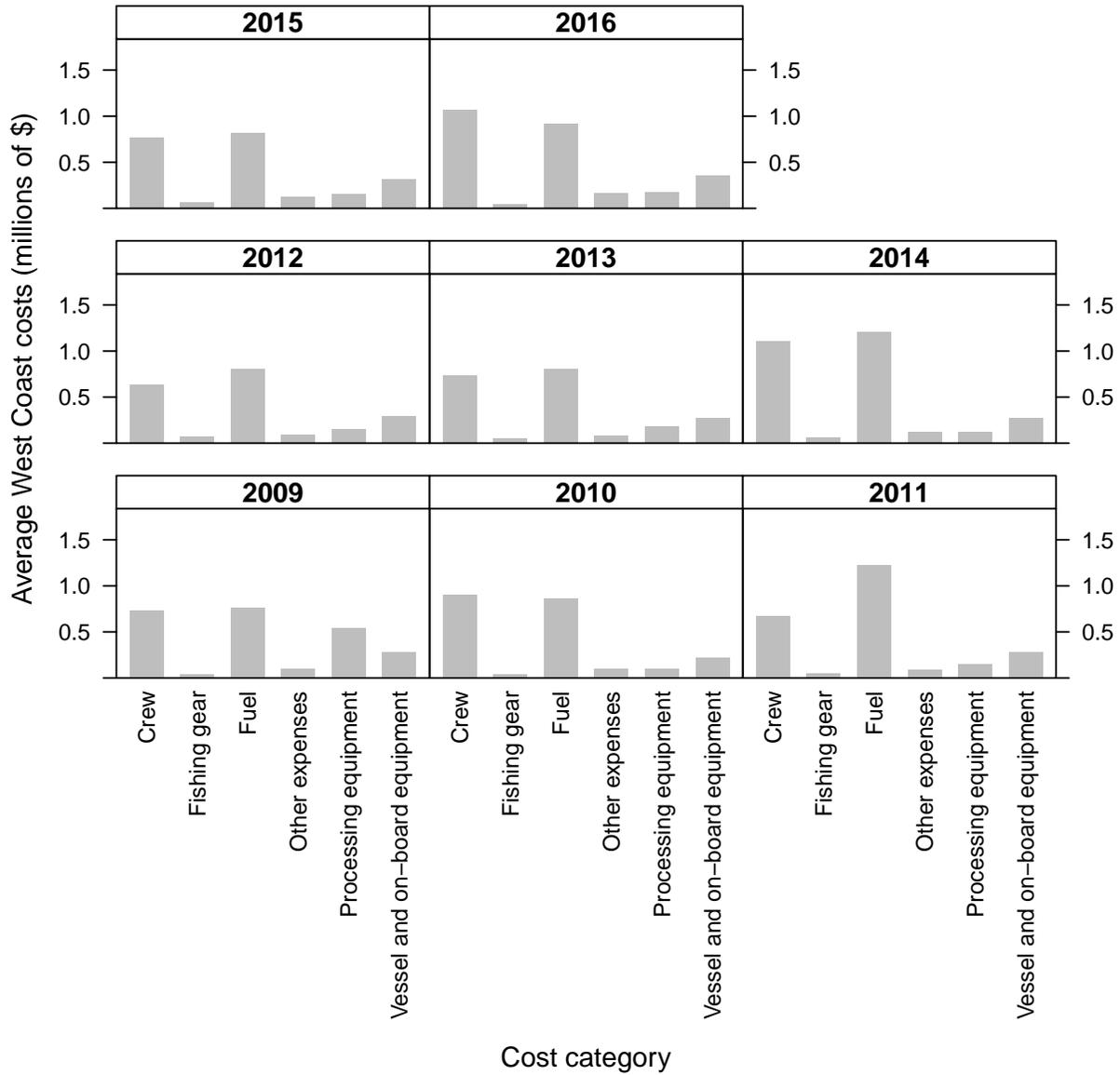


Figure 14: Average costs by category on the West Coast. Average costs per vessel by category on the West Coast including capitalized expenditures and expenses (millions of \$). Crew includes both processing and non-processing crew expenses. The “Other” category includes expenses on additives, communication, fees, insurance, freight, moorage, observers, offloading, supplies, packing, travel, and Sea-State monitoring. “NA” is shown where data are confidential.

10 Net Economic Benefits

The level of net benefits generated by fishery participants indicates whether an operation is a viable ongoing business, but there are numerous ways to calculate and assess net benefits depending on the data available, including *economic profit*¹ and *net revenue*. Economic profit is an indicator of the long-term viability of fishery operations since it encapsulates all costs, including the opportunity cost of non-cash inputs, and can be used to estimate whether there are incentives or disincentives to invest in capital or enter and leave the fishery. However, calculations of economic profit are beyond the scope of these reports because the EDC Program does not collect information on opportunity costs.

The EDC Program calculates a monetary, financial measure of a participant's net cash flow by subtracting monetary costs from gross revenue, which we call net revenue. The only costs that are included are those that are actually paid or associated with a financial transaction. Net revenue therefore measures the annual financial well-being of a participant's operation and can be used to assess how changes in fishery management may affect monetary gains or losses.

10.1 Net revenue

Net revenue is calculated two ways: using only variable costs, and using variable costs plus fixed costs (total costs).² The first calculation is called variable cost net revenue, while the second is called total cost net revenue (Figure 15). Variable cost net revenue is useful for examining changes in fishery operations that likely do not affect fixed costs. For example, the cost of processing an additional metric ton of fish is most representative of the true costs when only variable costs are considered. Total cost net revenue is generally a better measure of financial gain or loss for an entire year, season, or fishery.

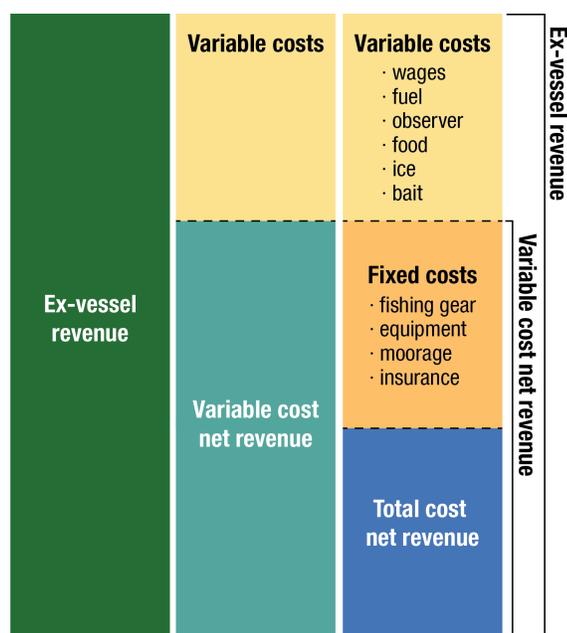


Figure 15: Composition and derivation of variable and total cost net revenue used in the EDC Program analysis of revenue, costs, and economic performance.

There are two caveats associated with the net revenue calculations in this report. First, as noted in Section 4, there are certain costs associated with operating a vessel that are not requested on the EDC

¹ Whitmarsh D., James C., Pickering H., Neiland A. 2000. The profitability of marine commercial fisheries: a review of economic information needs with particular reference to the UK. *Marine Policy*, Vol. 24(3), pp. 257-263.

² See Section 8 for a more complete discussion of variable and fixed costs used in this report.

form either because it is difficult to determine the share of the cost associated with the vessel, because costs pertain to items used for activities other than catching or processing fish, or are too difficult to allocate to a particular vessel in a multi-vessel company. These costs include office space, vehicles and transport trucks, storage of equipment, professional fees, and income taxes. Therefore, the net revenue presented here is likely an overestimate of true net revenue.

Second, the EDC forms do not collect information about financing costs of large purchases and investments. Instead of using principal and interest payment information in calculations of net revenue, we therefore must use the total costs associated with the purchases, repair, maintenance, or improvements. For example, if a new engine is purchased, the total cost of the engine is used in the year that it was reported even though the actual cash outlay, if it were financed, would only be the principal and interest payments. It is likely that many larger capital costs, and perhaps some operating costs, are financed. This would mean that the actual cash outlays in a particular year for those items would be less than what is used in the EDC net revenue calculation. This may largely balance out over time because previously financed capital is also not included. Moreover, total cost net revenue is expected to be representative of actual total cost net revenue only when averaged over many years and across participants because relatively large capital costs only occur periodically.

Net revenue for all West Coast fishing activities

Average net revenue is calculated for all activities on the West Coast. West Coast revenue only includes revenue from fish production. The variable and fixed costs do not include costs related to acquiring limited entry permits, quota shares, or quota pounds.

$$\text{Variable cost net revenue} = \text{West Coast revenue} - \text{West Coast variable costs}$$

$$\text{Total cost net revenue} = \text{West Coast revenue} - (\text{West Coast variable costs} + \text{West Coast fixed costs})$$

Table 10.1: West Coast variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast (millions of \$) (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Revenue	\$6.50	5	\$9.06	6	\$6.60	9	\$5.66	9	\$7.21	9	\$11.02	9	\$7.12	9	\$9.75	9
(Variable costs)	\$2.86	5	\$3.48	6	\$3.18	9	\$2.67	9	\$2.82	9	\$4.53	9	\$3.25	9	\$4.42	9
Variable cost net revenue	\$3.64	5	\$5.58	6	\$3.42	9	\$2.98	9	\$4.39	9	\$6.49	9	\$3.87	9	\$5.33	9
(Fixed costs)	\$1.85	5	\$0.95	6	\$1.11	9	\$1.14	9	\$1.15	9	\$1.10	9	\$1.27	9	\$1.39	9
Total cost net revenue	\$1.79	5	\$4.63	6	\$2.31	9	\$1.84	9	\$3.24	9	\$5.39	9	\$2.60	9	\$3.94	9

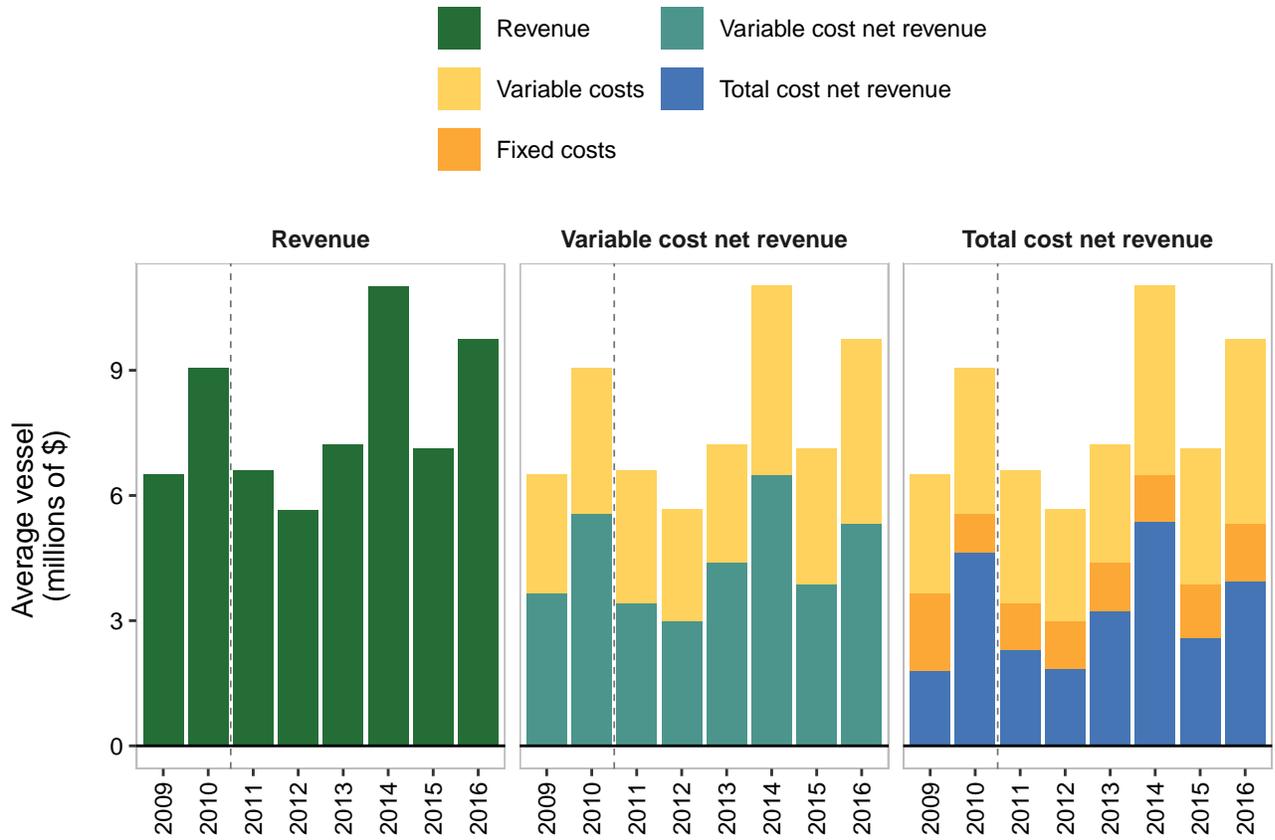


Figure 16: Average total reported revenue (left), average variable cost net revenue (revenue minus variable costs) (middle), and average total cost net revenue (revenue minus variable costs and fixed costs) (right) (millions of \$). Dashed line represents the beginning of the catch share program.

11 Economic Performance: Cost, Revenue, Net Revenue, and Product Recovery Rates

Net revenue rates

As an indication of changes in efficiency and profitability, rates are calculated for revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue by days at sea (West Coast processing and steaming), metric ton of fish produced, and metric ton of fish harvested (Tables 11.1, 11.2, and 11.3).

Table 11.1: Revenue, costs, and net revenue per day. Average vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue per day (\$) (N = number of EDC vessels with non-zero, non-NA responses).

Per day	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N								
Revenue	\$149,099	5	\$144,231	6	\$139,343	9	\$174,697	9	\$152,815	9	\$186,516	9	\$112,664	9	\$128,987	9
(Variable costs)	\$68,496	5	\$57,028	6	\$67,899	9	\$83,234	9	\$63,588	9	\$77,329	9	\$51,196	9	\$59,690	9
Variable cost net revenue	\$80,602	5	\$87,204	6	\$71,444	9	\$91,462	9	\$89,227	9	\$109,187	9	\$61,469	9	\$69,297	9
(Fixed costs)	\$79,660	5	\$18,145	6	\$26,785	9	\$46,948	9	\$24,780	9	\$19,712	9	\$21,481	9	\$18,986	9
Total cost net revenue	\$942	5	\$69,059	6	\$44,659	9	\$44,515	9	\$64,447	9	\$89,475	9	\$39,988	9	\$50,311	9

Table 11.2: Net revenue per metric ton harvested. Average vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue per metric ton harvested (\$) (N = number of EDC vessels with non-zero, non-NA responses).

Per metric ton harvested	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Variable cost net revenue	\$491	5	\$591	6	\$416	9	\$472	9	\$452	9	\$562	9	\$500	9	\$416	9
Total cost net revenue	-\$200	5	\$470	6	\$248	9	\$233	9	\$312	9	\$459	9	\$317	9	\$292	9

Table 11.3: Revenue, costs, and net revenue per metric ton produced. Average vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue per metric ton produced (\$) (N = number of EDC vessels with non-zero, non-NA responses).

Per mt produced	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N														
Revenue	\$2,500	5	\$2,743	6	\$2,423	9	\$2,693	9	\$2,358	9	\$2,567	9	\$2,563	9	\$2,370	9
(Variable costs)	\$1,162	5	\$1,088	6	\$1,195	9	\$1,298	9	\$1,023	9	\$1,070	9	\$1,216	9	\$1,133	9
Variable cost net revenue	\$1,338	5	\$1,656	6	\$1,229	9	\$1,396	9	\$1,335	9	\$1,498	9	\$1,347	9	\$1,237	9
(Fixed costs)	\$2,022	5	\$338	6	\$507	9	\$710	9	\$397	9	\$274	9	\$506	9	\$374	9
Total cost net revenue	-\$683	5	\$1,318	6	\$721	9	\$685	9	\$938	9	\$1,224	9	\$841	9	\$863	9

Product recovery rates

The product recovery rate for the catcher-processor whiting sector is calculated as follows:

$$\frac{\sum_{n=1}^N WT_n^{fishoutputs}}{\sum_{n=1}^N WT_n^{fishinputs}}$$

where N is the number of catcher-processors that harvested fish on the West Coast, $WT_n^{fishoutputs}$ is the weight of fish harvested and $WT_n^{fishinputs}$ is the weight of production for each catcher-processor. The average product recovery rate is calculated for each survey year (Table 11.4).

Table 11.4: Product recovery rate. The average product recovery rate (total weight of production divided by total weight of fish harvested) for catcher-processors on the West Coast (N = number of vessels with non-zero, non-NA responses).

	2009	2010	2011	2012	2013	2014	2015	2016
	Mean N							
Product recovery rate	0.38 5	0.37 6	0.34 9	0.34 9	0.35 9	0.38 9	0.36 9	0.34 9