

Economic Data Collection Program

Mothership Report (2009-2012)

Draft Report for PFMC Review

Do Not Cite

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Northwest Fisheries Science Center¹

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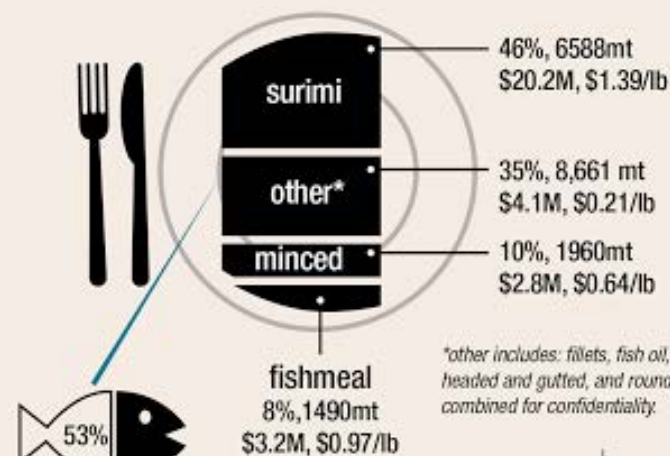
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2012 Economic Data Collection (EDC)
West Coast Groundfish Trawl
Catch Share Program

MOTHERSHIP

DRAFT

PACIFIC WHITING PRODUCTION SUMMARY



product recovery rate

ECONOMIC SUMMARY*

Vessel Average

\$6.1M revenue
\$4.6M variable costs
\$1.5M variable cost net revenue
\$1.7M fixed costs
\$-0.2M total cost net revenue

\$23.6K variable cost net revenue per day

Fleet-wide Totals

\$30.3M revenue
\$7.4M variable cost net revenue
\$-1.1M total cost net revenue

ALASKA PARTICIPATION

7 vessels
187,613 mt total fleet weight

WC DELIVERY PORTS

of vessels offloading in each port

Bellingham (3)

Seattle* (2)

(*all five motherships report Seattle as their home port)

3,740 mt average total weight of processed product delivered per vessel

FISHERY PARTICIPATION

Days at Sea

Average days fishing, processing, and steaming on the West Coast	46
Average days steaming to and from Alaska	21
Average days in Alaska	141

TOTAL US PACIFIC WHITING TAC

135,480 mt

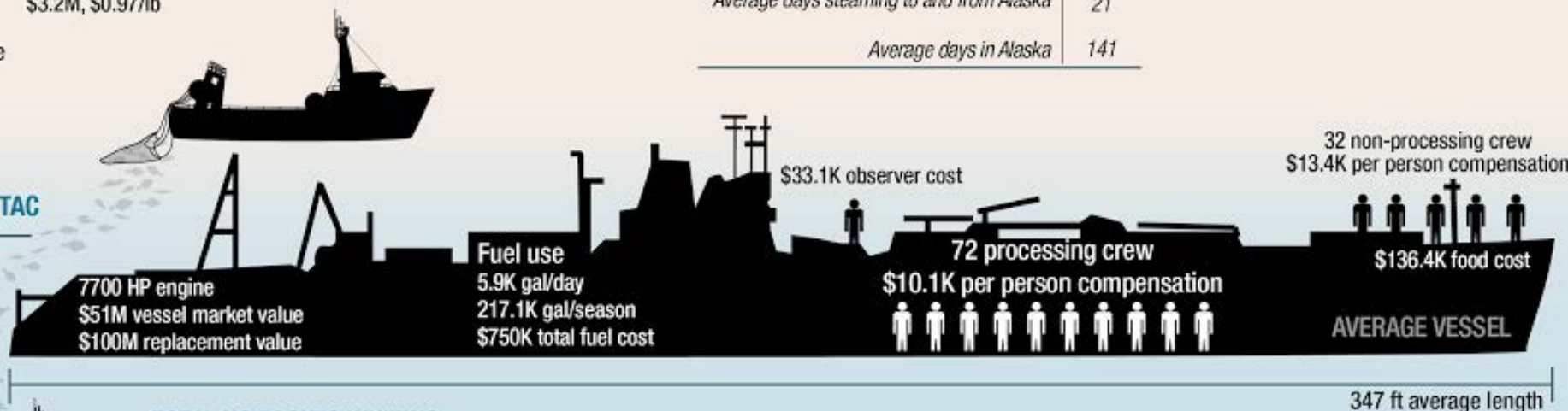
TOTAL CATCH

37,505mt, 0.11\$/lb

TOTAL US PACIFIC WHITING TAC MS ALLOCATION

39,235 mt (24% of total U.S. TAC)

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



Mothership Sector: 2012 Highlights

In 2012, five motherships, owned by four companies, processed Pacific whiting on the West Coast.

- Mothership vessels spent an average of 46 days fishing, processing, and steaming along the West Coast, primarily in May-November.
- The fleet spends a majority of its time (70%) processing Alaska pollock in the Bering Sea and Aleutian Islands off Alaska.
- West Coast motherships deliver to two ports: Blaine/Bellingham and Seattle. All five motherships listed Seattle as their homeport.
- A little less than an average of 70 processing and 32 non-processing crewmembers worked on each mothership vessel. Average compensation for each processing and non-processing crewmember was \$10,000 and \$13,500, respectively.
- The fleet's annual price paid to catcher vessels has increased from \$180 per metric ton in 2009 to \$248 in 2012.¹
- The average first-wholesale revenue per vessel was close to \$6.1 million. Fillet and surimi production made up 83% of the total production value.
- Surimi generally makes up the largest share of revenue, with an average first-wholesale price of \$3,100 per metric ton in 2012. Fishmeal has an average first-wholesale price of \$2,100 per metric ton. Average first-wholesale price of all products types was \$1,700.
- Average variable cost net revenue (revenue minus variable costs) fell to \$1.5 million in 2012 from \$2.4 million in 2011, but still represented an increase over the \$1.1 million variable cost net revenue in 2009. Motherships earned a variable cost net revenue per metric ton produced of \$83 in 2012; a 91% decrease from 2009.
- Average total cost net revenue per vessel (revenue minus both variable and fixed costs) was -\$227 thousand dollars in 2012, about -\$841 per metric ton produced.

Infographic created by Su Kim, Scientific Communications Office, Northwest Fisheries Science Center.

¹ Values reported in inflation adjusted 2012 dollars.

Report Contents

Mothership Sector: 2012 Highlights	2
Acknowledgments	5
Report Introduction	6
Mothership Overview	9
Mothership Data Summaries	19
List of Tables	22
List of Figures	24
1 Introduction	25
2 Vessel Participation on the West Coast and in Alaska	30
3 Delivery Ports	32
4 Vessel Physical Characteristics	33
5 Vessel Fuel Use and Crew Size	35
6 Whiting Purchases	37
7 Revenue	39

8	Costs	43
9	Net Revenue and Economic Profit	59
10	Economic Performance: Cost, Revenue, Net Revenue, Markup, and Product Recovery Rates	64

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We would like to acknowledge the efforts of all the Northwest Fisheries Science Center (NWFSC) economists who provided a wide range of input into survey design, implementation, and analysis. The group worked together in an effort to provide high quality data that can be distributed in a timely and secure fashion. We thank Su Kim of the NWFSC Scientific Communications Office for producing the Infographic on the second page of this report.

We appreciate the efforts of the Northwest Regional Office for support in the Program development, outreach, and communication efforts. The Permit Office staff was particularly instrumental in ensuring coordination with the mandatory participation requirements.

The Northwest Division of the Office of Law Enforcement (OLE) and the National Oceanic and Atmospheric Administration (NOAA) Office of General Council helped extensively with many aspects of the Program development and enforcement. They continue to cooperate with the EDC Program to ensure compliance. Thanks to the Northwest Fisheries Science Center Scientific Data Management staff for building an extremely useful administrative tracking system and database.

We thank PacFIN and AKFIN staff for providing access to important landings, permit, and vessel data. The staff at ODFW, WDFW, and CDFG also contributed with data used for the fielding of the baseline data collection. Other data and assistance with interpretation of data was provided by the At-sea Hake Observer Program and the West Coast Observer Program.

Finally and very importantly, we thank the members of the West Coast fishing industry who met with us to discuss the survey development and interpretation of the information collected. We appreciate the time and effort of each participant in the program.

Report Introduction

About the Report

The US West Coast groundfish fishery takes place off the coasts of Washington, Oregon and California, and is comprised of over 90 different species of fish. The 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.² 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.³ 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.⁴ The EDC information is used to monitor the economic effects of the catch share program, and collects information on operating costs, revenues, and vessel and processing facility characteristics.

This report summarizes information collected from the West Coast mothership vessels. The EDC reports are also produced for the other sectors,⁴ and cover the years 2009 to 2012. The 2009 and 2010 data were collected in 2011 to provide a baseline of pre-catch share information. The EDC reports are updated annually to disseminate the data collected and provide background, analysis, and context to support the interpretation of the data. The reports are also expected to provide a useful catalyst for feedback on the data collected and its analysis. It is envisioned that the scope of these reports will expand, and the methods used will be refined with each annual publication.

The report is composed of two major sections. The first section, Mothership Overview (beginning on page 9), is an in-depth summary that contains descriptive analyses of the mothership fleet focusing on activities during 2012. The second section, Mothership Data Summaries (beginning on page 20), provides tables of all of the data collected from 2009 to 2012, with a detailed discussion of the methods used to collect and analyze the data. The tables summarize responses for each EDC form question, as well as net revenue and economic performance rates. The data that form the basis for this report are confidential and must be aggregated so that individual responses are protected. In cases where there are not enough observations to protect confidentiality, the data are either not shown, or are combined with broader groups of data. More information about EDC Program administration and fielding of the

² For more information about West Coast Groundfish, see www.westcoast.fisheries.noaa.gov/fisheries/groundfish/.

³ More information about the West Coast Groundfish Trawl Catch Share Program is available online at www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

⁴ Please see the EDC website, www.nwfsc.noaa.gov/edc, for links to the forms used to collect the EDC data and for previous year's reports. The website will be updated with the 2009-2012 reports when they are finalized.

surveys, the EDC forms, data quality controls and quality checks, data processing, and safeguarding confidential information can be found in the EDC Administration and Operations Report.⁴

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 are 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.⁵

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 seafood catching, processing, distribution elements, 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) of 2007 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 MSA requires a formal review 5 years after the implementation of a catch share program to which the EDC program will make a valuable contribution.

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 economic 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 will require more specific and involved analysis using EDC data.

Regional economic impact analysis measures the effects of the program on regional economies. In general, 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 Pacific

⁵ For more information about the EDC program and the West Coast Groundfish Trawl Catch Share Program, please see the Economic Data Collection Program, Administration and Operations Report available at the EDC website: www.nwfsc.noaa.gov/edc

coast, the Northwest Fishery Science Center's IO-PAC model is used to estimate regional economic impacts.⁶

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.

MOTHERSHIP 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 cooperative programs for the at-sea mothership (including catcher vessels and motherships) and catcher-processor fleets. Mothership factory vessels process fish delivered at sea by catcher vessels. The At-sea Pacific whiting fishery also includes catcher-processors, which are vessels that both catch fish and process them on-board. In 2012, the mothership fleet generated \$34 million in income and 755 jobs from purchases of Pacific whiting caught in the catch share program.⁷

From the 1960s through 1990, foreign vessels processed most of the relatively small amount of Pacific whiting harvested off the West Coast. The U.S. outlawed this practice in 1990, and domestic catcher-processor and mothership vessels entered the fishery between seasons fishing for Alaskan pollock. The Pacific whiting sector grew rapidly in the 1990s with the development of a production process to transform Pacific whiting into surimi, a product popular in Asia, and used domestically as an ingredient in imitation crab. The

whiting fishery subsequently transformed into one of the largest fisheries by volume in the United States. In recent years the market for fillets has also grown.⁸

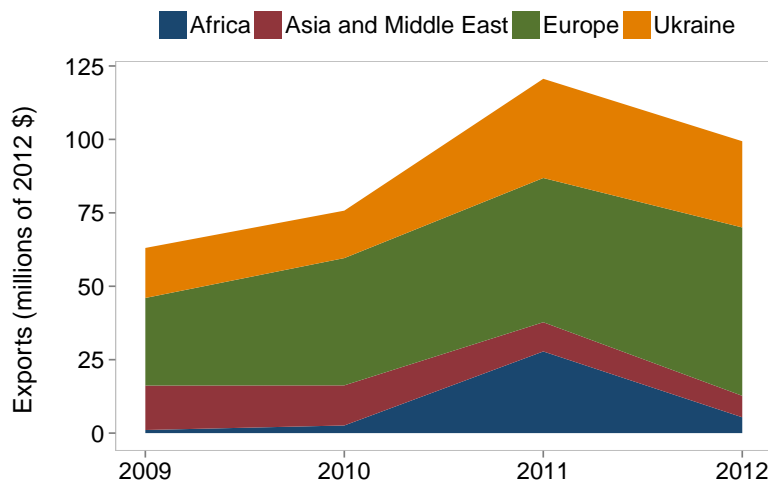


Figure 1: Total exports of fresh and frozen Pacific whiting (including mothership, catcher-processor, and shoreside production) from the state of Washington by recipient region (millions of 2012 \$).

⁷ The values were calculated using the IO-PAC model of the NWFSC. Note that these impacts do not include the income or employment of catcher vessels delivering to motherships. For more information about the IO-PAC model, see 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..

⁸ www.fishwatch.gov/seafood_profiles/species/whiting/species_pages/pacific_whiting.htm

The development of new international markets for smaller, unprocessed fish, and the MSC certification⁹ in 2009 that permitted importation of Pacific whiting products into the European Union also likely had an impact on demand for Pacific whiting, as did the development of new production technologies for fillets and surimi. In 2012, most of the U.S. Pacific whiting exports went to the European Union, followed by Ukraine, Russia, and China, among others (Figure 1).¹⁰

The Pacific Fishery Management Council and National Marine Fisheries Service (NMFS) are responsible for managing the U.S. fishery for the coastal stock of the Pacific whiting. Managers mainly use annual harvest quotas to regulate the coast-wide catch of Pacific whiting. Federal regulations prohibit at-sea processing south of the Oregon-California border. Pacific whiting is managed 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%.

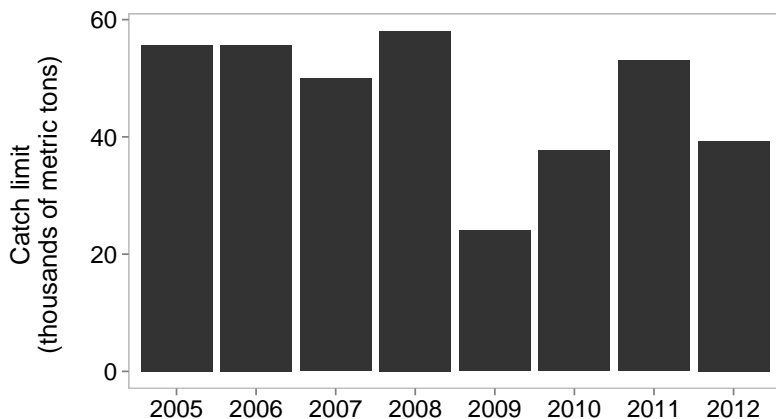


Figure 2: Mothership sector Pacific whiting catch limits, including any reapportionments among sectors that may have occurred during the season (thousands of metric tons).

Once the total allowable catch of Pacific whiting has been determined and the tribal sector's share has been apportioned, the remaining U.S. proportion is then allocated between the catcher-processor, mothership, and shoreside sectors. The mothership sector is allocated 24% while the catcher-processor and shoreside sectors are allocated 34% and 42%, respectively. Near the end of the season, NMFS often redistributes

unfished tribal allocation amongst the three commercial sectors according to the same proportions. Commercial allocation may also be redistributed between sectors; in 2008, catcher-processors received 6,000 metric tons of surplus mothership Pacific whiting.¹¹

The mothership sector had low catch during the baseline EDC years (2009 and 2010), corresponding to a relatively small catch limit.¹² After several seasons of large Pacific whiting harvests from 2006-2008, managers lowered the catch limit substantially in 2009, with a slight increase in 2010 (Figure 2). Low

⁹ The MSC seal of approval means that the West Coast Pacific whiting fishery has met the MSC standard for "good management practices to safeguard jobs, secure fish stocks for the future and to help to protect the marine environment". www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/pacific-hake-mid-water-trawl This certification has opened new markets, largely in the European Union, for Pacific whiting. www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/index

¹¹ For allocation and season catch summaries going back through 2005, see www.westcoast.fisheries.noaa.gov/fisheries/management/whiting/whiting_reports_and_rulemakings.html

¹² Values reported in inflation adjusted 2012 dollars. All averages are calculated from non-zero, non-NA responses.

harvest levels and a large recruitment class in 2010 encouraged management to increase the catch limit again in 2011. In 2012, updated projections resulted in a lower-than-usual allocation.¹³ Because of high variability in recruitment and other sources of uncertainty in the stock assessments, catch limits have varied substantially during the EDC collections of 2009-2012. In 2012, the at-sea mothership sector received an allocation of 39,235 metric tons of Pacific whiting from the Joint Management Committee of the Pacific Whiting Treaty; about 14,000 metric tons less than the allocation in 2011, and 1,560 metric tons more than the allocation in 2010 (see Mothership Data Summaries, Table 6.1). The mothership fleet caught 94-97% of its annual catch limit in 2009-2012. The average vessel received 7,510 metric tons of Pacific whiting from catcher vessels in 2012.

The flexibility introduced by the catch share program allows for the usage of new bycatch reduction strategies. Both the catch share provision and the mothership catcher vessels' cooperative charter have stated bycatch reduction as a primary goal under the trawl catch share program. Several measures have been voluntarily agreed upon by the catcher vessel cooperative members, including the prohibition of night fishing above the 42nd parallel north, and the designation of closures in bycatch "hotspots". In 2012, motherships received about six prohibited and protected fish per every 100 metric tons of Pacific whiting from at-sea catcher vessels. This included mostly Chinook salmon, but also chum salmon, coho salmon, Pacific halibut, and eulachon. Major non-prohibited bycatch species include Widow and Minor Slope rockfish, spiny dogfish, and squid. The bycatch rate in the mothership sector decreased by 71% between 2009 and 2012.

Mothership Sector Description

In 2012, four different companies owned the seven vessels with active permits in the West Coast at-sea mothership sector, and of these five motherships participated in the fishery. These motherships process Pacific whiting (Pacific hake) *Merluccius productus* on the West Coast. The average length of mothership vessels participating on the West Coast has declined slightly from 360 feet in 2009 to 347 feet in 2012. Their main engines have 7,700 horsepower, on average, and a fuel capacity of about 358,600 gallons. The West Coast at-sea catcher vessel fleet caught and delivered to motherships approximately 8% of all commercially harvested fish on the West Coast (including crab and shrimp), 22% of all catch shares fish, and 24% of Pacific whiting.

Two types of vessels participate in the Pacific whiting mothership sector: traditional motherships that also act as a mothership in Alaska, and catcher-processor vessels that only act as a mothership on the West Coast. Both types of vessels spend a majority of their time in the Alaska pollock fishery in the Bering Sea and Aleutian Islands (Figure 3). The mothership vessels that participated in the West Coast whiting fishery after the implementation of the catcher vessel cooperative have reported a decrease in Alaska pounds, and an increase in days in Alaska. Changes in Alaska operations likely also reflect changes in regulations and TAC in the Alaska pollock fishery, along with the West Coast shift to catch

¹³ <http://www.pcouncil.org/groundfish/stock-assessments/by-species/pacific-whiting-hake/>

shares. As a whole, the mothership fleet spends only about 30% of their total days (days processing and steaming on the fishing grounds) processing Pacific whiting on the West Coast.

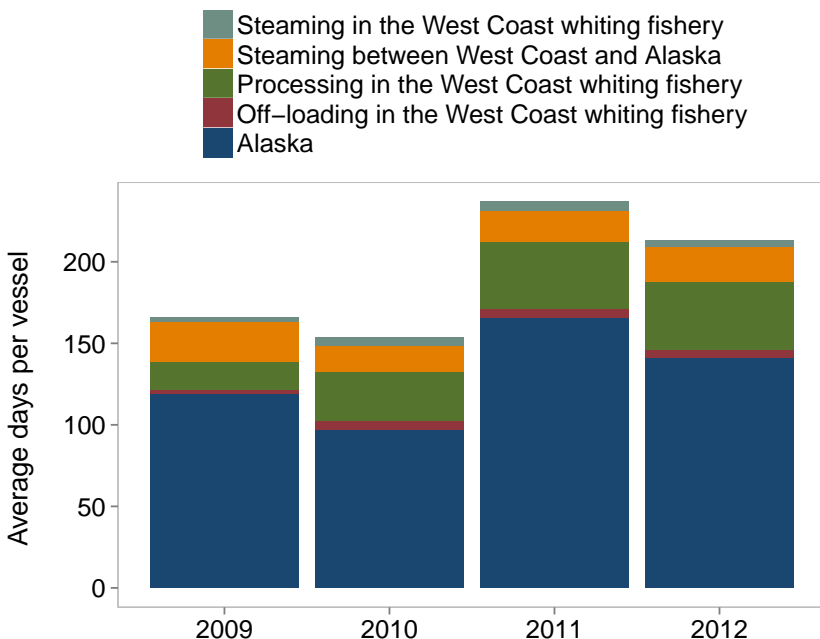


Figure 3: Average number of days spent in each activity per mothership vessel.

The number of participating vessels has declined from six in 2009 and 2010 to five in 2011 and 2012. The number of days the fleet participated in the West Coast fishery increased from 101 in 2009, to 285 in 2011, and decreased slightly to 211 in 2012. In 2012, the average mothership spent 21 days steaming between the West Coast and Alaska. Motherships spend about 90% of the days at sea processing fish and the rest of the time steaming along the coast. See Mothership Data Summaries, Table 2.1

for more information on fleet activity.

The catch share program provides increased operational flexibility to both the motherships and MS/CV vessels, demonstrated through changes in season length.

The length of the season – the number of days from the first to the last haul in the mothership sector – fluctuated during the years before catch shares (Figure 4). The 2006-2007 years make for a good comparison period to 2011-2012; in each period catch limit dropped by about one third from the prior year (Figure 2). In 2007, the sea-

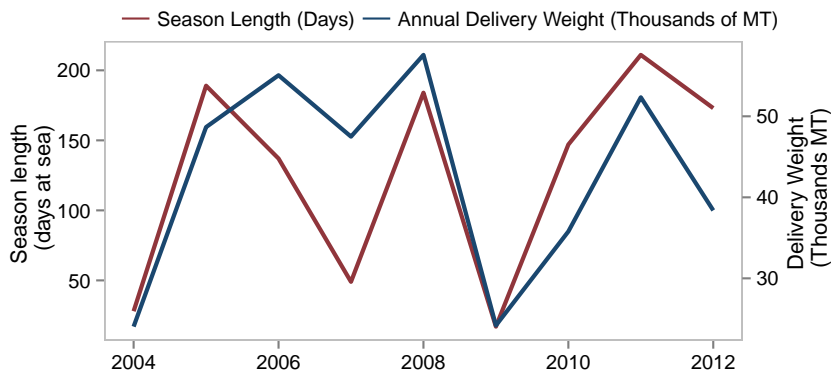


Figure 4: Season length and annual delivery weight (thousands of metric tons).

son length decreased by about thirteen weeks, corresponding to the decrease in the catch limit. After the implementation of the catch share program, a similar decrease in the catch limit in 2012 resulted in a season length decrease of only five weeks. The two years following the implementation of catch

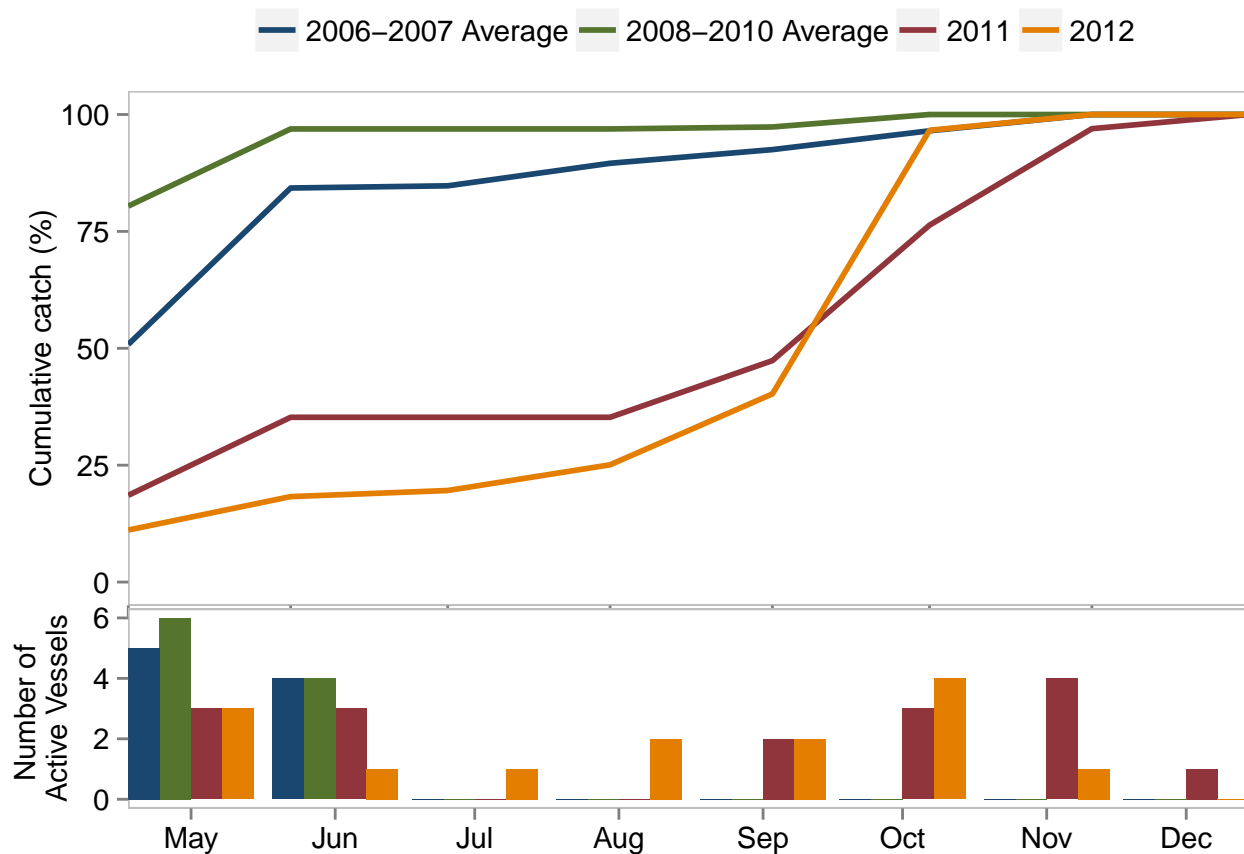


Figure 5: Cumulative catch (top) and number of active mothership vessels by month (bottom).

shares have had relatively long seasons compared to the six preceding years (Figure 4).

The season when motherships may begin at-sea processing, and catcher vessels harvesting at-sea, begins on May 15. In the years prior to catch shares, the mothership fleet had a larger percentage of the annual effort concentrated in May-June (Figure 5). In 2011-2012, the percentage of the fleet's total annual catch harvested in September-December increased dramatically. This may indicate that the catch share cooperative structure gives catcher vessels more flexibility about when to harvest their quota of the migratory Pacific whiting, and motherships more flexibility about when to process on the West Coast and when to go to Alaska. Perhaps reflecting the decline of a race to fish amongst the mothership cooperative catcher vessels, in 2012 at least one mothership vessel from the fleet remained in the West Coast whiting fishery in each month following the season opening. In prior years, the entire fleet went to Alaska for July and August, and generally did not return to the West Coast whiting fishery (Figure 5).

Economic Indicators

A mothership's variable costs include Pacific whiting purchases, fuel, crew compensation, co-op membership fees, and observer coverage among other costs, and vary with the level of fishery participation (see Mothership Data Summaries, Table 8.1). Variable costs make up the majority a vessel's total expenditures. The average mothership had variable costs on the West Coast of approximately \$4.6 million in 2012. Pacific whiting purchases constituted the largest portion of variable costs; the next three largest categories of expenses for a mothership included processing crew compensation (16%), fuel and lubrication (16%), and non-processing crew compensation (11%). Like the rest of the West Coast Groundfish Trawl Catch Shares program, both motherships and MS/CVs have an observer on-board 100% of the time while operating in the West Coast Pacific whiting fishery. The motherships spent on average \$33,148 on observer coverage in 2012.

The fleet's annual price paid per metric ton increased every year of the survey, from \$180 in 2009, to \$218 in 2010, and \$248 in 2012.¹⁴ Because the catch limit also increased in 2012 relative to 2009 (Figure 2), overall expenditures on Pacific whiting from catcher vessels increased substantially over the period, (Figure 6). Average processing crew compensation – the largest share of variable costs after fish purchases – rose about 83%. Compared to 2009, this amounted to a 141% increase in compensation per average processing crewmember. Non-processing crew compensation also increased 43% from 2009 to 2012. In 2009, the motherships had an average of 90 processing crew, which in 2012 declined to a little less than an average of 70 processing crew. Crewmembers include line workers, fishmeal crew, quality control, technicians, cleanup, factory managers, combis, and mechanics who work on processing equipment. An average of 32 non-processing crewmembers (captain, deckhands, wheelhouse, galley, and engineers) worked on a mothership vessel in 2012, which is only slightly less than the 35 in 2009. In 2012, motherships compensated processing and non-processing crewmembers \$10,000 and \$13,500 per position, respectively, for the Pacific whiting season.

The fleet as a whole took 26 one-way trips to and from Alaska in 2012. Average fuel use per day steaming both on the West Coast, and to Alaska decreased from the baseline to the post-catch share period by about ten and seven percent, respectively. Fuel and lubrication comprise one of the largest cost categories for the fleet on the West Coast, so the decrease in daily fuel use likely results in significant savings for the vessels. The Pacific States Marine Fisheries Commission tracks historical marine fuel prices, which in Washington State increased from \$1.92 in March 2009 to a high of \$4.10 per gallon in April 2012.¹⁵ The average cost reported by motherships for fuel expenses on the West Coast has increased with prices, between 2009 and 2012, increasing 172%.

Mothership vessel fixed costs include capitalized expenditures and expenses on vessel and on-board equipment, fishing gear for catcher vessels, and processing equipment. In general, these do not vary as

¹⁴ Values reported in inflation adjusted 2012 dollars.

¹⁵ www.psmfc.org/efin/docs/2012FuelPriceReport.pdf

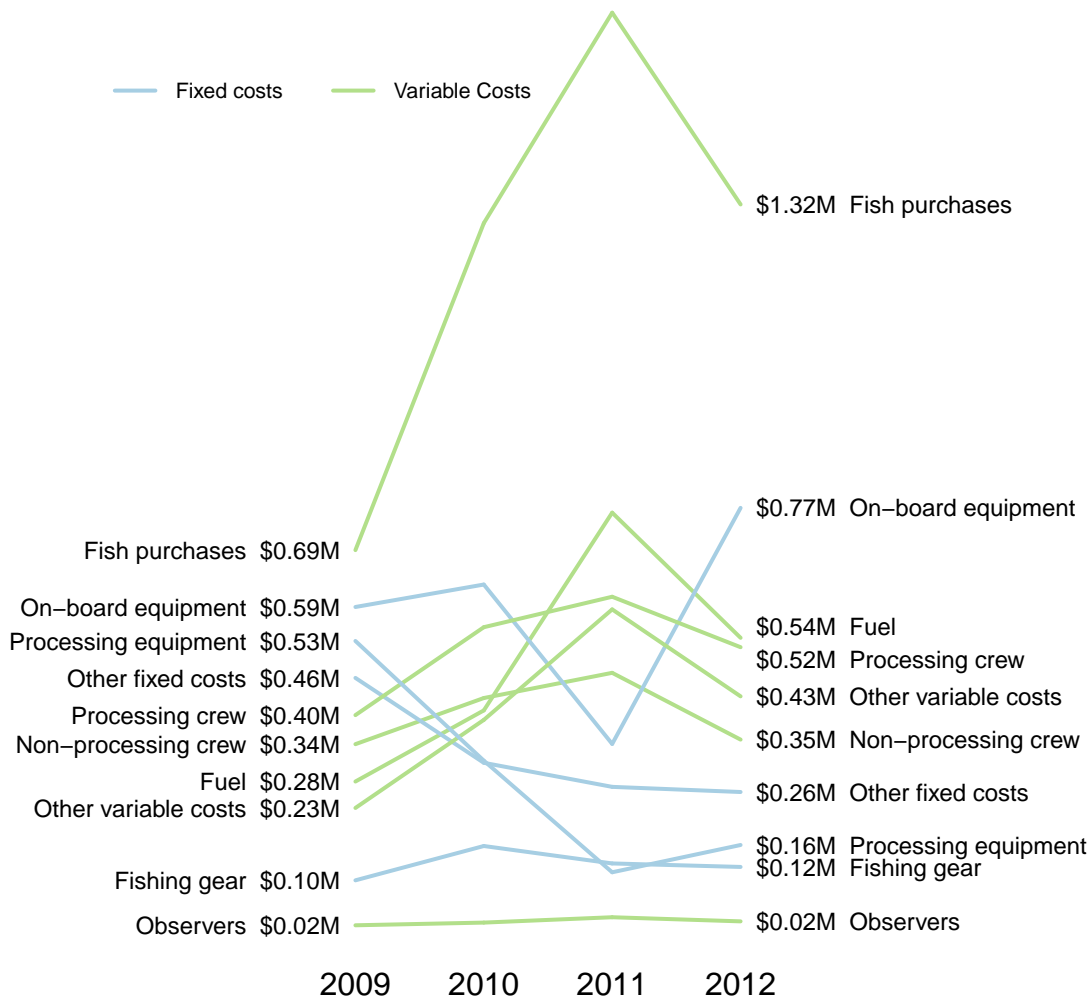


Figure 6: Average fixed and variable costs per vessel (2012 \$).

directly as variable costs with the level of fishery participation.¹⁶ The EDC form requests information for any equipment or gear used on the West Coast and for the vessels' total insurance and moorage costs (Tables 8.2-8.4).

Average total outlays on vessel and on-board equipment, fishing gear, and processing equipment shared on the West Coast decreased 17% from 2009, to \$4.7 million in 2012. The average West Coast portion of insurance and moorage costs in 2012 (\$1 million), decreased 37% from 2009.

¹⁶ All of the average fixed costs collected, and the breakout for fixed costs on the West Coast, are reported in Mothership Data Summaries Section 8.2

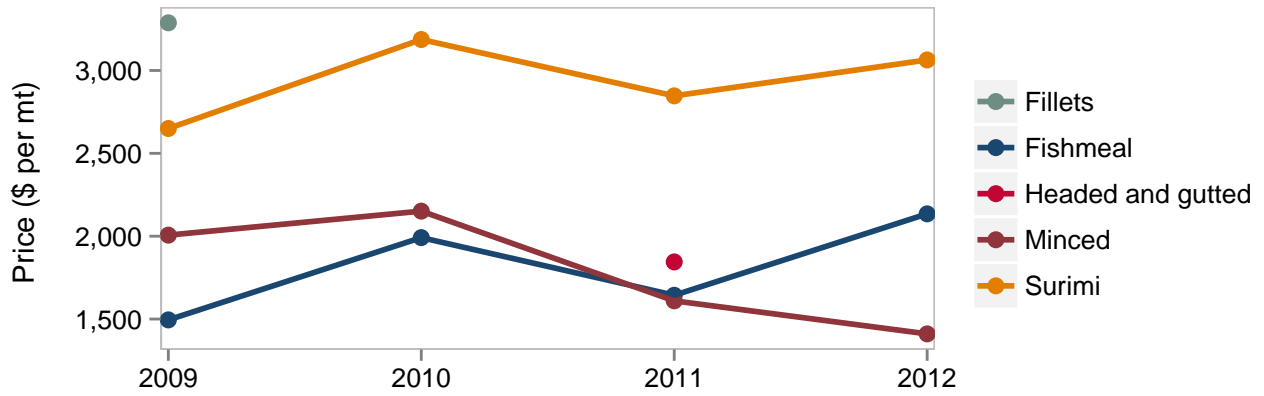


Figure 7: Average first-wholesale price by product type (2012 \$). Some values suppressed to protect confidential information.

Fishmeal has an average first-wholesale price of \$2,100 per metric ton (Figure 7). Surimi, with an average first-wholesale price of \$3,100 per metric ton in 2012, generally makes up the largest share of revenue (Figure 8). Average first-wholesale price of all products types was \$1,700. West Coast motherships deliver Pacific whiting primarily to two ports in Washington State: Blaine/Bellingham and Seattle. All of the motherships that participated in the West Coast whiting fishery list Seattle as their homeport.

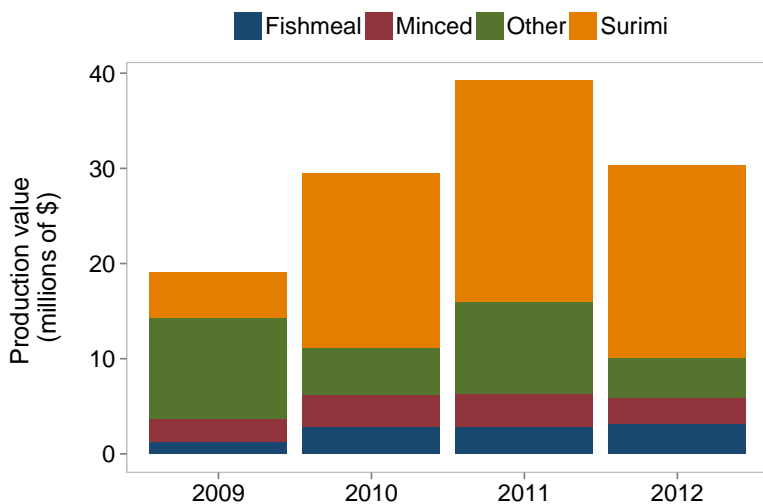


Figure 8: Fleet-wide production value by product type (millions of 2012 \$). The Other category includes fillets, fish oil, headed and gutted, and round, and are combined to protect confidential data. See Mothership Data Summaries Table 7.2 for more detailed information.

The average first-wholesale value per vessel of the mothership fleet's primary target, Pacific whiting, came close to \$6.1 million in 2012. The product recovery rate (total weight of production divided by total weight of fish purchased) increased from 0.32 to 0.53 during 2009-2012, possibly as a result of the increased season length. In the two years after the implementation of the catch share program, mothership vessels have had a longer period over which to accept deliveries and process fish, and the catcher vessels have more flexibility during the season to time fishing effort for higher

quality fish. In 2010-2012, overall production value weight and value of minced product and fishmeal has remained relatively constant. In 2011 and 2012 surimi made up a larger portion of revenue and total weight processed than in preceding years. The "Other" category— including products like fillets,

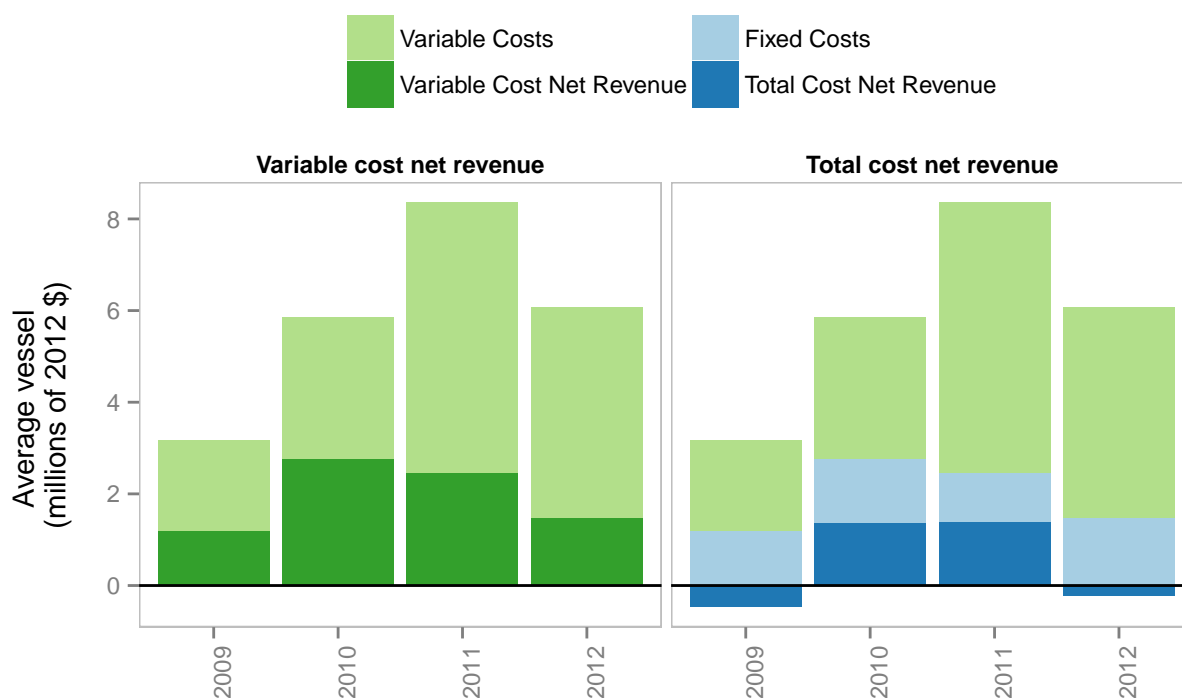


Figure 9: Average variable cost net revenue (revenue minus variable costs) (left), and average total cost net revenue (revenue minus variable costs and fixed costs) (right) per mothership (millions of 2012 \$).

minced, fish oil, fish sold in the round, or headed and gutted fish— made up a smaller portion of the fleet’s total production in 2012 than in prior years, but as shown in Figure 8, this value fluctuates from year to year.

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.¹⁷ To provide a complete picture of the changes that have occurred, both net revenue figures are presented at two scales. Figure 9 shows the average net revenue per vessel while Figure 10 shows the fleet-wide net revenue. Average net revenue shows the value generated by a typical vessel, while fleet-wide net revenue represents the total value generated by the fishery. Both figures only include revenues and costs associated with the catch share program. It is important to note that the EDC forms attempt 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.¹⁸ Average variable cost net revenue fell to \$1.5 million in 2012 from \$2.4 million in 2011, but still represented an increase over the \$1.1 million variable cost net revenue in 2009. Motherships earned

¹⁷ See Figure 6 for a description of which costs are considered variable costs and which costs are considered fixed costs.

¹⁸ See Mothership Data Summaries Section 8: Costs and Section 9: Net Revenue and Economic Profit for a more complete discussion of variable costs, fixed costs, and the calculation of net revenue.

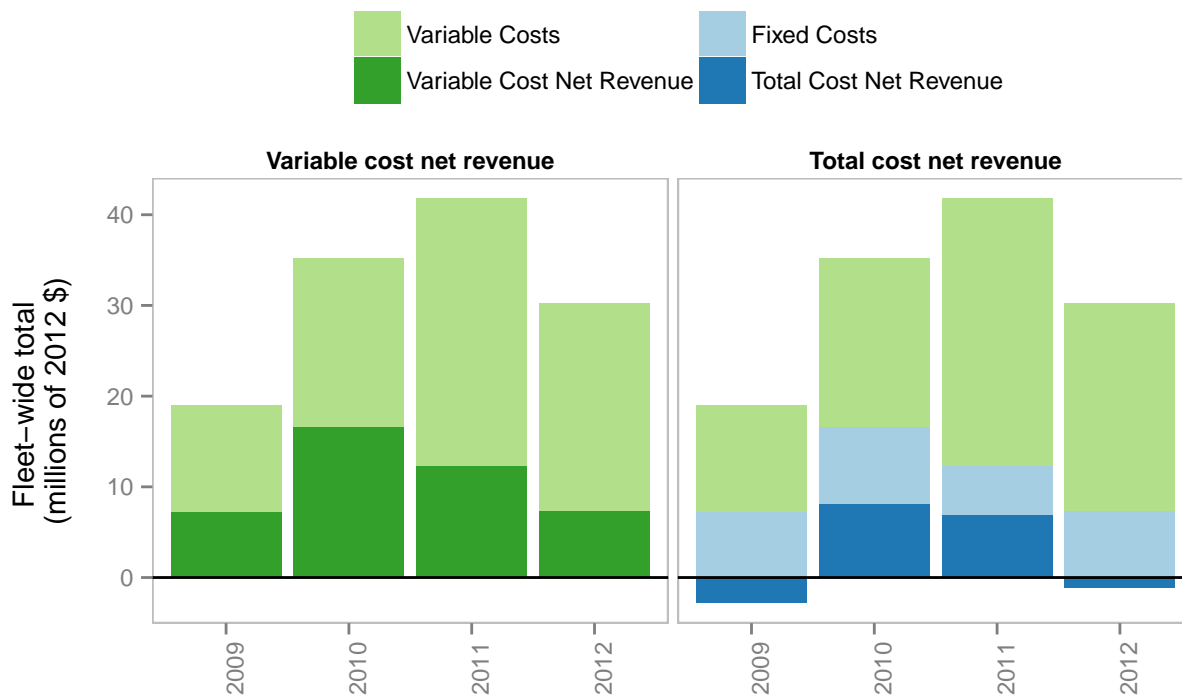


Figure 10: Fleet-wide variable cost net revenue (revenue minus variable costs) (left), and fleet-wide total cost net revenue (revenue minus variable costs and fixed costs) (right) (millions of 2012 \$).

a variable cost net revenue per metric ton produced of \$83 in 2012; a 91% decrease from 2009 (see Mothership Data Summaries, Table 10.2).

Average total cost net revenue per vessel was -\$226,854 in 2012 (Figure 9). Average total cost net revenue per metric ton produced was -\$841 in 2012.

The mothership fleet as a whole (Figure 10) experienced increasing variable costs from 2009-2011, with a slight reprieve in 2012. Revenue growth in 2011-2012 did not outstrip increased variable costs, resulting in a steady decline of the fleet's variable net revenue from 2010-2012. Fixed costs on the West Coast decreased slightly in 2011, which kept total cost net revenue from dropping dramatically that year, but fixed costs in 2012 returned to 2009-2010 levels and the fleet-wide total cost net revenue has declined 116% from the previous year. The motherships generated a fleet-wide revenue of \$30 million in 2012, and the fleet spent about \$31 million in fixed and variable costs.

MOTHERSHIP DATA SUMMARIES

MOTHERSHIP DATA SUMMARIES

Contents

Mothership Sector: 2012 Highlights	2
Acknowledgments	5
Report Introduction	6
Mothership Overview	9
Mothership Data Summaries	19
List of Tables	22
List of Figures	24
1 Introduction	25
1.1 Background	25
1.2 Cost Disaggregation	26
1.3 Understanding the report	26
1.4 Purpose of the data summaries	27
1.5 Mothership form administration	28
2 Vessel Participation on the West Coast and in Alaska	30
3 Delivery Ports	32
4 Vessel Physical Characteristics	33
5 Vessel Fuel Use and Crew Size	35
5.1 Fuel use	35

5.2	Crew size	36
6	Whiting Purchases	37
7	Revenue	39
8	Costs	43
8.1	Variable Costs	44
8.2	Fixed costs	46
8.2.1	Costs on vessel and on-board equipment, fishing gear, and processing equipment	46
8.2.2	Other fixed costs	49
8.3	Fixed costs on the West Coast	51
8.3.1	Costs on vessel and on-board equipment, fishing gear, and processing equipment on the West Coast	52
8.3.2	Other fixed costs on the West Coast	52
8.4	Fish purchases	53
8.5	Summary of West Coast costs	55
8.5.1	Quota and permit costs on the West Coast	58
9	Net Revenue and Economic Profit	59
9.1	Net revenue	60
9.1.1	Net revenue for all West Coast fishing activities	61
10	Economic Performance: Cost, Revenue, Net Revenue, Markup, and Product Recovery Rates	64

List of Tables

- 2.1 Average days at sea. 30
- 2.2 Mean number of one-way trips steaming between West Coast and Alaska. 30
- 2.3 Number of vessels that processed on the West Coast and Alaska. 31
- 3.1 Off-loading. 32
- 4.1 Average vessel characteristics. 33
- 4.2 Haul outs 34
- 5.1 Average daily fuel use. 35
- 5.2 Total fuel use. 35
- 5.3 Average crew size. 36
- 6.1 Annual mothership sector allocation, West Coast whiting purchases, and total purchases (West Coast, tribal, and Alaska purchases). 37
- 7.1 Whiting production weight. 40
- 7.2 Whiting production value. 40
- 8.1 Variable expenses. 45
- 8.2 Capitalized expenditures on vessel and on-board equipment, fishing gear, and processing equipment. 47
- 8.3 Expenses on vessel and on-board equipment, fishing gear, and processing equipment. 48
- 8.4 Other fixed expenses. 50
- 8.5 Depreciation. 51
- 8.6 West Coast fixed costs on vessel and on-board equipment, fishing gear, and processing equipment. 52
- 8.7 West Coast costs on insurance, moorage, and leasing. 52
- 8.8 Fish purchased and received. 54
- 8.9 Summary of costs on the West Coast. 56
- 9.1 West Coast variable cost and total cost net revenue. 62
- 10.1 Revenue, cost, and net revenue per day. 64
- 10.2 Revenue, cost, and net revenue per metric ton produced. 65

10.3 Net revenue per metric ton purchased. 65
10.4 Markup rate. 66
10.5 Product recovery rate. 66

List of Figures

- 1 Total exports of fresh and frozen Pacific whiting (including mothership, catcher-processor, and shoreside production) from the state of Washington by recipient region (millions of 2012 \$). 9
- 2 Mothership sector Pacific whiting catch limits, including any reapportionments among sectors that may have occurred during the season (thousands of metric tons). 10
- 3 Average number of days spent in each activity per mothership vessel. 12
- 4 Season length and annual delivery weight (thousands of metric tons). 12
- 5 Cumulative catch (top) and number of active mothership vessels by month (bottom). . 13
- 6 Average fixed and variable costs per vessel (2012 \$). 15
- 7 Average first-wholesale price by product type (2012 \$). Some values suppressed to protect confidential information. 16
- 8 Fleet-wide production value by product type (millions of 2012 \$). The Other category includes fillets, fish oil, headed and gutted, and round, and are combined to protect confidential data. See Mothership Data Summaries Table 7.2 for more detailed information. 16
- 9 Average variable cost net revenue (revenue minus variable costs) (left), and average total cost net revenue (revenue minus variable costs and fixed costs) (right) per mothership (millions of 2012 \$). 17
- 10 Fleet-wide variable cost net revenue (revenue minus variable costs) (left), and fleet-wide total cost net revenue (revenue minus variable costs and fixed costs) (right) (millions of 2012 \$). 18

- 6.1 Average annual purchases on the West Coast and Alaska. 38

- 7.1 Production value by product type and year. 41
- 7.2 Production weight by product type and year. 42

- 8.1 Average costs by category on the West Coast. 57

- 9.1 Mothership average variable cost and total cost net revenue. 63

1 Introduction

1.1 Background

The US West Coast groundfish fishery takes place off the coasts of Washington, Oregon and California, and is comprised of over 90 different species of fish. The 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.¹ 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) program³ 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 2012 data submitted for this report were collected in 2013.

EDC Program has enhanced the quantity and quality of economic information available for analysis and the management of the West Coast groundfish trawl fishery. While costs and earnings data are available for shorebased catcher vessels starting in 2004⁴, this is the first data collection from the mothership fleet. This report summarizes the 2009-12 EDC mothership survey data, and with its companion reports covering the other sector, is the second in what is expected to be an annual series of reports. EDC economists will expand and refine the scope and methods used with each new annual publication.

¹ For more information about West Coast Groundfish, see www.westcoast.fisheries.noaa.gov/fisheries/groundfish/.

² More information about the West Coast Groundfish Trawl Catch Share Program is available online at www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

³ Additional information on the EDC Program, including the EDC data collection forms can be found at www.nwfsc.noaa.gov/edc

⁴ 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.

1.2 Cost Disaggregation

For vessels that participated in the tribal sector of the West Coast At-sea whiting fishery, West Coast costs, days at sea, fuel use, and production weight and value have been adjusted to reflect only non-tribal mothership sector activities as needed using a ratio of mothership pounds over all the West Coast pounds. In addition, some categories of costs on the EDC forms are for West Coast-only operations, while others are combined for the West Coast and Alaska Fisheries. Therefore, cost disaggregation on these shared costs is required to estimate total costs and net revenues on the West Coast.

When disaggregating the West Coast and Alaska costs, we allocate proportionally to the weight of fish purchased or harvested in each fishery. We calculate a ratio of the sum of West Coast Pacific whiting weight for all the years the vessel has supplied data, over the weight in All Fisheries for the same time span:

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

where n is an individual vessel in a season, summed over all of the years, y, that the vessel has supplied EDC data. Thus, each vessel's ratio of costs being allocated to the West Coast is the same for all years. This method provides for a constant proportion of fixed costs allocated to the West Coast over time, and this proportion is less sensitive to fluctuations in TAC for the West Coast Pacific whiting and Alaska fisheries.

1.3 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 Mothership Overview, all dollar amounts reported in the Mothership Data Summaries are in nominal dollars.

All data submitted via the EDC Program are confidential under 402(b) of the Magnuson- Stevens Act (16 U.S.C. 1801, et seq.) and under NOAA Administrative Order 216-100⁵. 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 should comprise over 90 percent of the value displayed. In the case of the West Coast whiting mothership fishery, there are only four companies. 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

⁵ For more information about form administration, please see Appendix

reported zeroes. More information about how confidential data are protected in the EDC Program can be found in the Administration and Operations Report.

One change implemented this year is the inclusion of a measure of variance of the data. The stacked dots included in the tables provide information about the coefficient of variation (CV) of the mean. We use the following scoring: $\dot{\cdot}$ represents $CV < 0.5$, $\dot{\cdot}$ represents $0.5 \leq CV < 1.0$, $\dot{\cdot}$ represents $1.0 \leq CV < 2.0$, and $\dot{\cdot}$ represents $2.0 \leq CV$. For 2009-2012, none of the CVs exceeded 1.54.

Although participants are identified on a calendar year basis, they complete the form using information based on the fiscal year of the entity. Currently data are presented for survey year, and therefore data assigned to a survey year may not overlap completely with the calendar year. Information obtained from outside of the EDC Program is adjusted to match the fiscal year provided on each form. For the four years of data collected from motherships, 71% of forms reported a fiscal year that is the same as the calendar year.

The form had very few changes between the 2009-2010 data collection, and the 2011 and 2012 collections. The 2009 and 2010 EDC mothership 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 disappeared 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 the West Coast fisheries in addition to that harvested in Alaska/Other, in order to validate the external data source we used to calculate revenue from West Coast whiting.

1.4 Purpose of the data summaries

This report, like the other four EDC reports⁶, 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 Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 2007, the data are summarized as averages or totals for each question on

⁶ In addition to the mothership report, there are four companion reports:

- Economic Data Collection Program, Administration and Operations Report Draft Report for PFMC Review (November 2014)
- Economic Data Collection Program, Catcher-Processor Report, 2009-2012 Draft Report for PFMC Review (November 2014)
- Economic Data Collection Program, Catcher Vessel Report, 2009-2012 Draft Report for PFMC Review (November 2014)
- Economic Data Collection Program, First Receiver and Shorebased Processor Report, 2009-2012 Draft Report for PFMC Review (November 2014)

the EDC forms. Thus summarized, the reports make the data available to the public for both research and informational purposes.

The second objective is to provide information about the performance of the catch share program. This includes information that can be used to monitor 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 will serve as the basis for the 5-year review of the catch share program that is mandated in the MSA, as well as the NOAA Fisheries National Catch Shares Performance Indicators. Currently, with just two years of catch share EDC data, it may be difficult to draw firm conclusions about the performance of the program. In addition, the catch share program may have a transitional period in the first few years as participants learn about the system and develop new business strategies.

Third, the reports serve as the basis for economic models that are used as part of the Pacific Fishery Management Council's (PFMC) biennial specification process for groundfish management. These models include the IO-PAC model⁷, as well as estimates of revenue, costs, and net revenue.

Lastly, and perhaps most importantly, the data reports are expected to provide 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, catcher-processor, and first receiver and shorebased processor forms.

1.5 Mothership 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 the baseline data collection (2009 and 2010) and all annual/ongoing data collections for 2011 onward. For the baseline period, all owners, lessees, and charterers of a mothership vessel that received whiting in 2009 or 2010 as recorded in 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 mothership vessel registered to a mothership permit at any time are required to complete an EDC form §660.114(b)(3)(ii). For permit owners, an MS permit application will not be considered complete until the required EDC form for that 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,

⁷ 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.

in part, 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 2012, data were collected from all owners, lessees, and charters of a mothership registered to a limited entry trawl permit during 2011. The forms are fielded on this schedule in order to allow participants the time necessary to complete their taxes, which may contain some information that is required on the EDC forms.

If a form has missing information, or the information provided on the form is believed to be incorrect, EDC Program staff attempt to contact the participant to correct the information. On occasion, the participant cannot be reached or the participant cannot provide the missing information. In these cases, the missing or inaccurate data are treated on a case-by-case basis during analysis as documented in the Administration and Operations Report. 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 mothership fleet participates in fisheries on the West Coast and Alaska. Table 2.1 provides the average days at sea by activity listed. Participants are instructed to count partial days as full days when recording days at sea on the forms.

Table 2.1: Average days at sea. Average days at sea by activity in West Coast and Alaska activities for mothership vessels (N = number of vessels with non-zero, non-NA responses).

Description	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	119 [*]	6	117 [*]	5	165 [*]	7	141 [*]	7
Off-loading in the West Coast whiting fishery	2 [‡]	6	4 [‡]	6	7 [‡]	5	5 [‡]	5
Processing in the West Coast whiting fishery	17 [*]	6	24 [*]	6	51 [‡]	5	42 [*]	5
Steaming between West Coast and Alaska	25 [*]	6	20 [*]	5	20 [*]	7	21 [*]	7
Steaming in the West Coast whiting fishery	3 [*]	6	4 [*]	6	7 [‡]	5	4 [*]	5

Table 2.2 presents the median number of one-way trips vessels made steaming between Alaska and the West Coast that year. The median number of steaming trips motherships take to Alaska appears to remain constant through the four survey years.

Table 2.2: Mean number of one-way trips steaming between West Coast and Alaska. Mean number of one-way trips between the West Coast and Alaska (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
One-way trips to Alaska	3.7 [*]	6	3.6 [*]	5	4.0 [*]	7	3.7 [*]	7

Table 2.3: Number of vessels that processed on the West Coast and Alaska.

Location	2009	2010	2011	2012
Alaska	6	5	7	7
West Coast	6	6	5	5

3 Delivery Ports

Table 3.1 lists the number of vessels delivering to each port. Some vessels delivered to more than one port in a survey year. This frequency table summarizes responses to the question on the EDC form that asks for the percentage of all West Coast whiting products off-loaded from the mothership vessel at each major West Coast port.

Table 3.1: Off-loading. Total number of vessels that off-loaded in each port. Some vessels delivered to multiple ports in the same year.

Location	2009	2010	2011	2012
Astoria	0	0	1	0
At-sea	0	0	0	0
Blaine/Bellingham	1	3	3	3
Coos Bay	0	0	0	0
Port Angeles	0	0	0	0
Seattle	5	5	2	2
Tacoma	—	0	0	0
Westport	0	0	—	—
Other	0	0	0	0

4 Vessel Physical Characteristics

Physical vessel characteristics are shown below in Table 4.1. Survey participants were 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.

Table 4.1: Average vessel characteristics. Average market value, replacement value, horsepower, fuel capacity and length (N = number of EDC vessels with non-zero, non-NA responses).

Vessel characteristic	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Market value (\$)	54,500,000	4	54,500,000	4	48,600,000	5	51,200,000	5
Replacement value (\$)	107,500,000	4	107,500,000	4	99,000,000	5	100,000,000	5
Vessel length (feet)	360	6	360	6	347	7	347	7
Vessel fuel capacity (gallons)	397,721	6	397,721	6	361,171	7	358,600	7
Horsepower of main engines	8,525	6	8,525	6	7,807	7	7,735	7

The participants provide information about whether the vessel was hauled out. The information shown below in Table 4.2 about how many vessels in the fleet are hauled out in that survey year provides context that may be used to explain major costs associated with vessel repair and maintenance.

Table 4.2: Haul outs. Number of vessels (N) that hauled out the vessel during their fiscal year (% percent of vessels in survey year).

Haul out	2009		2010		2011		2012	
	N	%	N	%	N	%	N	%
YES	3	50.0%	1	16.7%	2	28.6%	3	42.9%
NO	3	50.0%	5	83.3%	5	71.4%	4	57.1%

5 Vessel Fuel Use and Crew Size

5.1 Fuel use

(Table 5.1) contains the vessels' average fuel use per day, for propulsion and other uses, when engaged in West Coast activities. The other uses referred to on the form may include non-propulsion fuel uses, such as diesel or fish oil used to run fishmeal plants, vessel generators, or power processing equipment. The information in the table below represents the average of the average fuel use provided by participants.

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

Activity	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Processing and steaming in the West Coast whiting fishery	6,532 [·]	6	6,463 [·]	6	5,036 [·]	6	5,851 [·]	5
Steaming between West Coast and Alaska	6,733 [·]	6	6,533 [·]	6	5,414 [·]	7	6,292 [·]	7

The average total fuel used by the vessel during the survey year for propulsion or other use in the West Coast whiting fishery excludes fuel used for steaming between the West Coast and Alaska.

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

Activity	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Total bunker fuel	***	***	***	***	***	***	***	***
Total diesel	118,105 [·]	6	135,657 [·]	6	278,356 [·]	5	217,073 [·]	5
Total fish oil	***	***	***	***	***	***	***	***

5.2 Crew size

Participants provide the total number processing and non-processing crewmembers when the vessel was operating in the West Coast whiting fishery during the survey year (Table 5.3). 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 crew size of non-processing and processing crew (N = number of EDC vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Non-processing	35.2*	6	33.0*	6	34.0*	5	32.2*	5
Processing	90.3*	6	85.2*	6	66.0*	5	71.8*	5

6 Whiting Purchases

The West Coast data for the mothership sector annual whiting fish purchases in Table 6.1 are provided by the A-SHOP through the Pacific Fisheries Information Network (PacFIN) database. The values for average vessel fish purchases and total fish purchases in all fisheries (including the West Coast and Alaska) are from a question on the EDC form that asks participants to provide the total round weight of all fish processed on the vessel in all fisheries during the survey year.

Table 6.1: Annual mothership sector allocation, West Coast whiting purchases, and total purchases (West Coast, tribal, and Alaska purchases). Final allocation of whiting in the West Coast mothership whiting sector, total whiting purchases (excluding tribal purchases), and total weight of all purchases (West Coast, Alaska, and tribal) (N = number of vessels with non-zero, non-NA responses).

Description	2009		2010		2011		2012	
	Total	N	Total	N	Total	N	Total	N
Mothership West Coast whiting allocation	24,034		37,679		53,039		39,235	
West Coast whiting purchases (A-SHOP)	23,534	6	35,750	6	49,908	5	37,507	5
West Coast and Alaska purchases	203,491	6	212,601	6	219,647	6	187,613	5

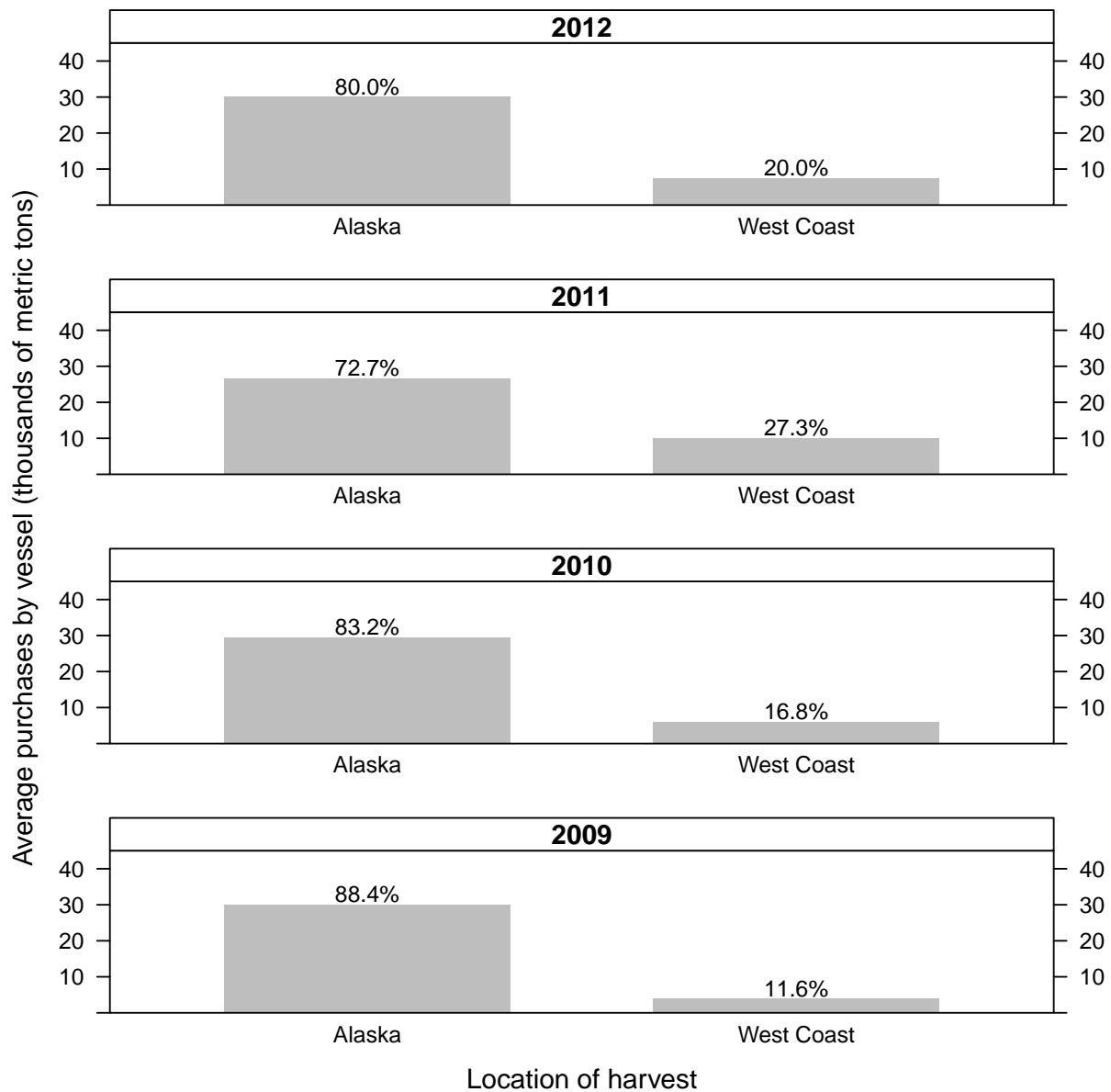


Figure 6.1: Average annual purchases on the West Coast and Alaska. Average annual purchases (thousands of metric tons) from 2009 to 2012 on the West Coast and in Alaska. Percentages above each bar indicate the portion of the total purchases in that fishery.

7 Revenue

The EDC forms ask about three forms of revenue: revenue from production of seafood products, revenue from sale or lease of West Coast whiting mothership permits, and revenue from lease or bareboat charter of the vessel. All vessels that processed fish on the West Coast reported production revenue, but there were no vessels that reported revenue from permits or lease/charter. It is possible that vessels may have made end-of-season informal arrangements regarding leftover quota; however, the EDC form does not capture this type of transfer.

Tables 7.1 and 7.2 provide summary information on annual production in the mothership West Coast whiting sector. Participants provide total weight of production and value of production by major product categories. These values include 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. The revenue only includes fish processed on the West Coast.

Table 7.1: Whiting production weight. Average production weight (metric tons) for whiting (N = number of vessels with non-zero, non-NA responses).

Product Category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Filletts	398 [·]	4	***	***	***	***	***	***
Fish oil		0		0	***	***	***	***
Fishmeal	166 [·]	5	278 [·]	5	437 [·]	4	372 [·]	4
Headed and gutted	***	***	***	***	900 [·]	3	***	***
Minced	309 [·]	4	522 [·]	3	547 [·]	4	653 [·]	3
Roe		0		0		0		0
Round	***	***		0	***	***	***	***
Stomachs		0		0		0		0
Surimi	358 [·]	5	940 [·]	6	2,040 [·]	4	1,647 [·]	4
Other	***	***		0		0		0
Average total weight	1,528 [·]	6	1,883 [·]	6	3,544 [·]	5	3,740 [·]	5

Table 7.2: Whiting production value. Average production value (\$) for whiting (N = number of vessels with non-zero, non-NA responses).

Product Category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Filletts	1,240,692 [·]	4	***	***	***	***	***	***
Fish oil		0		0	***	***	***	***
Fishmeal	235,762 [·]	5	544,999 [·]	5	707,839 [·]	4	795,070 [·]	4
Headed and gutted	***	***	***	***	1,613,303 [·]	3	***	***
Minced	587,910 [·]	4	1,082,570 [·]	3	864,638 [·]	4	921,409 [·]	3
Roe		0		0		0		0
Round (un-processed)	***	***		0	***	***	***	***
Stomachs		0		0		0		0
Surimi	900,053 [·]	5	2,949,102 [·]	6	5,716,951 [·]	4	5,045,888 [·]	4
Other	***	***		0		0		0
Other species		0		0		0		0
Average total value	3,008,372 [·]	6	4,737,432 [·]	6	7,716,079 [·]	5	6,054,338 [·]	5

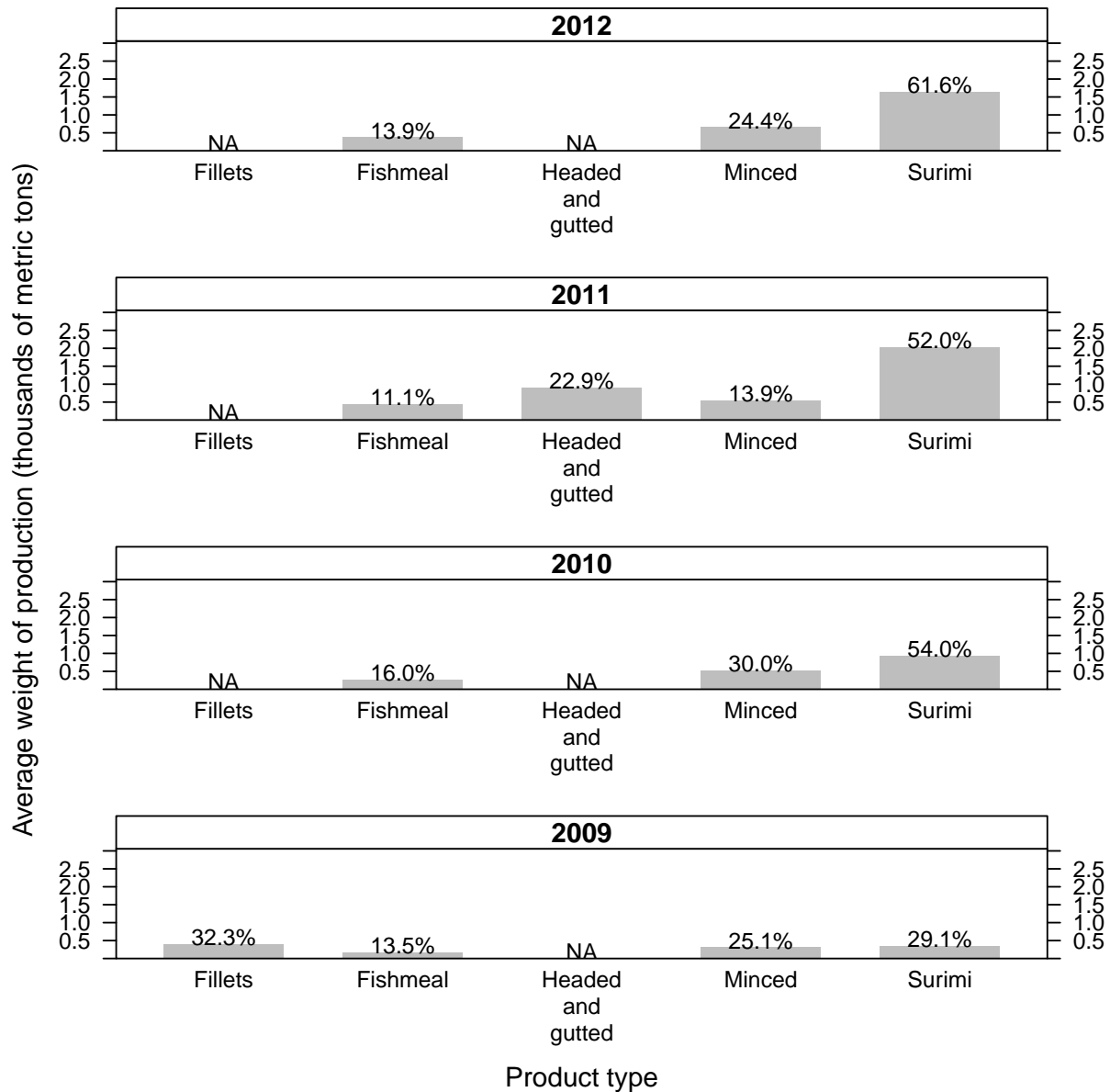


Figure 7.1: Production value by product type and year. Average whiting production value by product type and year. Confidential data have been suppressed and replaced with "NA"; product categories where production value was reported as zero for all vessels for all years are not included. The percentage of each product type of all production is listed on the top of each bar.

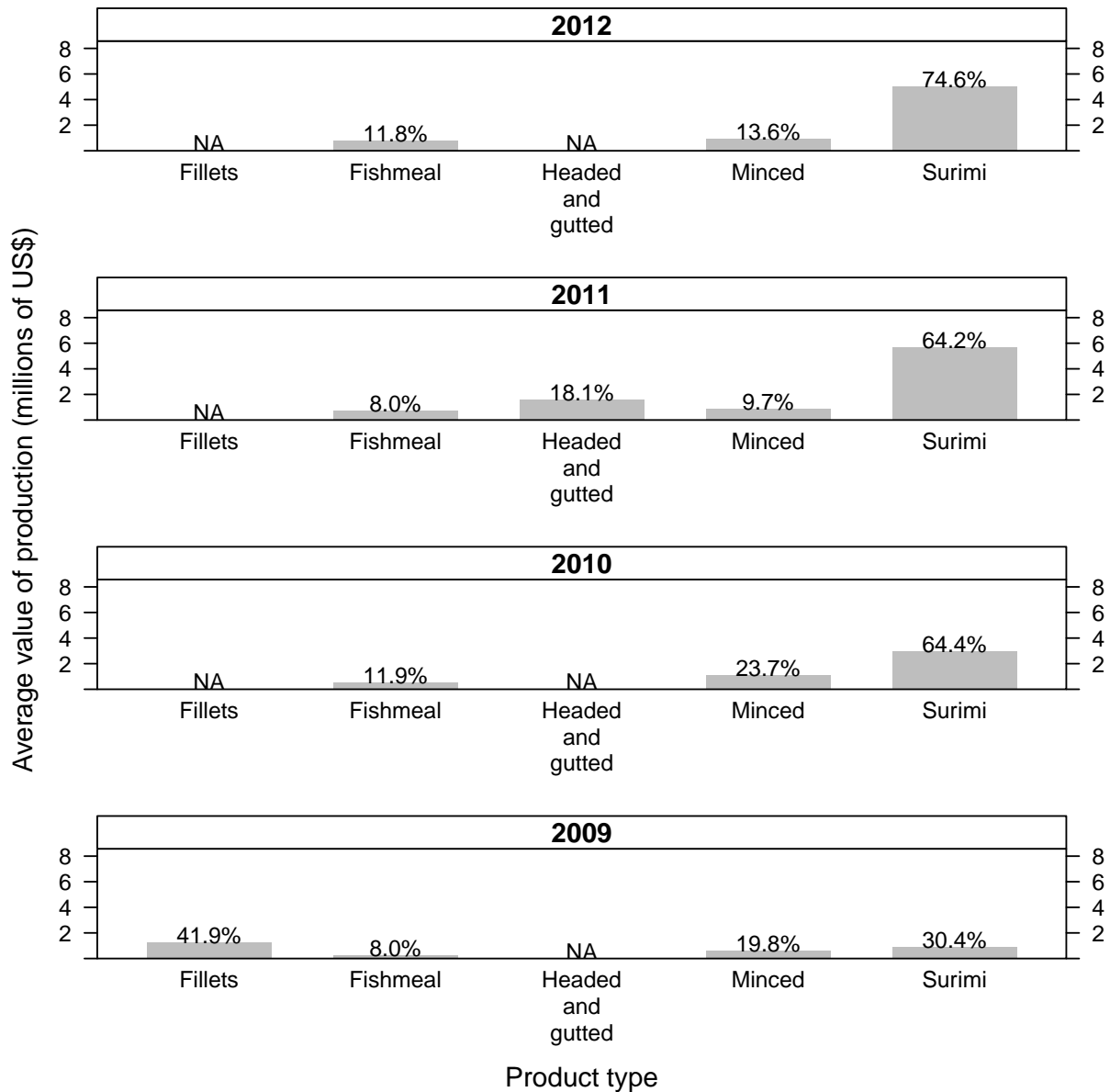


Figure 7.2: Production weight by product type and year. Average whiting production weight by product type and year. Confidential data have been suppressed and replaced with "NA"; product categories where production value was reported as zero for all vessels for all years are not included. The percentage of each product type of all production is listed on the top of each bar.

8 Costs

This section of the report describes the cost data that are collected on the EDC mothership form. It reports variable costs, fixed costs, and total costs, and how those costs are disaggregated to estimate the proportion of costs attributed to West Coast fisheries.

For the purposes of the EDC, 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 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 as fixed, versus variable. For the purposes of this report, we consider the costs listed in Tables 8.2, 8.3 and 8.4 to be fixed, and the costs listed in Table 8.1 to be variable. The EDC Program will continue to explore, and possibly improve, the categorization of these costs.

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

In order to conduct economic analyses of specific fisheries it is important to have costs broken out by fishery, i.e. West Coast whiting or processing in Alaska. For some costs, it may be feasible for participants to break out or track costs at the fishery level. However, for most costs this is impossible, or would require additional burden to do so. During the EDC form development process, 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 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.

Finally, there are a variety of costs that are associated with running a mothership 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 processing, or are too difficult to allocate to

a particular vessel in a multi-vessel company. These expenses include office space, pickup trucks, storage of equipment, professional fees, and marketing. In general, the EDC forms attempt to capture costs that are directly related to vessel maintenance and processing operations, and not costs that are related to activities or equipment off the vessel. For these reasons, the EDC aggregated measures of costs (variable costs, fixed costs, and total costs) underestimate the true costs of operating a business.

8.1 Variable Costs

Variable costs were collected for all West Coast activities. Unlike fixed costs, variable costs are directly related to processing operations, and therefore it was possible for vessels to separate expenses for activities on the West Coast from other activities.

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

Expense Category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Co-op membership fees		0		0	***	***	***	***
Communication	5,761	6	4,300	6	15,656	5	8,942	5
Food	47,038	5	48,032	6	127,144	5	136,385	5
Freight	***	***	***	***	***	***	38,139	3
Fuel and lubrication	261,980	6	389,757	6	1,049,821	5	750,015	5
Non-fish ingredients (additives)	29,753	5	148,860	6	392,343	4	245,107	4
Non-processing crew	325,982	6	411,262	6	651,194	5	492,699	5
Observers	15,744	6	20,700	6	42,902	5	33,148	5
Offloading	33,577	6	30,744	6	55,136	5	29,240	5
On-board cargo/product insurance	12,276	5	11,665	5	***	***	135,695	5
Packing materials	86,612	6	97,406	6	228,073	5	132,756	5
Processing crew	375,726	6	534,459	6	840,520	5	726,295	5
Supplies	***	***	40,475	4	47,200	3	70,400	3
Travel	18,178	4	14,481	4	33,335	4	39,273	4
Pacific whiting purchases	658,389	6	1,237,291	6	2,294,085	5	1,845,707	5
Non-whiting fish purchases		0		0		0		0
Average total variable costs	1,864,762	6	2,976,445	6	5,812,775	5	4,585,581	5

8.2 Fixed costs

8.2.1 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 process fish
- 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
- 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 split out West Coast capitalized expenditures and expenses on fishing gear, and capitalized expenditures on processing equipment from shared expenses.

Table 8.2: Capitalized expenditures on vessel and on-board equipment, fishing gear, and processing equipment. Average capitalized expenditures (\$) on vessel and on-board equipment, fishing gear, and processing equipment (N = number of EDC vessels with non-zero, non-NA responses).

Expenditure category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Fishing gear shared between the West Coast and other fisheries	\$174,336:	5	***	***	\$576,144:	5	\$553,442:	4
Fishing gear used only on the West Coast	***	***	***	***		0		0
Processing equipment shared between the West Coast and other fisheries	\$2,259,050:	5	\$882,139:	5	***	***	\$382,216:	5
Processing equipment used only on the West Coast		0		0		0		0
Vessel and on-board equipment in all fisheries	\$1,816,714:	5	\$1,565,967:	6	\$681,416:	7	\$2,224,681:	7
Average total capitalized expenditures	\$3,543,417:	6	\$2,638,958:	6	\$1,287,662:	7	\$2,813,945:	7

Table 8.3: Expenses on vessel and on-board equipment, fishing gear, and processing equipment. Average expenses (\$) 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 all fisheries the vessel participates in (West Coast, Alaska, and other) and others are for West Coast Fisheries only (Washington, Oregon, and California).

Expense category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Fishing gear repair and maintenance shared between the West Coast and other fisheries	285,506 [·]	4	272,654 [·]	4	187,430 [·]	7	240,680 [·]	7
Fishing gear repair and maintenance used only on the West Coast	***	***	***	***	***	***	***	0
Processing equipment shared between the West Coast and Alaska	516,536 [·]	4	261,935 [·]	5	240,975 [·]	7	600,880 [·]	7
Vessel and on-board equipment	1,609,246 [·]	6	1,142,062 [·]	6	1,022,819 [·]	7	1,260,277 [·]	6
Average total costs on vessel and on-board equipment, fishing gear, and processing equipment	2,166,277 [·]	6	1,568,536 [·]	6	1,473,320 [·]	7	1,921,797 [·]	7

8.2.2 Other fixed costs

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

Expense category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Insurance premium payments (hull and machinery, protection and indemnity, and pollution insurance)	1,200,395 [*]	6	1,072,765 [*]	6	866,488 [*]	7	692,086 [*]	7
Lease of vessel	***	***		0	***	***	***	***
Moorage	401,886 [*]	6	333,389 [*]	6	299,151 [*]	7	317,656 [*]	7
Average total fixed costs	1,868,948 [*]	6	1,406,154 [*]	6	1,168,567 [*]	7	1,012,599 [*]	7

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

	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Depreciation	2,279,615*	6	2,280,392*	6	2,138,087*	7	2,428,690*	7

8.3 Fixed costs on the West Coast

As described above, not all costs reported on the EDC forms are for West Coast only operations. Therefore, cost disaggregation was required both to estimate total costs and total cost net revenue on the West Coast. Estimates of West Coast only costs are calculated using a ratio of pounds caught on the West Coast to pounds caught in all fisheries, including Alaska, Tribal, and any other fisheries, which provides an estimate of the proportion of the vessel costs attributed to the West Coast for costs that are shared. This approximation for the proportion of shared spending on the West Coast is then summed with the West Coast Only spending categories to provide a total estimate for annual West Coast Only spending (Table 8.6). See Section 1.2 above for discussion of this method.

8.3.1 Costs on vessel and on-board equipment, fishing gear, and processing equipment on the West Coast

Table 8.6: West Coast fixed costs on vessel and on-board equipment, fishing gear, and processing equipment. Capitalized expenditures and expenses on vessel and on-board equipment, fishing gear, and processing equipment on the West Coast (N = number of vessels with non-zero, non-NA responses).

Cost category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Fishing gear	111,299 [‡]	5	230,827 [‡]	4	176,819 [‡]	5	170,745 [‡]	5
Processing equipment	502,773 [‡]	6	302,354 [‡]	6	154,841 [‡]	5	226,219 [‡]	5
Vessel and on-board equipment	560,978 [‡]	6	608,697 [‡]	6	474,210 [‡]	5	1,078,537 [‡]	5
Average total West Coast costs on vessel and on-board equipment, fishing gear, and processing equipment	1,156,500 [‡]	6	1,064,935 [‡]	6	805,870 [‡]	5	1,475,501 [‡]	5

8.3.2 Other fixed costs on the West Coast

Table 8.7: West Coast costs on insurance, moorage, and leasing. Expenses on insurance, moorage, and leasing on the West Coast (N = number of vessels with non-zero, non-NA responses).^{6.5in}

Cost category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
West Coast portion of insurance expenses	230,431 [‡]	6	220,471 [‡]	6	168,678 [‡]	5	144,131 [‡]	5
West Coast portion of lease expenses	***	***		0	***	***	***	***
West Coast portion of moorage expenses	93,352 [‡]	6	68,438 [‡]	6	71,876 [‡]	5	78,774 [‡]	5
Average total fixed costs	429,277 [‡]	6	288,909 [‡]	6	242,176 [‡]	5	224,487 [‡]	5

8.4 Fish purchases

The mothership form includes a question about the purchase of whiting and "Other" fish during the year. This information, along with a calculation of the average annual price is presented in Table 8.8. The average price for the season is calculated using the total reported revenue divided by the total reported purchase weight for each vessel for that survey year.

Table 8.8: Fish purchased and received. Average purchase weight (mt), purchase cost (\$), and weight received but not paid for of whiting and other species. (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Total weight of whiting purchased	3,922 [*]	6	5,958 [*]	6	9,982 [*]	5	7,501 [*]	5
Total cost of whiting purchased	658,389 [*]	6	1,237,291 [*]	6	2,294,085 [*]	5	1,845,707 [*]	5
Average annual whiting purchase price per mt	171 [*]	6	210 [*]	6	237 [*]	5	248 [*]	5
Total weight of other fish purchased	0	0	0	0	0	0	0	0
Total cost of other fish purchased	0	0	0	0	0	0	0	0
Total weight of whiting received but not paid for	141 [*]	4	***	***	***	***	***	***
Total weight of other fish received but not paid for	***	***	***	***	***	0	0	0

8.5 Summary of West Coast costs

Table 8.9: Summary of costs on the West Coast. 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 (N = number of EDC vessels with non-zero, non-NA responses).

Cost category	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Total costs on vessel and on-board equipment, fishing gear, and processing equipment	\$1,156,500:	6	\$1,064,935:	6	\$805,870:	5	\$1,475,501:	5
Total other fixed costs	\$429,277:	6	\$288,909:	6	\$242,176:	5	\$224,487:	5
Total variable costs	\$1,864,762:	6	\$2,976,445:	6	\$5,812,775:	5	\$4,585,581:	5
Average total costs	\$3,450,539:	6	\$4,330,288:	6	\$6,860,821:	5	\$6,285,569:	5

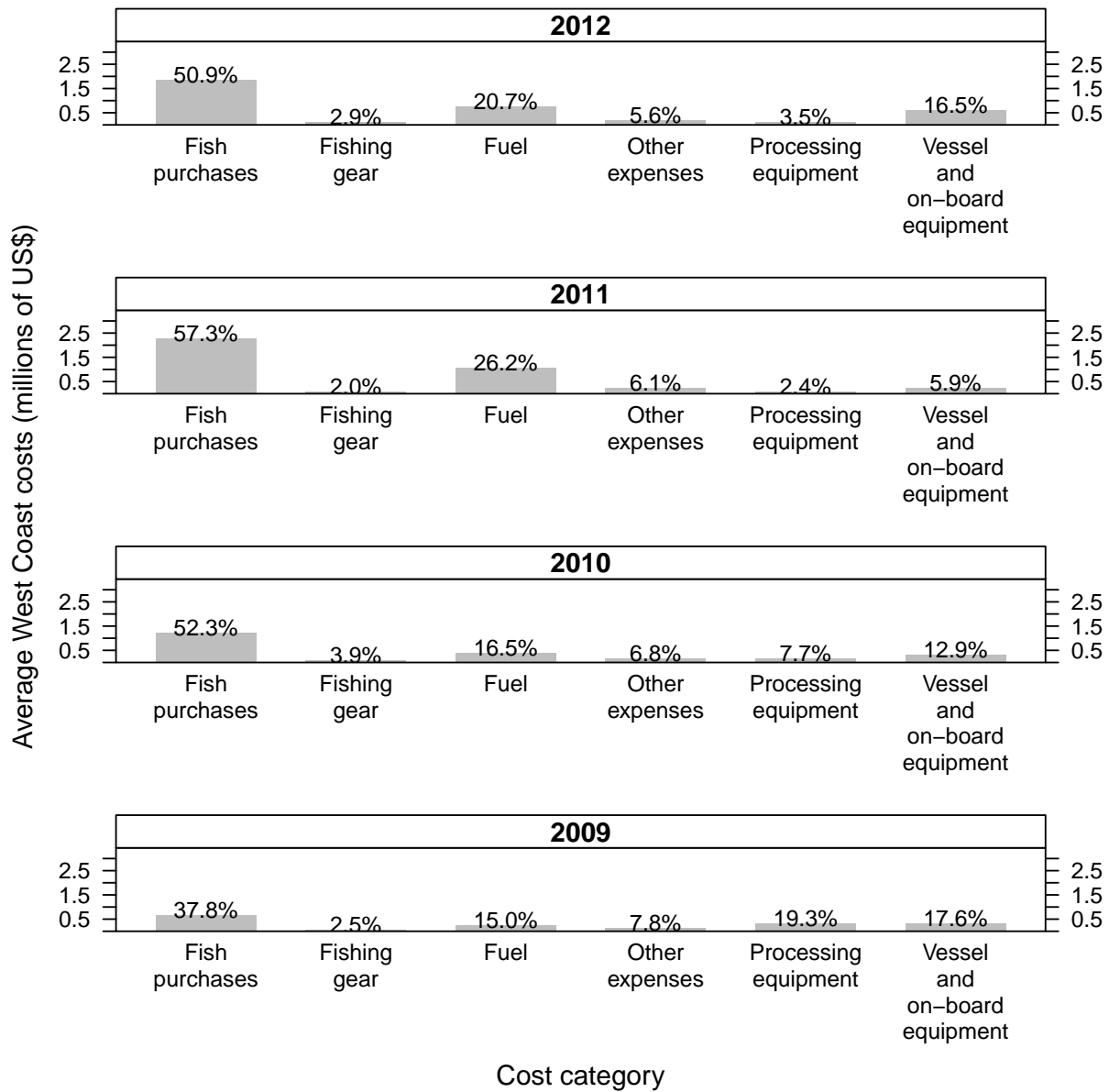


Figure 8.1: Average costs by category on the West Coast. Average costs by category on the West Coast including capitalized expenditures and annual expenses (millions of dollars). Crew includes both processing and non-processing crew expenses shown in Table 8.7. The “Other” category includes expenses on additives, communication, fees, insurance, freight, moorage, observers, offloading, supplies, packing, travel, and Sea-State monitoring. Percentages above each bar indicate the portion the category makes up of total West Coast costs.

8.5.1 Quota and permit costs on the West Coast

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. The EDC form does not capture this type of transfer.

9 Net Revenue and Economic Profit

Net returns from operating a vessel are presented in this section. The level of net returns not only indicates whether a vessel is a viable ongoing business, but also the size of net benefit that is created from society's perspective. Two different measures of net returns are examined. They differ in the types of costs that are taken into account, and therefore, their interpretation and use. The first is a monetary, financial measure that attempts to track a vessel's net cash flow, which we call *net revenue*. It is calculated as revenue minus monetary costs. The only costs that are accounted for are those that are actually paid or associated with a financial transaction. The second measure attempts to track the broader economic performance of a vessel and includes all costs regardless of whether there is a cash or financial transaction. Costs are measured by their true resource costs, which may or may not be equal to monetary outlays. This measure is called *economic profit*¹. The distinction between the two measures is probably most easily understood through a few examples relevant to fisheries.

Labor costs for the net revenue measure are the total payments to the crew and captain. If work is performed that is not paid for, then it is not included as a cost. This commonly occurs in commercial fishing when the owner of a vessel is also the captain, but does not draw a captain's wage. In this case, the net revenue is higher than it would be if the captain drew a wage or hired a captain. In the end, the vessel owner-captain is not necessarily any worse off since s/he is the residual claimant to the net revenue. However, the net revenue would be higher than a comparable vessel that hired a captain². Economic profit, on the other hand, accounts for the cost associated with an owner's time that is used as a captain. This is called an opportunity cost in the economics literature³, and is typically approximated by the wage of a comparably productive captain⁴.

A second example of the difference between net revenue and economic profit is the treatment of vessel capital costs. Again, net revenue only includes costs that are actually paid, which includes items such as vessel repair, maintenance, and upgrades. Economic profit would also include the opportunity cost of owning the vessel, a capital asset. By owning a vessel, the owner foregoes other investment

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 The same would also be true when a vessel owner does not receive a wage for work performed to repair or maintain a vessel or gear.

³ See Boardman, Anthony, David Greenberg, and Aidan Vining. *Cost-Benefit Analysis: Concepts and Practice*, Prentice Hall, NJ. 2000. pp. 31-32.

⁴ A more accurate measure would be the owner-captain's most valued wage off the vessel.

opportunities that would provide a rate of return. This is called the opportunity cost of capital, and is typically approximated by the market rate of return associated with businesses of comparable risk, multiplied by the market value of the vessel.

Both net revenue and economic profit are useful measures for fishery management. Net revenue attempts to measure the annual financial well-being of vessel operations. It can be used to determine if there is a monetary gain or loss, or how changes in fishery management may affect the level of monetary gain or loss. Economic profit is a better indicator of the long-term viability of fishery operations since it includes all costs, and values the costs at their opportunity cost. It can be used to estimate whether there are incentives or disincentives to invest in capital, or enter and leave the fishery. It is also a better measure of the net benefit of the fishery to the nation.

Calculations of net revenue are included in this report. The cost categories used in net revenue, based on those reported in the EDC forms, are discussed below. Currently, calculations of economic profit are beyond the scope of the report. Economic profit relies on opportunity costs, which may be different from some of the costs reported on the EDC forms, so additional methods and analyses are required. The EDC Program economists will continue to work on developing measures of economic profit so that it may be included in future reports.

9.1 Net revenue

Net revenue is calculated two ways: using only variable costs, and using variable costs plus fixed costs (total costs)⁵. The first calculation is called *variable cost net revenue*, while the second is called *total cost net revenue*. Variable cost net revenue is useful to examine changes in fishery operations that are not so great as to affect fixed costs. For example, the cost of processing an additional day, or processing an additional metric ton of fish, is better represented by only considering variable costs. Total cost net revenue is usually a better summary measure of financial gain or loss for an entire year, season, or fishery.

There are several caveats associated with the net revenue calculations in this report. As noted in Section 8, there are a variety of costs that are associated with running a vessel that are not requested by the EDC 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 processing, or are too difficult to allocate to a particular vessel in a multi-vessel company. These expenses include office space, vehicles and transport trucks, storage of equipment, professional fees, and marketing. In general, the EDC forms attempt to capture only costs that are directly related to vessel maintenance and processing operations, and not costs that are related to activities or equipment off the vessel. Therefore, the EDC calculated net revenue is an overestimate of the true net revenue. The difference is likely much greater for total cost net revenue than variable cost net revenue since most of the excluded costs are fixed costs.

⁵ See Section 8 for a more complete discussion of variable and fixed costs used in this report

Another caveat is that the EDC forms do not collect information about income taxes or financing costs. This has several implications. The first is that these costs are not included in the net revenue calculations. Therefore, net revenue is greater than it would be otherwise. The second is that in lieu of financing information (principal and interest payments), EDC total cost net revenue uses the total costs associated with vessel and gear purchases, repair, maintenance and improvements. For example, if a new engine is purchased, the total cost of the engine is used, even though the actual cash outlay, if it were financed, would only be the principal and interest payments made that year. 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 for the net revenue calculation. Over time, this may balance out to some degree because previously financed or purchased capital and equipment are also not included, except for the year in which they are purchased⁶. Moreover, total cost net revenue is expected to be representative of actual total cost net revenue only when averaged over many years and across vessels because relatively large capital costs occur periodically.

9.1.1 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 production of fish. The variable and fixed costs do not include costs related to acquiring limited entry permits, quota shares, or quota pounds.

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

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

⁶ At best, it is just a partial balancing out because the interest payments are not accounted in the EDC data.

Table 9.1: 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 (N = number of vessels). Fixed costs include capitalized expenditures and expenses on vessel and on-board equipment, fishing gear, and processing equipment and other fixed costs (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$3,008,372	6	\$5,645,012	6	\$8,230,477	5	\$6,058,715	5
(Variable costs)	\$1,864,762	6	\$2,976,445	6	\$5,812,775	5	\$4,585,581	5
Variable cost net revenue	\$1,143,610	6	\$2,668,567	6	\$2,417,702	5	\$1,473,134	5
(Fixed costs)	\$1,585,777	6	\$1,353,843	6	\$1,048,046	5	\$1,699,988	5
Total cost net revenue	-\$442,167	6	\$1,314,724	6	\$1,369,656	5	-\$226,854	5

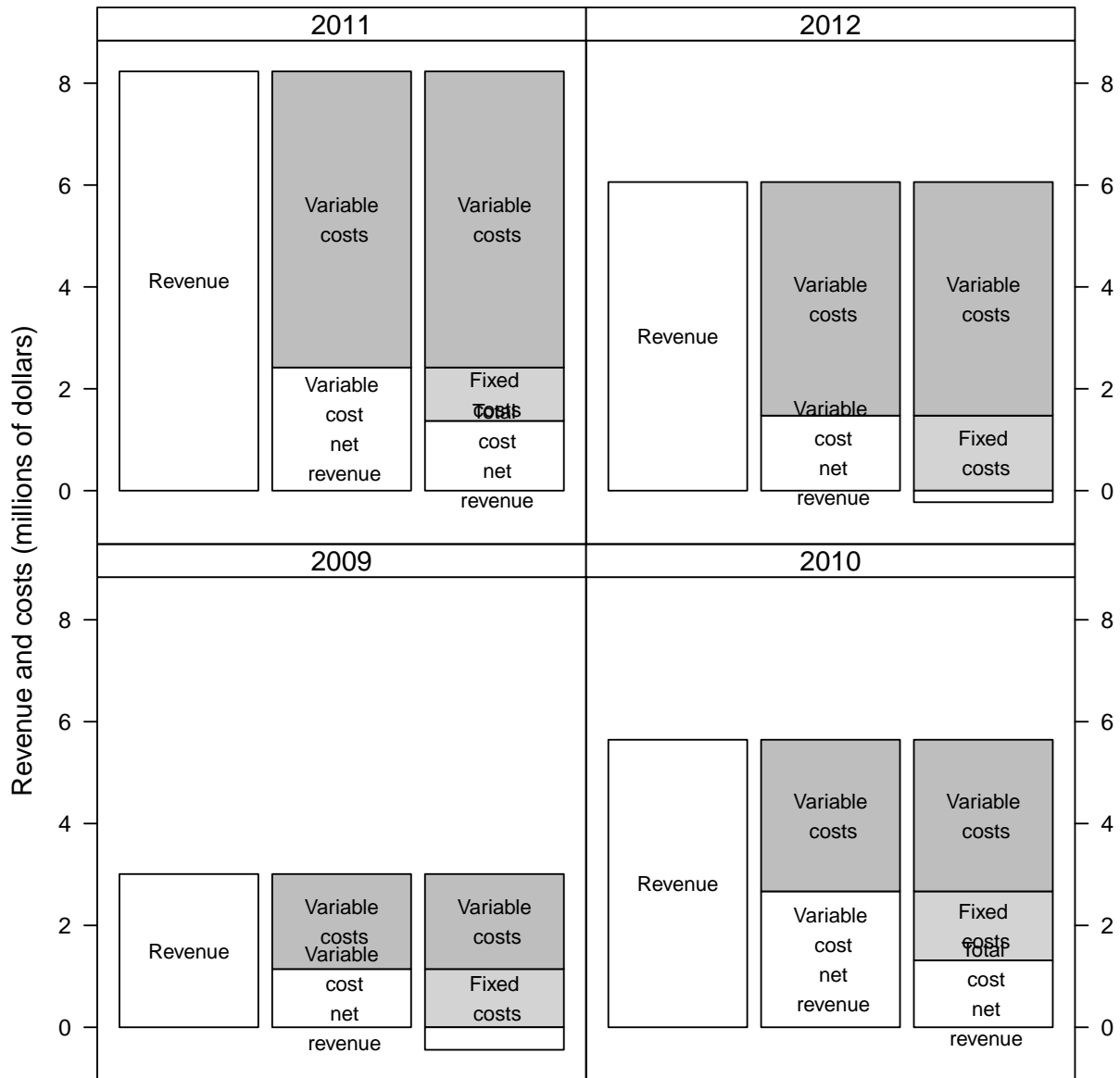


Figure 9.1: Mothership average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast. Fixed costs include capitalized expenditures, capital expenses, and other fixed costs.

10 Economic Performance: Cost, Revenue, Net Revenue, Markup, and Product Recovery Rates

Table 10.1, Table 10.2, and Table 10.3) provide a breakdown of the revenue, variable cost, variable cost net revenue, total cost, and total cost net revenue by days at sea (West Coast processing and steaming), metric ton of fish produced, and metric ton of fish purchased.

Table 10.1: Revenue, cost, and net revenue per day. Mean revenue per day, variable cost per day, variable cost net revenue per day, fixed costs per day, and total cost net revenue per day.

	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$152,259	6	\$164,112	6	\$117,448	5	\$116,769	5
(Variable costs)	\$93,860	6	\$93,468	6	\$86,481	5	\$93,216	5
Variable cost net revenue	\$58,400	6	\$70,645	6	\$30,967	5	\$23,553	5
(Fixed costs)	\$78,844	6	\$43,743	6	\$16,768	5	\$35,883	5
Total cost net revenue	-\$20,444	6	\$26,902	6	\$14,200	5	-\$12,330	5

Table 10.2: Revenue, cost, and net revenue per metric ton produced. Mean revenue per metric ton produced, variable cost per metric ton produced, variable cost net revenue per metric ton produced, fixed costs per metric ton produced, and total cost net revenue per metric ton produced.

	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$2,160	6	\$2,647	6	\$2,000	5	\$1,715	5
(Variable costs per metric ton produced)	\$1,314	6	\$1,480	6	\$1,478	5	\$1,632	5
Variable cost net revenue	\$847	6	\$1,166	6	\$521	5	\$83	5
(Fixed costs per metric ton produced)	\$1,163	6	\$784	6	\$297	5	\$924	5
Total cost net revenue	-\$317	6	\$383	6	\$225	5	-\$841	5

Table 10.3: Net revenue per metric ton purchased. Mean variable cost net revenue per metric ton purchased and total cost net revenue per metric ton purchased.

Description	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Variable cost net revenue	\$307	6	\$370	6	\$229	5	-\$39	5
Total cost net revenue	-\$94	6	\$144	6	\$113	5	-\$577	5

The markup for the mothership whiting sector (Table 10.4) is

$$\frac{R_n}{C_n}$$

where N is the number of motherships that processed on the West Coast, R_n is the value of production for each mothership vessel, and C_n is the cost of fish purchases by each mothership vessel. The entity average markup is calculated for each survey year and shown in (Table 10.4).

The product recovery rate for the mothership whiting sector (Table 10.5) is

$$\frac{WT_n^{fishoutputs}}{WT_n^{fishinputs}}$$

where N is the number of motherships that purchased fish on the West Coast, $WT_n^{fishoutputs}$ is the weight of fish produced by each mothership vessel, and $WT_n^{fishinputs}$ is the weight of fish purchases from catcher vessels by each mothership vessel. The entity average product recovery rate is calculated for each survey year and shown in (Table 10.5).

Table 10.4: Markup rate. The markup rate (total value of production divided by total cost of fish purchases) for motherships on the West Coast (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Markup	4.87 [*]	6	3.95 [*]	6	3.37 [*]	5	3.12 [*]	5

Table 10.5: Product recovery rate. The product recovery rate (total weight of production divided by total weight of fish purchases) for motherships on the West Coast (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012	
	Mean	N	Mean	N	Mean	N	Mean	N
Product recovery rate	0.38 [*]	6	0.32 [*]	6	0.44 [*]	5	0.53 [*]	5