

Economic Data Collection Program

Mothership Report

Draft Report for PFMC Review

Do Not Cite

Northwest Fisheries Science Center¹

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Summary

This report summarizes information collected from the West Coast groundfish mothership fleet as a part of the Economic Data Collection (EDC) Program, which was implemented to monitor the economic effects of the 2011 transition of the West Coast groundfish trawl fishery to a catch share program. The catch share program consists of cooperative programs for the at-sea mothership and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet. Annual EDC submissions are required from all fishery participants. The mothership form is available online¹. This mothership report (and its companion reports covering the other sectors) is the first 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.

The report covers the years 2009 to 2011. It contains information about annual participation by motherships in the West Coast and Alaska groundfish trawl fisheries, as well as the physical characteristics, fuel use, and crew size of mothership vessels participating in the West Coast groundfish trawl fisheries. Fish purchase quantity and cost and the ports of delivery for processing in Alaska and the West Coast are provided for vessels participating in the West Coast groundfish trawl fisheries. The report also contains variable and fixed cost information, production, revenues, and calculated net revenue from West Coast fish purchases. Finally, a breakdown of costs, revenue, and net revenue per day at sea, per metric ton of production, and per metric ton purchased provide basic metrics of the economic performance of the mothership fleet.

¹http://www.nwfsc.noaa.gov/research/divisions/fram/economic_data.cfm

1 Introduction

1.1 Background

In January 2011, the West Coast groundfish trawl fishery transitioned to a 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 and catcher-processor fleets. The Economic Data Collection (EDC) Program¹ 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, was submitted in 2011 for the 2009 and 2010 operating years. Data for the first year the fishery operated under the catch share program (2011), was submitted in 2012.

This draft report summarizes the 2009-11 EDC mothership survey data. The 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 cost earnings data are available for shorebased catcher vessels starting in 2004², this is the first data collection from the mothership fleet.

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

- Economic Data Collection Program, Administration and Operations Report, Draft Report for the SSC Economic Subcommittee Review (March 2013)
- Economic Data Collection Program, Catcher-Processor Report, Draft Report for the SSC Economic Subcommittee Review (March 2013)
- Economic Data Collection Program, Catcher Vessel Report, Draft Report for the SSC Economic Subcommittee Review (March 2013)
- Economic Data Collection Program, First Receiver and Shorebased Processor Report, Draft Report for the SSC Economic Subcommittee Review (March 2013)

¹Additional information on the EDC Program, including the EDC data collection forms can be found at www.nwfsc.noaa.gov/edc

²Lian, 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.

The Administration and Operations Report describes the EDC Program administration and fielding of the surveys, the EDC forms, data QA/QC 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.

This mothership report and other reports, listed above, comprise the first of what is expected to be an annual series of reports. It is envisioned that over time, the scope of these reports will expand, and the methods used will be refined with each annual publication. As such, the data summaries and analyses may change in subsequent years as improvements are implemented. Future reports will contain additional summaries that describe the variation of the data, either numerically or graphically. They are not contained in this report due to time constraints.

1.2 Purpose of the report

This report, as well as the other three EDC data summary reports have 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 the EDC forms. Thus summarized, the reports make the data available to the public for both research and informational purposes.

Second, the data summary reports 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 NMFS National Catch Shares Performance Indicators. Currently, with just a single year 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 either provide or serve as the basis for economic models that will be used as part of the Pacific Fishery Management Council's (PFMC) biennial specification process for groundfish management. These models include the IO-PAC model³, 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.

³Leonard, 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.

1.3 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 Office 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). 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 owner, 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, 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.

1.4 About the survey participants

One distinguishing factor among the vessels that affects interpretation of EDC data is whether the vessel received fish in Alaska, the West Coast, or Alaska and the West Coast. Although the questions on the EDC form ask about fisheries on the West Coast, Alaska, and other fisheries, the mothership vessels in the survey population do not fish anywhere other than the West Coast and Alaska. For vessels that participated in the tribal sector of the West Coast at-sea hake 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.

1.5 Understanding the report

The data provided in the summary tables throughout the report are for all vessels that processed on the West Coast during the survey year, unless otherwise noted.

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 216-100. 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 of the value displayed. 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 only reported zeroes. More information about how confidential data are protected in the EDC Program can be found in the Administration and Operations Report.

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.

The form had very few changes between the baseline data collection in 2009-2010, and the 2011 collection. The 2009 and 2010 EDC mothership forms asked if the participant received 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.

For each value displayed in the summary data tables, N is displayed. In most cases, N represents the number of responses to the question that are not "NA" and not zero, unless noted otherwise.

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. In 2011, the vessels spent on average, less time off-loading and steaming on the West Coast than in 2009 and 2010, and more days processing on average in Alaska in 2011 than during the baseline period.

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 (N)	2010 (N)	2011 (N)
Processing in Alaska	117 (6)	99 (7)	147 (8)
Processing in the West Coast whiting fishery	19 (6)	25 (8)	35 (6)
Steaming in the West Coast whiting fishery	3 (6)	5 (8)	4 (6)
Steaming between West Coast and Alaska	24 (6)	19 (7)	18 (8)
Off-loading in the West Coast whiting fishery	3 (6)	4 (8)	5 (6)

Table 2.2 presents the average 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 three survey years.

Table 2.2: Average one-way trips steaming between West Coast and Alaska. Median number of one-way trips between the West Coast and Alaska.

	2009 (N)	2010 (N)	2011 (N)
One-way trips to Alaska	4 (6)	4 (7)	4 (8)

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

Description	2009	2010	2011
Number of vessels that processed on the West Coast	6	7	8
Number of vessels that processed in Alaska	6	8	6

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 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.

Location	2009	2010	2011
Off-load in Blaine/Bellingham	1	3	3
Off-load in Seattle	5	5	2
Off-load in Tacoma	2	3	1

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).

Description	2009 (N)	2010 (N)	2011 (N)
Market Value (\$)	54,500,000 (4)	57,700,000 (6)	51,016,667 (6)
Replacement Value (\$)	107,500,000 (4)	100,000,000 (6)	96,416,667 (6)
Length (feet)	360 (6)	338 (8)	346 (8)
Horsepower	8,525 (6)	7,794 (8)	7,564 (8)
Fuel Capacity (gallons)	397,721 (6)	342,291 (8)	355,071 (8)

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 that were hauled out during their fiscal year.

Response	2009	2010	2011
Yes	2	3	2
No	4	5	6

5 Vessel Fuel Use and Crew Size

5.1 Fuel use

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

Description	2009 (N)	2010 (N)	2011 (N)
Processing and steaming in the West Coast whiting fishery	6,763 (6)	5,876 (8)	5,105 (7)
Steaming between West Coast and Alaska	6,917 (6)	5,099 (8)	5,312 (8)

In 2011, the average total fuel used by the vessel during the survey year for propulsion or other use in the West Coast whiting fishery was less than in 2010 or 2009 (Table 5.2) . This total excludes fuel used for steaming between the West Coast and Alaska. The increase from 2011 is likely due to the increase in the number of days at sea processing on the West Coast, see Table 2.1.

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

Description	2009 (N)	2010 (N)	2011 (N)
Diesel	118,007 (6)	141,900 (8)	193,220 (6)
Fish oil	***	***	***

5.2 Crew size

Participants provide the total number processing and non-processing crew members 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. The number of processing crew appears to have declined from 2009 through 2010 and 2011, while the non-processing crew size appears more stable throughout the survey years.

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

Description	2009 (N)	2010 (N)	2011 (N)
Non-processing	35 (6)	31 (8)	32 (6)
Processing	90 (6)	88 (8)	71 (6)

The average fuel use per day on the West Coast decreased slightly from 2009 to 2011 (Table 5.1). This total includes both 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.

6 Whiting Purchases

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 U.S. and Canadian fishermen. Once the U.S. allocation has been determined, it is then allocated between catcher-processor, mothership, and shoreside sectors. Between 2009 and 2011, the total allocation to the mothership more than doubled from 24,034 metric tons for the sector in 2009 to 53,039 metric tons in 2011 (Table 6.1)¹.

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 States 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 survey that asks participants to provide the total round weight of all fish processed on the vessel in all fisheries during the survey year.

¹*Pacific Whiting Fishery Summary* provided by the Northwest Regional Office: <http://161.55.131.129/Groundfish-Halibut/Groundfish-Fishery-Management/Whiting-Management/2011/upload/2011-summary.pdf>

Table 6.1: Annual mothership allocation, average West Coast whiting purchases per vessel and total West Coast and Alaska fish purchases (metric tons).

Description	2009 (N)	2010 (N)	2011 (N)
Total mothership West Coast whiting allocation	24,034	37,679	53,039
Average West Coast whiting purchases by vessel (A-SHOP)	4,049 (6)	4,492 (8)	7,190 (6)
Total West Coast whiting mothership fleet purchases (A-SHOP)	24,297 (6)	35,935 (8)	50,331 (6)
Total West Coast and Alaska mothership fleet purchases	200,395 (6)	222,705 (8)	240,934 (6)
Average West Coast and Alaska purchases by vessel	33,399 (6)	27,838 (8)	34,419 (7)

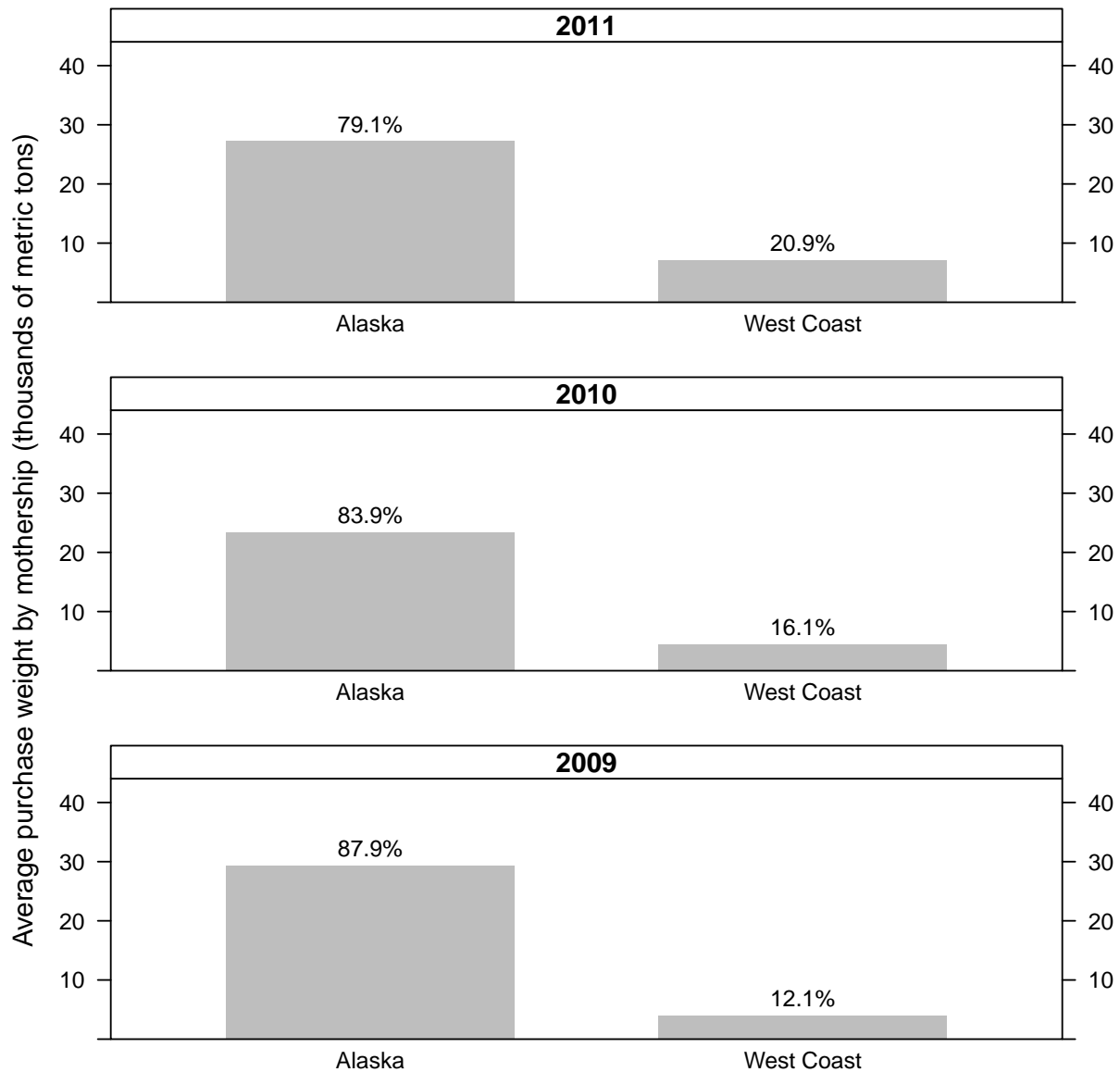


Figure 6.1: Average annual purchases on the West Coast and Alaska. Average annual purchases (thousands of metric tons) from 2009 to 2011 on the West Coast and in Alaska. Percentages above each bar indicate the portion of the total purchases in that fishery.

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, this type of transfer is not captured by the EDC form.

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 MT (N)	2010 MT (N)	2011 MT (N)
Fillets	325 (4)	247 (4)	139 (4)
Fishmeal	156 (5)	160 (5)	216 (4)
Fish oil	***	***	***
Headed and gutted	***	347 (4)	386 (3)
Minced	249 (4)	233 (4)	252 (4)
Other	***	***	***
Round	0 (0)	***	***
Roe	0 (0)	***	0 (0)
Stomachs	0 (0)	0 (0)	0 (0)
Surimi	388 (5)	839 (8)	1,047 (5)
Average vessel total	1,650 (6)	1,881 (8)	2,330 (6)

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

Product Category	2009 \$ (N)	2010 \$ (N)	2011 \$ (N)
Fillets	1,056,422 (4)	704,259 (4)	369,641 (4)
Fishmeal	225,287 (5)	303,913 (5)	360,994 (4)
Fish oil	0 (0)	***	***
Headed and gutted	***	564,395 (4)	692,760 (3)
Minced	477,987 (4)	473,463 (4)	394,001 (4)
Other	***	***	***
Round	0 (0)	***	***
Roe	0 (0)	***	0 (0)
Stomachs	0 (0)	0 (0)	0 (0)
Surimi	1,179,759 (5)	2,538,276 (8)	2,993,931 (5)
Average vessel total	3,673,561 (6)	4,640,531 (8)	5,113,203 (6)

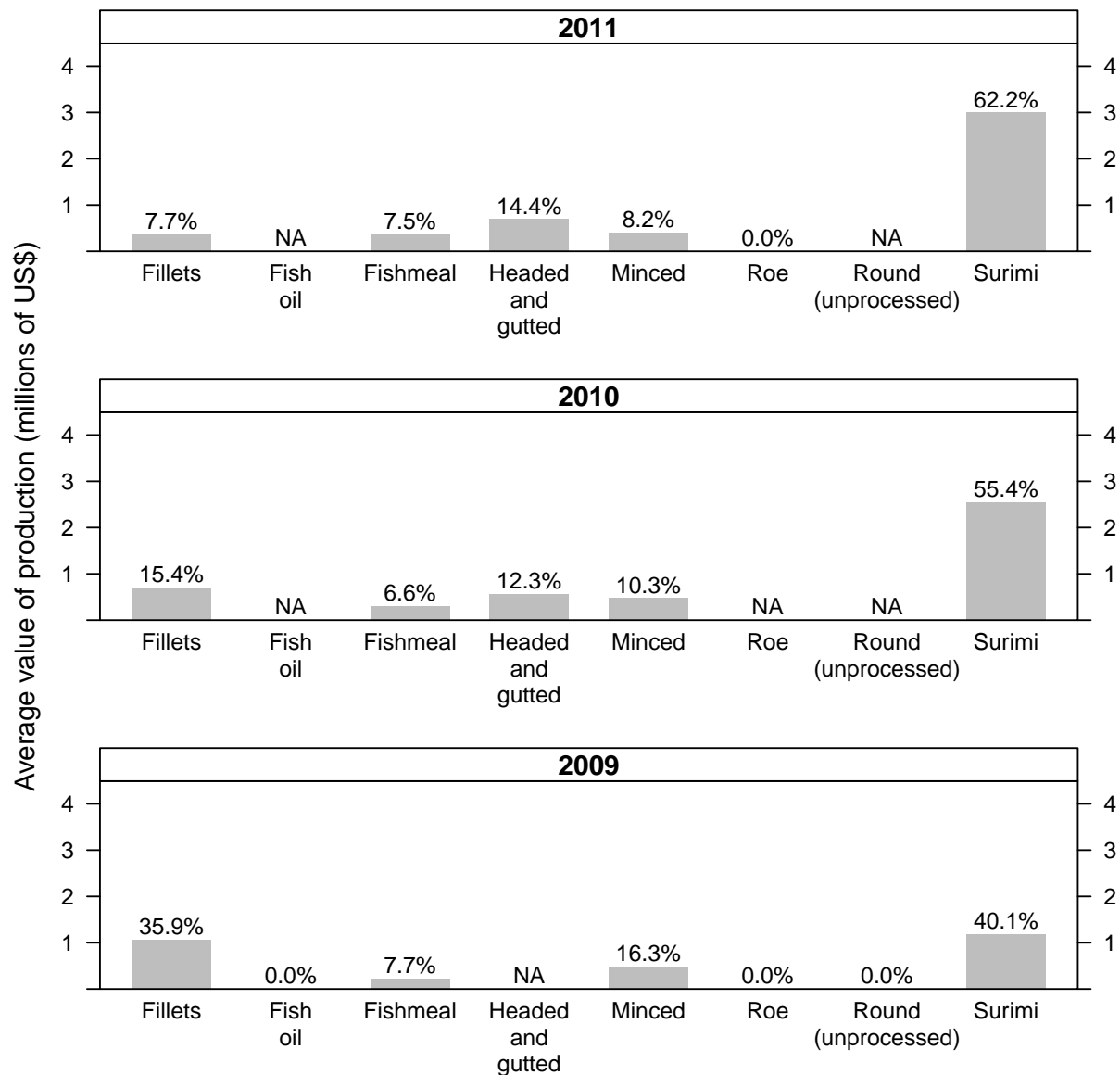


Figure 7.1: Production value by product type and year. Average whiting production value by product type and year. Confidential data have been suppressed and replaced with "NA", product categories where production value was reported as 0 for all vessels for all years are not included. The percentage of each product type of all production is listed on the top of each bar.

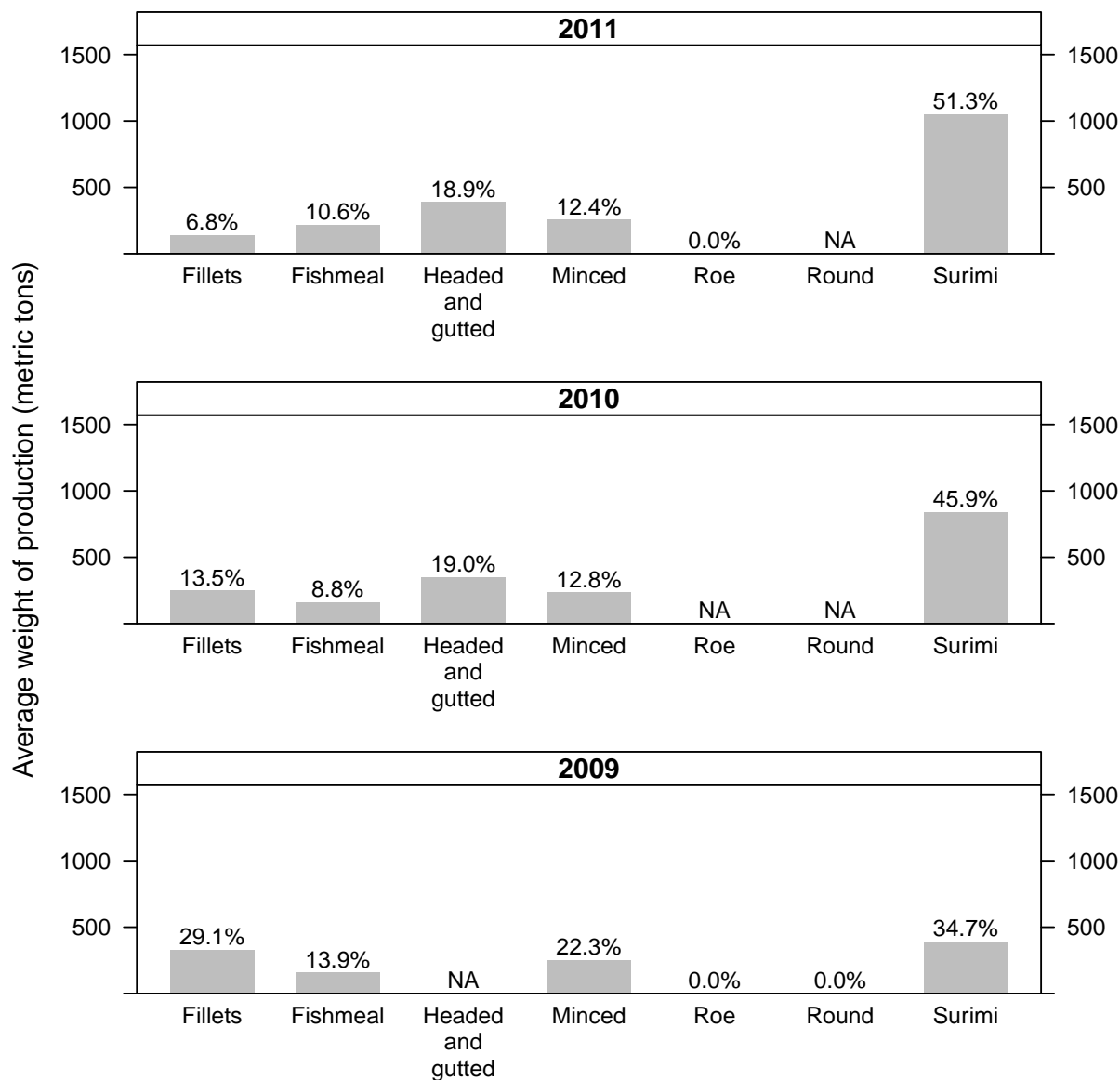


Figure 7.2: Production weight by product type and year. Average whiting production weight by product type and year. Confidential data have been suppressed and replaced with "NA", product categories where production value was reported as 0 for all vessels for all years are not included. The percentage 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 payments. 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 category 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. Processing crew wages made up the largest portion of variable costs in 2009 and 2010, however in 2011, expenses on fuel and lubrication nearly doubled from 2009 and 2010, and surpassed processing crew wages as the largest portion of variable costs (Table 8.1). The next largest variable costs in 2011 on the West Coast were non-processing crew wages, non-fish ingredients (additives), and packing materials.

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 \$ (N)	2010 \$ (N)	2011 \$ (N)
Co-op membership fees	0 (0)	0 (0)	4,773 (3)
Communication	6,183 (6)	5,598 (8)	13,282 (6)
Fishing gear repair and maintenance	***	***	25,351 (4)
Food	44,281 (5)	47,713 (8)	90,159 (6)
Freight	***	9,397 (5)	13,420 (3)
Fuel and lubrication	330,094 (6)	380,084 (8)	715,474 (6)
Non-fish ingredients (additives)	43,637 (5)	138,796 (8)	223,126 (5)
Non-processing crew wages	395,978 (6)	365,546 (8)	425,924 (6)
Observers	18,937 (6)	18,416 (8)	23,981 (6)
Offloading	34,907 (6)	32,150 (6)	22,262 (5)
On-board cargo/product insurance	11,893 (5)	10,518 (7)	***
Packing materials	94,824 (6)	107,813 (8)	154,550 (6)
Processing crew wages	450,248 (6)	626,179 (8)	595,093 (6)
Supplies	***	27,884 (5)	19,380 (4)
Travel	12,168 (4)	7,547 (7)	20,224 (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

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 vessels with non-zero, non-NA responses). Note that some capitalized expenditures 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).

Expenditure category	2009 \$ (N)	2010 \$ (N)	2011 \$ (N)
Fishing gear shared between the West Coast and other fisheries	230,702 (5)	***	711,220 (6)
Fishing gear used only on the West Coast	***	***	0 (0)
Vessel and on-board equipment	1,477,668 (5)	846,126 (8)	1,089,892 (8)
Processing equipment shared between the West Coast and other fisheries	2,687,834 (5)	817,710 (7)	175,503 (5)
Processing equipment used only on the West Coast	0 (0)	***	0 (0)

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 \$ (N)	2010 \$ (N)	2011 \$ (N)
Fishing gear repair and maintenance shared between the West Coast and other fisheries	285,637 (4)	196,689 (6)	163,766 (8)
Fishing gear repair and maintenance on the West Coast	***	***	25,351 (4)
Vessel and on-board equipment	1,693,868 (6)	1,344,278 (8)	1,133,014 (8)
Processing equipment shared between the West Coast and Alaska	344,358 (4)	441,818 (6)	276,708 (8)

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 \$ (N)	2010 \$ (N)	2011 \$ (N)
Insurance premium payments (hull and machinery, protection and indemnity, and pollution insurance)	1,200,878 (6)	1,045,572 (8)	905,653 (8)
Moorage	388,929 (6)	332,542 (8)	207,233 (8)
Lease of vessel	***	0 (0)	***

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

Expense category	2009 \$ (N)	2010 \$ (N)	2011 \$ (N)
Depreciation	2,285,967 (6)	2,251,126 (8)	2,079,527 (8)

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 purchased on the West Coast to pounds purchased 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 8.9).

$$C_n^{WC} = EX_n^{WC} + C_n^{SHD} \times \frac{WT_n^{WC}}{WT_n^{TOT}}, \quad (8.1)$$

where C_n^{WC} is the annual expenses associated with the West Coast for each vessel n , EX_n^{WC} are the West Coast only expenses (as reported on the EDC forms), and C_n^{SHD} are the costs that were shared between the West Coast and Alaska (as reported by the vessels on the EDC forms). The ratio of WT_n^{WC} (total purchases of fish on the West Coast) to WT_n^{TOT} (total purchases in all fisheries) are used to apportion the EX_n^{SHD} between the West Coast and other fisheries. The shared expenses include both the “Shared” and “All” costs described above. The annual expenses on the West Coast are calculated for each survey year.

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

Table 8.6: West Coast costs on vessel and on-board equipment, fishing gear, and processing equipment. Average costs on vessel and on-board equipment, fishing gear, and processing equipment 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 \$ (N)	2010 \$ (N)	2011 \$ (N)
Fishing gear	46,509 (6)	73,279 (8)	184,339 (6)
On-board and vessel equipment	41,243 (6)	62,632 (8)	174,753 (6)
Processing equipment	282,654 (6)	298,874 (8)	54,962 (6)

8.3.2 Other fixed costs on the West Coast

Table 8.7: West Coast costs on insurance, moorage, and leasing. (N = number of vessels with non-zero, non-NA responses).

Cost category	2009 \$ (N)	2010 \$ (N)	2011 \$ (N)
West Coast portion of insurance expenses	152,493 (6)	163,832 (8)	166,077 (6)
West Coast portion of moorage expenses	48,587 (6)	44,647 (8)	46,231 (6)

8.3.3 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. This type of transfer is not captured by the EDC form.

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: Whiting purchases. Average fish cost per pound (\$/lb), value of whiting purchases (\$), and weight of whiting purchases (MT).

	2009 (N)	2010 (N)	2011 (N)
Cost (\$/metric ton)	166.224 (6)	0.103 (8)	0.105 (6)
Value of whiting purchases (\$)	747,115 (6)	1,204,631 (8)	1,434,138 (6)
Weight of whiting purchaes (metric tons)	4,389 (6)	5,437 (8)	6,322 (6)

8.4.1 Summary of West Coast costs

Table 8.9: Summary of costs on the West Coast. Average costs on vessel and on-board equipment, fishing gear, and processing equipment, other fixed costs, variable costs, and costs of fish purchases on the West Coast (N = number of vessels with non-zero, non-NA responses).

Description	2009 \$ (N)	2010 \$ (N)	2011 \$ (N)
Cost of whiting purchased	747,115 (6)	1,204,631 (8)	1,434,138 (6)
West Coast capitalized expenditures on vessel and on-board equipment, fishing gear, and processing equipment	451,179 (6)	453,002 (8)	489,520 (6)
West Coast expenses	2,258,026 (6)	2,711,598 (8)	3,304,710 (6)

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 opportunities that would provide a rate of return. This is called the

¹Whitmarsh 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

²The 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.

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

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

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 draft 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 the 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 underestimate 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.

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

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

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.

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

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

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).

Description	2009 \$ (N)	2010 \$ (N)	2011 \$ (N)
Revenue	3,673,561 (6)	4,640,531 (8)	5,113,203 (6)
(Variable costs)	2,228,840 (6)	2,996,768 (8)	3,800,777 (6)
Variable cost net revenue	1,444,721 (6)	1,643,763 (8)	1,312,426 (6)
(Fixed costs)	568,902 (6)	551,691 (8)	453,237 (6)
Total cost net revenue	879,419 (6)	1,101,469 (8)	868,774 (6)

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

10 Cost, Revenue, Net Revenue, Markup, and Product Recovery Rates

Table 10.1 provides 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. Although total revenue in the fishery increased slightly from 2010 to 2011, from \$5.3 million to \$5.5 million (Table 7.1), the average total revenue per day decreased from \$105 thousand per day to \$93 thousand per day (Table 10.1).

Table 10.1: Revenue, cost, and net revenue rates.

Description	2009 \$ (N)	2010 \$ (N)	2011 \$ (N)
Revenue per day (West Coast processing and steaming)	86,099 (6)	104,238 (8)	95,853 (6)
Revenue per metric ton produced	2,226 (6)	2,467 (8)	2,194 (6)
Variable cost per day (West Coast processing and steaming)	13,334 (6)	12,392 (8)	8,496 (6)
Variable cost per metric ton produced	345 (6)	293 (8)	195 (6)
Variable cost net revenue per day (West Coast processing, and steaming)	33,861 (6)	36,923 (8)	24,603 (6)
Variable cost net revenue per metric ton produced	876 (6)	874 (8)	563 (6)
Variable cost net revenue per metric ton purchased	357 (6)	366 (8)	183 (6)
Total cost per day (West Coast processing, and steaming)	81,008 (6)	98,144 (8)	98,011 (6)
Total cost per metric ton produced	2,095 (6)	2,322 (8)	2,244 (6)
Total cost net revenue per day (West Coast processing, and steaming)	20,611 (6)	24,742 (8)	16,286 (6)
Total cost net revenue per metric ton produced	533 (6)	585 (8)	373 (6)
Total cost net revenue per metric ton purchased	217 (6)	245 (8)	121 (6)

The markup for the mothership whiting sector (Table 10.2) is

$$\frac{\sum_{n=1}^N R_n}{\sum_{n=1}^N C_n}$$

where N is the total number of motherships that processed on the West Coast, R_n is the value of production by mothership vessel, and C_n is the cost of fish purchases by mothership vessel. The markup is calculated for each survey year.

The product recovery rate for the mothership whiting sector (Table 10.2) is

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

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

Table 10.2: Markup and product recovery rate. The markup (total value of production divided by total cost of fish purchases) and product recovery rate (total weight of production divided by total weight of fish purchases) for mothership whiting vessels on the West Coast (N = number of vessels with non-zero, non-NA responses).

Description	2009 (N)	2010 (N)	2011 (N)
Markup	4.917 (6)	3.852 (8)	3.565 (6)
Product Recovery Rate	0.407 (6)	0.419 (8)	0.324 (6)