

Economic Data Collection Program
Catcher Vessel Report (2009-2015)

Erin Steiner, Marie Guldin, Amanda Warlick, Lisa Pfeiffer

National Marine Fisheries Service

Northwest Fisheries Science Center¹

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¹ For questions or comments, please contact the EDC Program at [nwsc.edc@noaa.gov](mailto:nwfsc.edc@noaa.gov).

2015 Economic Data Collection (EDC)
 West Coast Groundfish Trawl
 Catch Share Program

CATCHER VESSELS

FISHERY PARTICIPATION

CATCH SHARE FISHERIES	Vessels	Avg Days at Sea	Total Landings (1000s mt)
At-sea Pacific whiting	14	42.4	27.9
Shoreside Pacific whiting	22	54.4	57.3
Non-whiting midwater	13	12.5	2.0
DTS trawl (with trawl endorsement)	51	35.2	10.6
Non-whiting, non-DTS trawl (with trawl endorsement)	46	25.3	5.4
Groundfish fixed gear (with trawl endorsement)	18	31.7	0.9
Groundfish fixed gear (with fixed gear endorsement)	10	26.8	0.4
Crab	52	28.8	0.3
Shrimp	47	70.3	18.3
Other fisheries	19	23.1	0.2
Alaska	25	123.7	112.5

ECONOMIC SUMMARY*

Vessel Average

\$485.9K revenue
 \$304.9K variable costs
 \$181.0K variable cost net revenue
 \$132.1K fixed costs
 \$48.9K total cost net revenue
 \$5.5K variable cost net revenue per day

Fleet-wide Totals

97 vessels
 \$47.1M revenue
 \$17.6M variable cost net revenue
 \$4.7M total cost net revenue

ALASKA PARTICIPATION

Alaska: \$39.7M
 25 vessels

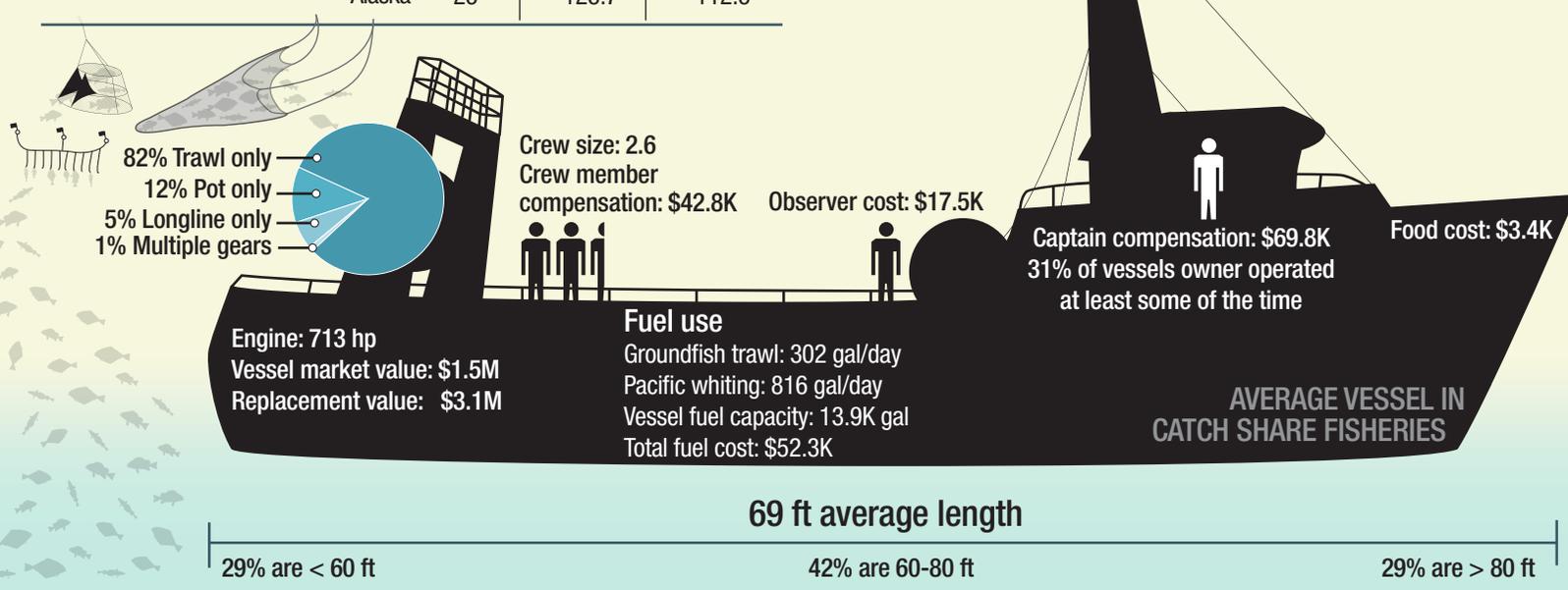
SHORESIDE PARTICIPATION

Total value of catch share groundfish landings
 Vessel ports

South & central Washington, Puget Sound: \$4.2M
 13 vessels

AT-SEA PARTICIPATION

At-sea: \$5.4M
 14 vessels



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



Catcher Vessel Sector: 2015 Highlights

In 2015, the fifth year of the catch share program, there were 97 catcher vessels that participated in the West Coast groundfish trawl catch share program (catch share program).

- Catcher vessels generated \$62.9 million in income and 825 jobs from deliveries of fish caught in the catch share program.
- Catcher vessels spent an average of 58 days fishing in the catch share program and spent an average of 77 additional days fishing in non-catch share fisheries, including fishing in Alaska.
- West Coast catcher vessels deliver to ports in Washington, Oregon, California, and to mothership at-sea; the two ports with the highest landings in 2015 were Astoria and Newport, both in Oregon.
- An average of 2.6 crew members worked aboard each West Coast catcher vessel, each earning an average compensation of \$42,800.
- In 2015, 31% of vessels were owner-operated at least part of the year.
- The average ex-vessel revenue per vessel from participation in the catch share program was \$486,000.
- Average catch shares variable cost net revenue (ex-vessel revenue minus variable costs) per vessel was \$181,000, and the fleet-wide variable cost net revenue was \$17.6 million.
- Average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) per vessel was \$48,900 and the fleet-wide total cost net revenue was \$4.74 million.
- Between 2011 and 2015, average variable cost net revenue was between 2.0% and 21.3% lower when quota costs and earnings were included.

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

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Acknowledgments

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

Report Introduction

About the Report

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

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

This report summarizes information collected from the West Coast catcher vessel fleet. The EDC reports are also produced for the other sectors, and currently cover the years 2009 to 2015. The 2009 and 2010 data were collected in 2011 to provide a baseline of pre-catch share information. There is a one-year lag in collecting the EDC data to allow companies to close their accounting books. Thus, 2015 data were collected from May to September 2016. The EDC reports are updated annually to disseminate the data and contextualize its interpretation. The reports also serve as a catalyst for feedback on the data collected and its analysis. The scope of these reports continues to expand and the methods are refined with each publication.

The report is composed of three major sections. The first section, Catcher Vessel Overview (beginning on page 8), is an in-depth summary that contains descriptive analyses focusing on activities during 2015. The second section, Catcher Vessel Data Summaries (beginning on page 51), provides tables of all of the data collected from 2009 to 2015, with a detailed discussion of the methods used to summarize the data. The third section, Catcher Vessel Data Analysis (beginning on page 116), contains information about cost disaggregation and calculations of net revenue and economic performance. The data that form the basis for this report are confidential and must be aggregated or not shown so that individual responses are protected. More information about EDC Program administration, the EDC forms, data quality controls, data processing, and safeguarding confidential information can be found in the EDC Administration and Operations Report.²

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

The economic benefits of the West Coast groundfish trawl fishery and the distribution of these benefits were expected to change under the West Coast groundfish trawl catch share program. To monitor these changes, the Pacific Fishery Management Council (PFMC) proposed the implementation of the mandatory collection of

¹ Information about the Catch Share Program is available at http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

² Economic Data Collection Program, Administration and Operations Report available at: <http://www.nwfsc.noaa.gov/edc>.

economic data. Using data collected from industry participants, the EDC Program monitors whether the goals of the catch share program have been met.

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

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

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

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

Regional economic impact analysis measures the effects of the program on regional economies. The catch share program will likely affect different regional economies in different ways. Regional economic modeling involves tracking the expenditures of all businesses, households, and institutions within a given geographic region to arrive at the effects on income and employment. On the West Coast, the Northwest Fishery Science Center's IO-PAC model³ is used to estimate regional economic impacts using data from both the EDC survey forms and the voluntary cost earnings survey as model inputs.⁴

³ 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.

⁴ For more information on cost earnings survey data collection process, see the Administration and Operations Report Draft Report (May 2016).

OVERVIEW

Management context

In January 2011, the West Coast limited entry groundfish trawl fishery transitioned to the West Coast Groundfish Trawl Catch Share Program. The catch share program consists of 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. The vessels participating in the IFQ program deliver shoreside to buyers and processors with first receiver site licenses and at-sea vessels deliver to mothership vessels.

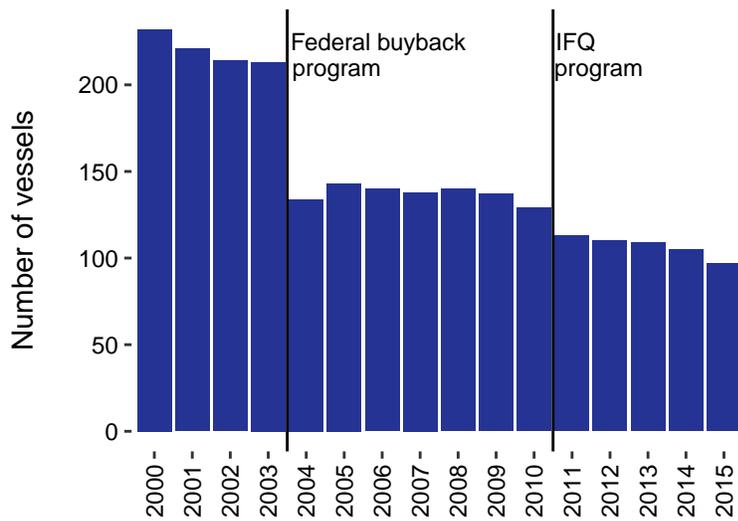


Figure 1: Number of catcher vessels participating in the At-sea and Shoreside limited entry trawl groundfish fisheries (2000-2010) and the number of vessels participating in the West Coast Groundfish Trawl Catch Share Program (2011-2015).

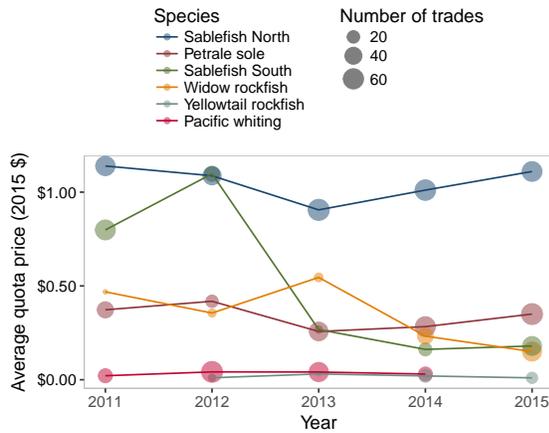
2004 (post-buyback program) and 2010 (pre-catch share program). In 2011, the first year of the catch share program, the number decreased to 113, with the lowest number of vessels to date in 2015 (97 vessels).

The NMFS has mandatory rebuilding plans that limit bycatch for species that are designated “overfished.” There are two rockfish species that remain designated as overfished as of 2015: Pacific ocean perch and darkblotched rockfish. In 2011, widow rockfish was taken off the overfished list.² As a result, the annual catch limit (ACL) for widow rockfish was raised starting in 2013.

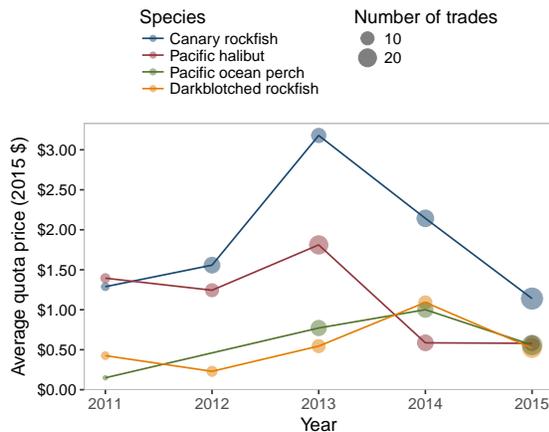
¹ 68 FR 42613, available at www.federalregister.gov/articles/2003/07/18/03-18344/magnuson-stevens-act-provisions-fishing-capacity-reduction-program-pacific-coast-groundfish-fishery.

² NMFS 2011. Status of the widow rockfish resource in 2011: http://www.pcouncil.org/wp-content/uploads/Widow_2011_Assessment.pdf.

Prior to 2011, the fishery was managed with a system that included trip and landings limits, area restrictions, seasonal closures, and gear restrictions. Many of these measures were developed to assist in the rebuilding of seven species that are caught as targets or bycatch in the groundfish fishery and were declared overfished by 2003. The catch share program was designed to alleviate the restrictive, inflexible nature of trip and landings limits, which limited the landings of groundfish species by two-month periods. Landings limits tend to encourage discarding, which can be detrimental to the rebuilding of overfished species. Under the catch share program, vessels holding a limited entry trawl permit were allocated individual quota shares.



(a) Quota prices for IFQ target species.



(b) Quota prices for IFQ bycatch species.

Figure 2: Quota prices for IFQ target and bycatch species with the highest number of transactions per year. The size of the circle represents the number of trades included in the price calculation.

predetermined price, but instead the payment is a percentage of the ex-vessel value of the landed fish. Barter transactions generally refer to a “quota for quota” trade, where individuals trade quota they do not plan to fish themselves. In 2015, petrale sole quota was traded the most frequently (\$0.35 per pound), followed by northern sablefish quota (North of 36°N) (\$1.11), widow rockfish (\$0.15), and southern sablefish quota (South of 36°N)

Quota shares were allocated for 30 different groundfish species and rockfish complexes to permit owners based on their historical participation.³ Annually, the quota shares are converted into quota pounds, which are then used by vessels to harvest fish within the catch share program. The quota shares and quota pounds are transferable through lease arrangements and sale, and are infinitely divisible.⁴ The catch share program allows vessels to catch their quota at any time during the season. One hundred percent at-sea observer coverage – another feature of the program – ensures that all catch, including discards, is counted against a vessel’s quota pounds.

Just as all quota for target species are allocated to individuals, so are quota for the overfished species. If an individual is unable to cover catch of overfished species with their existing quota, they are prohibited from fishing. In response to the consequences related to catching a species without available quota, some vessels have formed risk pools. The risk pools minimize the risk of needing to prematurely end the fishing season by pooling quota of overfished species with other quota owners. The participants in some risk pools are contractually obligated to follow a set of fishing guidelines, and if the guidelines are followed, any catch of overfished species is covered by the pooled quota and the individual can continue fishing.

Within the catch share program, there are various ways that quota pounds can be traded. The types of trades most frequently recorded are self-trades, other, cash sales, and barter. The “other” category includes cases such as transfers involving risk pools and arrangements where there is no

³ Additional information on the regulations, including the Federal Register notice, can be found at the West Coast Region website: www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

⁴ There was a moratorium on transfers of quota share percentages (permanent transfers of allocation) until January 1, 2015.

(\$0.18)(Figure 2a). The price paid for southern sablefish quota (South of 36°N) was only 16% of the price for the northern quota. There were 2.3 times more trades for southern sablefish in 2015 compared to 2014, the highest number of trades since 2011. There were no single species trades for whiting quota in 2015.⁵

Landings and unharvested quota for each of the catch share species groups are shown in Figures 3 and 4, as well as average prices for landings in that group. Trawl sector-specific allocations of the ACL were implemented for all species as part of the catch share program. Prior to the program, only Pacific whiting and sablefish had a sector-specific allocation. Percent utilization of the ACL was low for many species, with the exception of Pacific whiting (Figure 3), sablefish, and petrale sole (Figure 4). Pacific whiting approached full TAC attainment in all years except for 2015. In 2015, Pacific whiting catch and TAC attainment was very low for the whiting sectors largely due to anomalous ocean conditions (termed “The Blob”) that caused ecosystem-wide changes impacting the spatial and temporal distribution of whiting and their prey.

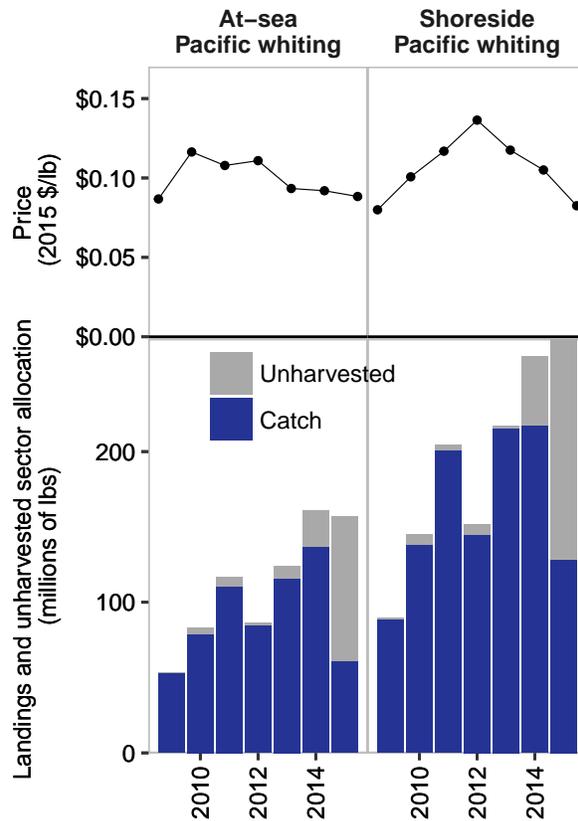


Figure 3: Landings and unharvested sector allocation and average ex-vessel prices (2015 \$) in the At-sea and Shoreside Pacific whiting sectors. Pacific whiting includes any reapportionment among sectors that may have occurred during the season.

⁵ Note that the prices are based on a relatively small number of single species trades, which are less common than multispecies trades. See Holland, D. S., and K. Norman. 2015. The Anatomy of a Multispecies Individual Fishing Quota (IFQ) "Market" in Development. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-F/SPO-158, 30 p. <http://spo.nmfs.noaa.gov/tm/TM158.pdf>

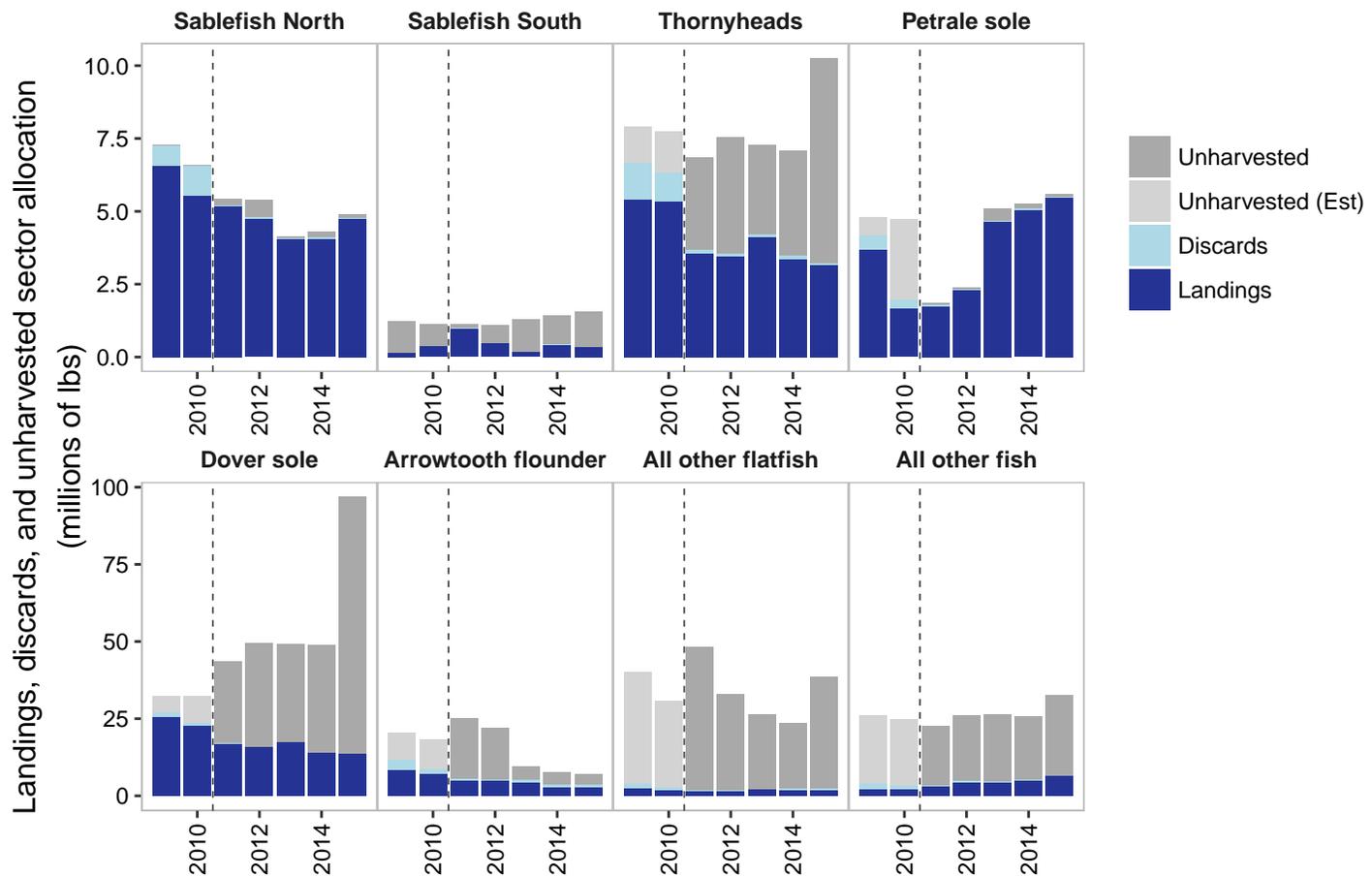


Figure 4: Landings (dark blue), Discards (light blue), and Unharvested (grey) trawl sector allocation of non-whiting groundfish species (millions of lbs). If carryover was made available for a specific quota category, the total weight was deducted from the original year and added to the following year (2011-2015). Except for sablefish, there was no trawl-specific quota in 2009 and 2010; for context, Unharvested (Est) (light grey) was calculated for 2009 and 2010 as $\text{Optimal Yield} \times \frac{2011 \text{ Trawl Sector Allocation}}{2011 \text{ Annual Catch Limit}} - \text{Landings} - \text{Discards}$ by stock or complex.

Catcher Vessel Sector Description

In 2015, the fifth year of the catch share program, there were 97 catcher vessels that participated in the program. These include both catcher vessels that deliver shoreside and those that deliver to at-sea motherships.⁶ Catcher vessels generated \$62.9 million in income and 825 jobs from deliveries of fish caught in the catch share program.⁷ These vessels caught about 61% of all catch share fish (the catcher-processor sector caught the remainder) and 31% of all fish caught commercially on the West Coast.

The catcher vessels that fished in 2015 ranged from 44 feet to 141 feet in length and employed between one and four crew members. The total fleet-wide number of days spent fishing in the limited entry groundfish trawl fishery has decreased from 9,000 during the pre-catch share period (2009-2010) to 5,480 in 2015. There were 60 vessels that fished in 2009 and/or 2010 that did not fish in 2015. Of those vessels, 20 stopped fishing on the West Coast completely, and 40 continued fishing in other fisheries (e.g., shrimp, crab, tuna, and California halibut). Despite the exit of some vessels from the catch share program, there were 17 vessels that fished in 2015 but did not fish in the trawl fishery in 2009 or 2010. Of those “new” vessels, 13 fish in the Groundfish fixed gear with trawl endorsement fishery.

The two ports with the highest catch share landings in 2015 were Astoria and Newport, Oregon (Table 1). Astoria received 74.5 million pounds of catch share fish, worth \$17.4 million and Newport received 45.9 million pounds, worth \$8 million. All Washington ports combined, received 35 million pounds, worth \$4.2 million. All of the California ports combined received 10.3 million pounds, worth \$9 million. Fourteen vessels delivered 61 million pounds of fish to at-sea motherships, worth \$5.4 million. Compared to 2014, the deliveries in the at-sea whiting fishery and deliveries to Washington ports decreased the most, as a result of low whiting catches. Southern Oregon and Northern California actually saw slight increases in 2015 compared to 2014.

Table 1: Deliveries by port area. Total ex-vessel revenue, landings weight, and number of vessels delivering to each port area for all catch share fisheries in 2015. Some vessels make deliveries in multiple ports, and each vessel is counted in every port where catch is delivered. Delivery port areas by fishery are not shown to protect confidential information.

	Revenue (millions of \$)	Landings (millions of lbs)	Number of vessels
At-sea	5.4	60.9	14
Washington state	4.2	35.0	13
Astoria, Oregon	17.4	74.5	33
Newport, Oregon	8.0	45.9	21
Southern Oregon	3.9	5.0	18
Northern California	7.0	8.9	16
Santa Barbara, Morro Bay, Monterey, San Francisco, CA	2.0	1.4	12

⁶ Vessels can participate in both the shoreside and at-sea fisheries.

⁷ Note that these impacts do not include the complementary impacts associated with the shorebased buyers and processors, nor the mothership vessels. 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.

Fishery Participation

For the purposes of this report, the catch share program is divided into the following six fisheries:

- At-sea Pacific whiting fishery
- Shoreside Pacific whiting fishery
- Non-whiting midwater trawl fishery⁸
- Dover sole, thornyheads, and sablefish (DTS) trawl with trawl endorsement fishery
- Non-whiting, non-DTS trawl with trawl endorsement fishery
- Groundfish fixed gear with trawl endorsement fishery

Most vessels participate in more than one of these fisheries. In addition to the catch share fisheries, most vessels also fish in Alaska or participate in state-managed fisheries (primarily shrimp and crab). A few vessels participate in other federally managed fisheries including the Groundfish fixed gear with fixed gear endorsement, salmon, and tuna fisheries. Participation in these other fisheries is more common for the shoreside non-whiting vessels, while fishing in Alaska is more common for the At-sea and Shoreside Pacific whiting vessels. The Groundfish fixed gear with trawl endorsement fishery is the result of a "gear switching" provision that allows either for vessels with trawl quota to fish with fixed gear (pots or longlines) or for vessels that traditionally fished with fixed gear to lease or purchase trawl quota and fish with fixed gear. Fixed gear is primarily used to target sablefish. The At-sea and Shoreside Pacific whiting fisheries are the highest volume fisheries.

Regulations prohibit fishing with midwater trawl gear prior to May 1. The At-sea and Shoreside Pacific whiting fisheries occur between late May and October (Figure 5). The DTS trawl and Non-whiting non-DTS trawl fisheries occur year-round. Vessels that fish with both trawl permits and fixed gear permits tend to use the fixed gear permits during the Primary sablefish fishery (one component of the Groundfish fixed gear with fixed gear endorsement fishery) from April 1 through October 31, and then transfer a trawl permit onto their boat once they have finished fishing in that fishery. The opening of the crab season varies by state based on pre-season crab condition testing, but generally begins in December or January and lasts until March. The 2015/2016 crab season was declared a commercial fishery failure in California, as a result of "a massive and persistent toxic algal bloom of phytoplankton caused Dungeness crab [...] to accumulate dangerous level of domoic acid".⁹ Shrimp is caught between April and October. Salmon, halibut, and tuna are caught in much lower volumes throughout the year and are not shown in the figure.

⁸ In 2011, widow rockfish, one of the two main targets in the non-whiting midwater trawl fishery (the other is yellowtail rockfish), was taken off the overfished list. As a result, the annual catch limit for widow rockfish was increased in the 2013/2014 Biennial Harvest Specification. Vessels only began targeting widow in 2012.

⁹ Disaster determination letter for California Dungeness Crab and Rock Crab, 2015-2016. http://www.fisheries.noaa.gov/sfa/management/disaster/determinations/67_ca_crab/request.pdf

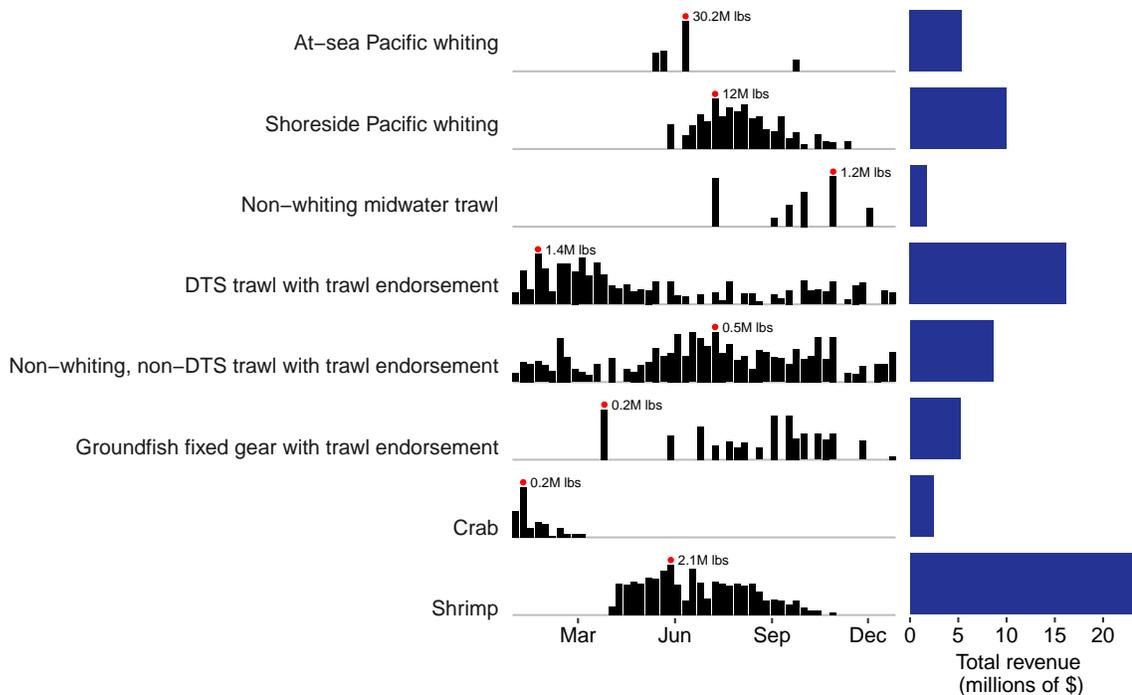


Figure 5: Landings by fishery and week (y-axis varies across fisheries) (left) and total ex-vessel revenue (millions of \$) (right) in each fishery in 2015. Red points represent highest landing (millions of pounds) by fishery. Data are not shown for weeks where there were less than three vessels fishing or if one vessel represented more than 90% of landings weight or revenue.

Economic Indicators

The EDC Program tracks economic indicators by compiling information submitted by participants about expenses and revenue and how those figures change over time. Pre-catch share data for the 2009 and 2010 operating years were submitted in 2011 and have been averaged to calculate “baseline” conditions within the fishery to which subsequent years of data can be compared. Values reported in the Overview are inflation-adjusted 2015 dollars.

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.¹⁰ To provide a complete picture of the changes that have occurred, both net revenue figures are presented at two scales: Average net revenue (Figure 6) is the value generated by a typical vessel, while fleet-wide net revenue (Figure 7) 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 only capture costs that are directly related to vessel fishing operations, and do not include other expenses such as vehicles or office expenses that may be related to the fishing business. Therefore, the net revenue reported here is an overestimate of the true net revenue.¹¹

¹⁰ See Figure 9 for a description of which costs are considered variable costs and which costs are considered fixed costs.

¹¹ See Section 13 of the Data Summaries for more information.

Average Net Revenue

Both average and fleet-wide variable cost net revenue are higher for all years after the implementation of the catch share program than the baseline period. Average variable cost net revenue was \$125,000 during the pre-catch share period, and fleet-wide variable cost net revenue was \$16.4 million. In 2015, the average variable cost net revenue was \$181,000 and the fleet-wide was \$17.6 million.

Total cost net revenue was higher in all years since the catch share program was implemented, except for 2012, which was higher than 2009, but not 2010. The trends are slightly different for average and fleet-wide total cost net revenue. Average total cost net revenue was highest, both average and fleet-wide in 2013 (\$137,000), and lowest in 2012 (\$29,700) for both. But, the second highest fleet-wide total cost net revenue occurred in 2014 (\$11 million), while the second highest average total cost net revenue occurred in 2011 (\$116,000).

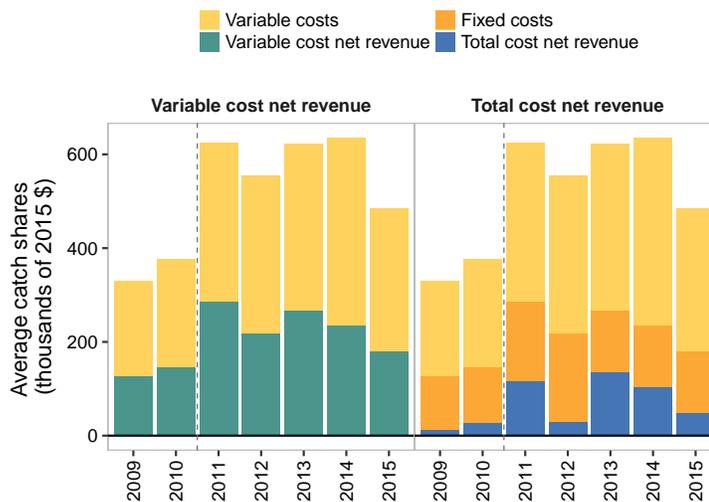


Figure 6: Average variable cost net revenue (ex-vessel revenue minus variable costs), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) per vessel from participation in all of the catch share fisheries combined (thousands of 2015 \$). Dashed line represents the beginning of the catch share program.

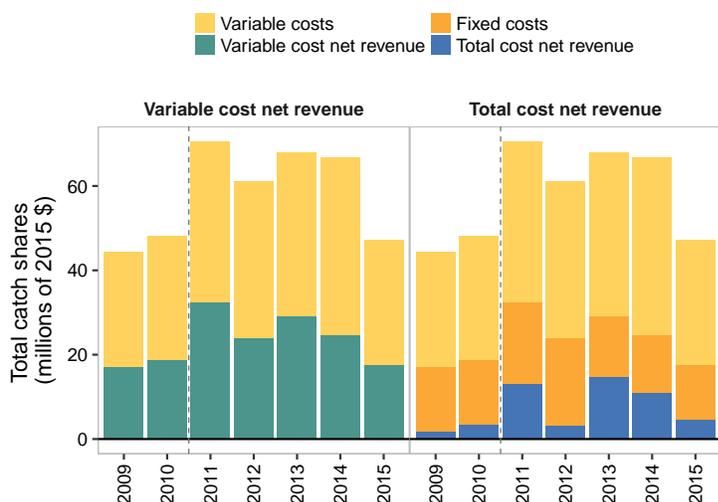


Figure 7: Fleet-wide variable cost net revenue (ex-vessel revenue minus variable costs), and fleet-wide total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) from participation in all of the catch share fisheries combined (millions of 2015 \$).

Increases in revenue are a result of a combination of considerable increases in TAC for Pacific whiting (compared to the baseline) as well as increases in ex-vessel prices for many target species. Compared to the pre-catch share period, the 2015 ex-vessel price for dover sole was 30% higher (\$0.47), and the ex-vessel price for thornyheads was 21% higher (\$0.68). Sablefish prices increased substantially in 2011 to \$2.90, but then decreased in 2012 to previous years' levels (\$2.11) (Figure 8). The ex-vessel price for Pacific whiting was higher than pre-catch shares (\$0.09 per pound) levels in all years since the implementation of the catch share program, except for 2015 when the price dropped to \$0.08 per pound (Figure 3).

Quota earnings and costs are excluded from calculations of net revenue above and

throughout this report for reasons related to both economic theory and data limitations. Leasing costs should not be included in calculations of net benefits because leasing constitutes a rent transfer of which there is no opportunity cost outside of the fishery. The data available do not allow for the allocation of costs to a specific fishery or calendar year (from the fiscal year reported on the EDC form); and quota lease revenue is not collected from quota share owners not involved with an actively participating vessel. Additionally, many quota trades are non-cash transactions and therefore cannot be included in the calculations. Despite these limitations, net revenue including quota was calculated to examine how these additional earnings and costs affect average operational performance measures currently reported. For all catch shares, the variable cost net revenue when quota was included was between 2.2% and 21.3% less than the variable cost net revenue when it was not included. For whiting vessels, the difference in variable cost net revenue when including quota versus not including quota was largest in 2015 (10% less), and for groundfish vessels, the difference was highest in 2015 (29% less). Including quota lease earnings increased the average revenue for all catch share participation by fiscal year between 2.3% and 6.5% than the ex-vessel revenue alone over the time period 2011 to 2015.¹²

Average Costs

In all years (2009-2015), the highest variable cost categories were crew and captain compensation and fuel (Figure 9). The highest fixed costs were vessel and on-board equipment. Fixed costs do not vary as directly with the level of fish harvest as much as variable costs. Costs per vessel have increased for nearly all cost categories, with the largest increases coming from equipment, captain and crew compensation, and fuel. Fleet-wide fixed costs were highest in 2011 and 2012, at \$19.4 million and \$20.6 million, but have since decreased to below pre-catch share levels. The lowest total fixed costs occurred in 2015 (\$12.8 million) as a result of a decrease in fleet size. In addition to the costs we have defined as variable and fixed, 64 vessels spent an average of \$61,800 on the purchase or lease of quota in 2015, slightly less than the average cost in 2014 (\$63,400).

As with net revenue, costs in 2015 differ from the other four years of the catch share program. Average crew and captain wages both decreased 24% between 2014 and 2015 as a result of decreased net revenue across the catch share program. There was also a decrease in fuel costs (36%) between 2014 and 2015 as a result of a 13% decrease in the number of days fishing as well as a slight decrease in fuel prices. Cost recovery fees were lower in 2015 than 2014 because of the lower ex-vessel revenue.

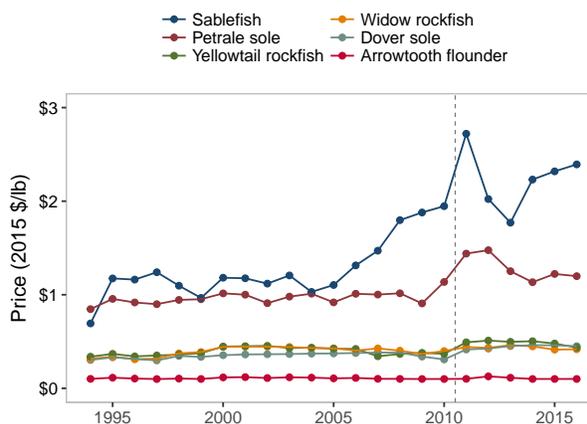


Figure 8: Ex-vessel prices (2015 \$) for top species from 1994 to 2015.

¹² Transactions from purchase or sale of quota shares are not included because there are too few observations.

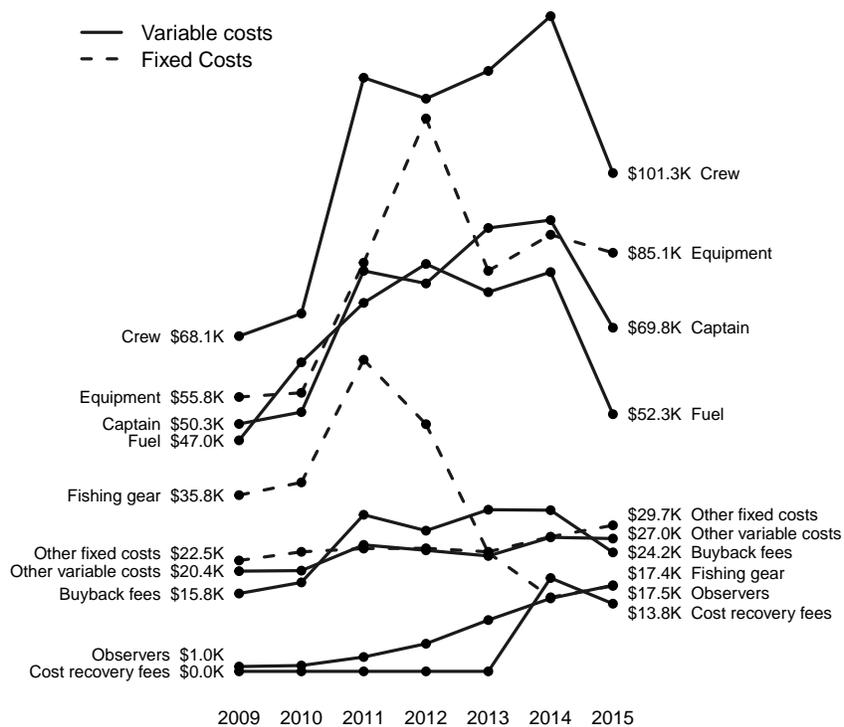


Figure 9: Average fixed (dashed line) and variable costs (solid line) (thousands of 2015 \$) per vessel in the West Coast Trawl Groundfish Catch Share Program. Note that vessels participating in Exempted Fishing Permit (EFP) programs during the pre-catch share period (2009-2010) paid for their own observer coverage.

One significant change resulting from the implementation of the catch share program was a shift to 100% observer coverage with partial industry funding. Prior to catch shares, there was approximately 20% observer coverage, paid for by NMFS. In order to lessen the cost of transitioning to the required 100% observer coverage, catcher vessels received a maximum subsidy of \$328.50 per day in 2011 and 2012. This subsidy decreased in 2013 to \$256 per day and in 2014 to \$216 per day. The subsidy in 2015 was \$108, but 2015 was also the first year where exempted fishing permits were issued to test Electronic Monitoring (EM) as an alternative. There were several alternative funding mechanisms used to subsidize the EM equipment and monitoring. Catcher vessels spent an average of \$17,500 on observers and electronic monitoring while operating in the catch share program in 2015 (Figure 9). In 2011, observer costs represented 0.9% of total variable costs, and increased to 6.3% in 2015. Note that as observer subsidies have decreased over time, the average expenses per vessel have increased and new costs associated with electronic monitoring have been introduced.

As noted above, most vessels participate in more than one fishery within the catch share program, as well as state and federally-managed fisheries that are not part of the catch share program. More details about each fishery and the economics of vessels participating in each fishery are included in the fishery-specific summaries in the following section.

Fishery Summaries

At-sea Pacific whiting

Fourteen vessels participated in the At-sea Pacific whiting fishery in 2015. These vessels delivered to three motherships as part of a single fishing cooperative. This fishery targets Pacific whiting (99.7% of total landings by weight) and has very low bycatch (Figure 10). Although the bycatch rate is extremely low, the total weight of bycatch was 422,000 pounds in 2015. The majority of this catch consisted of rockfish, coastal pelagics, and sharks, skates and rays. Not all species caught in this fishery must be “covered” with quota, but of the quota species, the most common were yellowtail rockfish (190,000 pounds), widow rockfish (37,900 pounds), rougheye rockfish (14,950 pounds), and splitnose rockfish (7,357 pounds).

Revenue

Participation in the At-sea Pacific whiting fishery resulted in \$5.36 million in ex-vessel revenue in 2015 (Figure 11 (top)). Vessels that participated in the At-sea Pacific whiting fishery also earned revenue fishing in Alaska (62.7% of total revenue) and fishing in the Shoreside Pacific whiting fishery (18.6% of total revenue). In 2015, all but two of the participants in the At-sea Pacific whiting fishery also fished in Alaska and most also fished in the

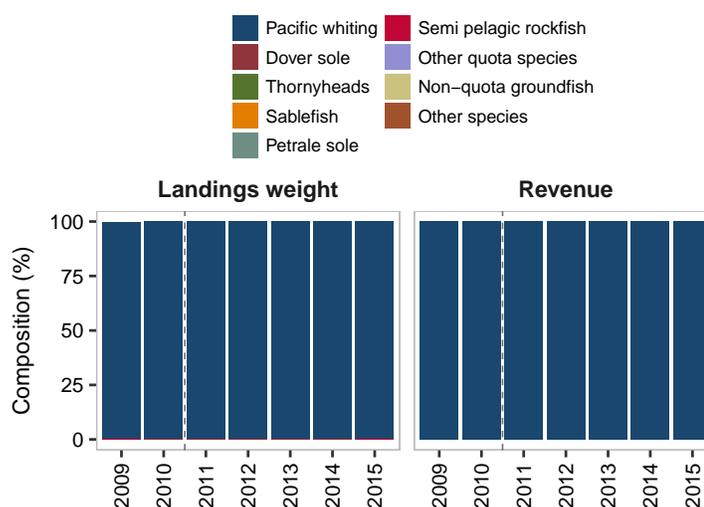


Figure 10: The species composition of catch (left) and revenue (right) in the At-sea Pacific whiting fishery (%). Dashed line represents the beginning of the catch share program.

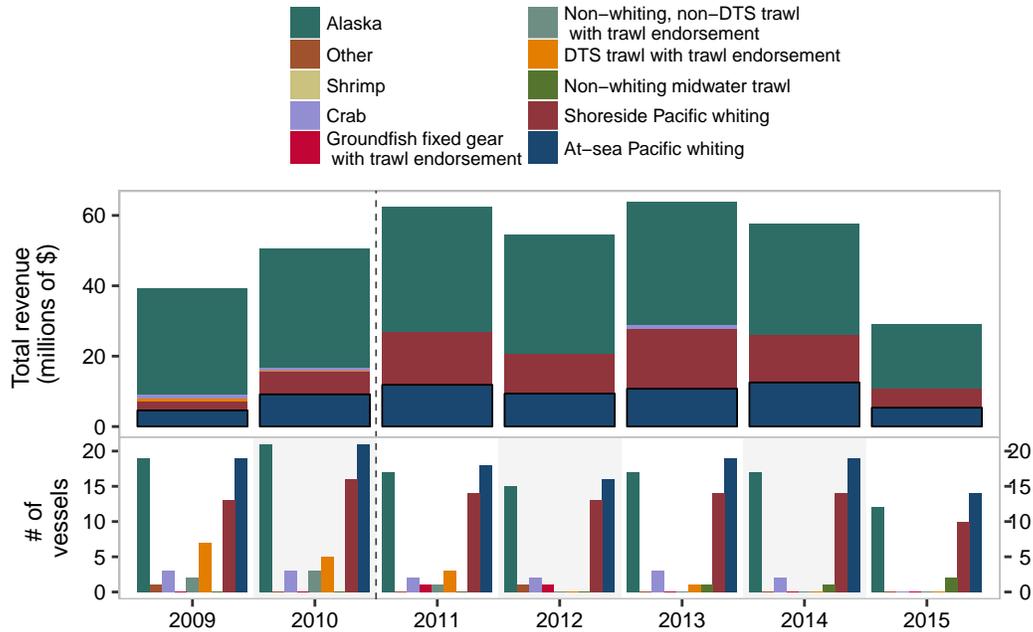


Figure 11: Total ex-vessel revenue earned by vessels that participated in the At-sea Pacific whiting fishery (black outline) by fishery (millions of 2015 \$) (top) and number of vessels that participated in each fishery (bottom). Dashed line represents the beginning of the catch share program. * Some values are suppressed to protect confidential data.

Shoreside Pacific whiting fishery (Figure 11 (bottom)). In 2009 through 2011, there were some vessels that also fished in the bottom trawl fisheries (DTS trawl with trawl endorsement and Non-whiting, non-DTS trawl with trawl endorsement fisheries), but there has been nearly no participation by At-sea Pacific whiting vessels since 2012. With the exception of 2015, total revenue has been higher since the implementation of the catch share program, mainly due to an increase in the catch limit for Pacific whiting and Alaska pollock (for those vessels that fish in Alaska). In 2015, total revenue for the at-sea whiting fleet was 42.7% less than pre-catch shares levels, a result of a decrease in Alaska and West Coast earnings.

Average Net Revenue

Average revenue from participating in the At-sea Pacific whiting fishery was \$383,000, average variable cost net revenue was \$147,000, and average total cost net revenue was \$1,080 in 2015 (Figure 12). The revenue and net revenue figures correlate closely to the volume of Pacific whiting allocated to the mothership sector, except for 2015. The average ex-vessel revenue and variable cost net revenue per vessel in 2015 was lower than any year since the catch share program was implemented. The ex-vessel revenue in 2015 was 42% less than 2014, and the variable cost net revenue was 38% less. The total cost net revenue in 2015 was lower than either of the pre-catch share years, but still higher than 2012 when average total cost net revenue was -\$18,700.

Average Costs

The single largest cost in 2015 was for vessel and on-board equipment (\$88,700 per vessel), followed by fuel (\$72,800), and crew (\$69,100) (Figure 13). The total amount spent on fuel, crew compensation, and captain compensation nearly doubled between 2009 and 2014, but decreased between 42% (fuel) and 66% (crew payments) between 2014 and 2015. On a per unit basis (not shown in the figure), crew compensation decreased from \$1.90 per hundred pounds delivered to mothership vessels in 2014 to \$1.57 per hundred pounds in 2015, while captain compensation only decreased from \$1.17 per hundred pounds delivered to \$1.11 per hundred pounds in 2015. Fuel

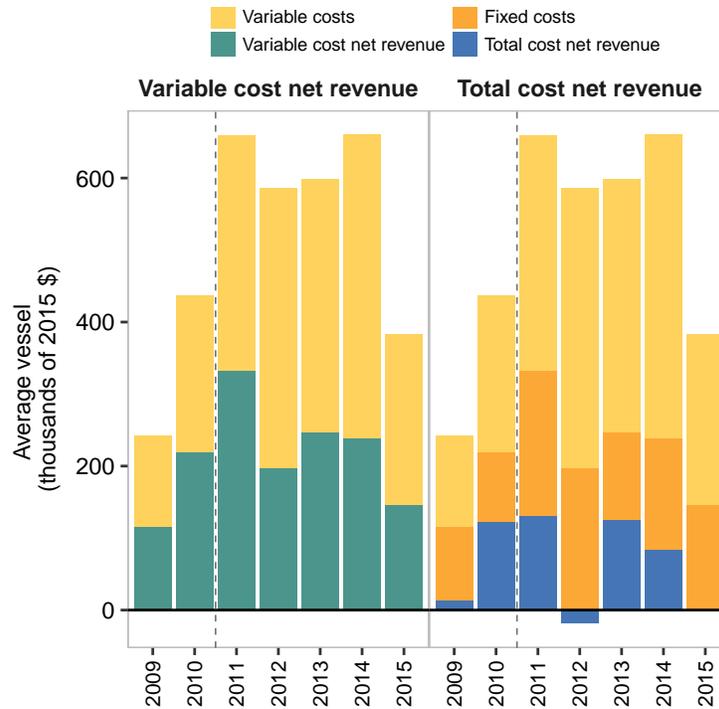


Figure 12: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the At-sea Pacific whiting fishery (thousands of 2015 \$). Dashed line represents the beginning of the catch share program.

expenses were less than \$0.02 per hundred pounds in all years except for 2012 and 2015. The increase in fuel costs in 2012 can at least be partly attributed to increases in fuel prices (see Mothership report for a full discussion). High fuel costs in 2015 are most likely attributable to increased time spent searching for fish. Crew compensation per hundred pounds was lower in 2015 (\$0.02) than any other year since the implementation of the catch share program.

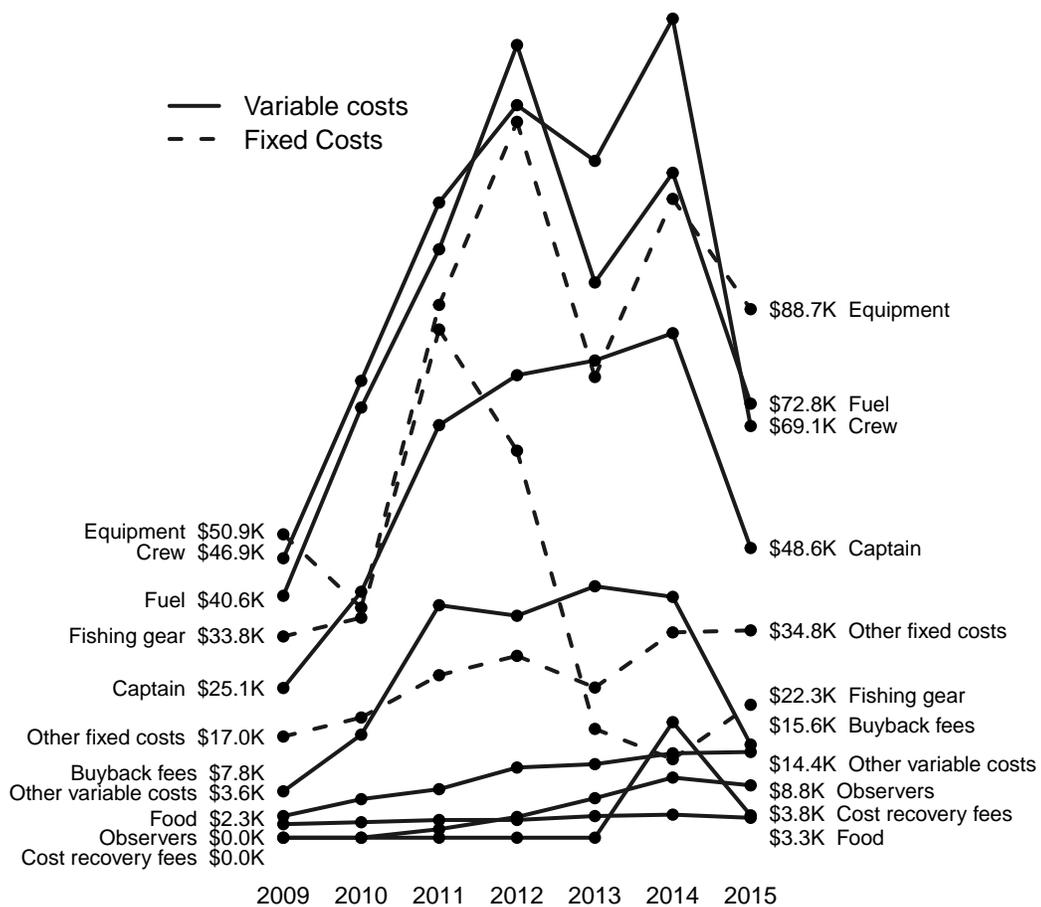


Figure 13: Average fixed (dashed line) and variable costs (solid line) per vessel in the At-sea Pacific whiting fishery (thousands of 2015 \$).

Shoreside Pacific whiting

Twenty-two vessels participated in the Shoreside Pacific whiting fishery in 2015. This fishery targets mainly Pacific whiting (97.9% of total landings by weight, Figure 14). In 2015, the bycatch rate in the Shoreside Pacific whiting fishery (2.1%) was higher than the At-sea fishery, amounting to 2.77 million pounds. The majority of the bycatch consisted of rockfish, sardines, sharks, skates and rays, and shad. Not all species caught in this fishery must be “covered” with quota, but of the quota species, the most common were widow rockfish (661,000 pounds), yellowtail rockfish (205,000 pounds), and splitnose rockfish (189,000 pounds).

Revenue

Participation in the Shoreside Pacific whiting fishery resulted in \$9.98 million in total ex-vessel revenue in 2015 (Figure 15 (top)). Vessels that participated in the Shoreside Pacific whiting fishery

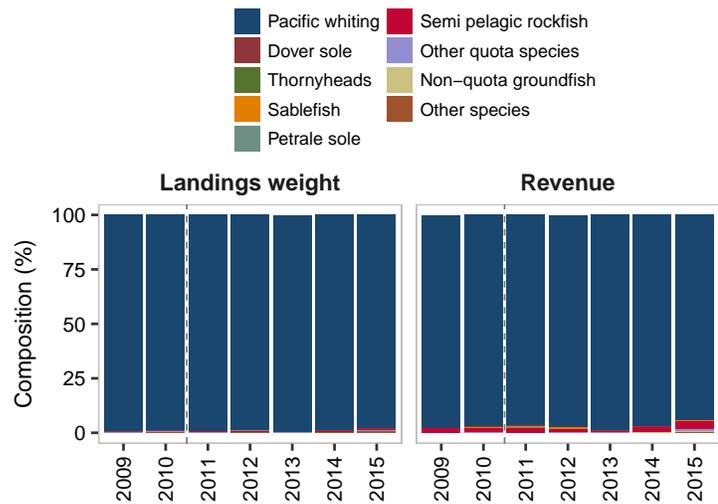


Figure 14: The species composition of catch (left) and revenue (right) in the Shoreside Pacific whiting fishery (%). Dashed line represents the beginning of the catch share program.

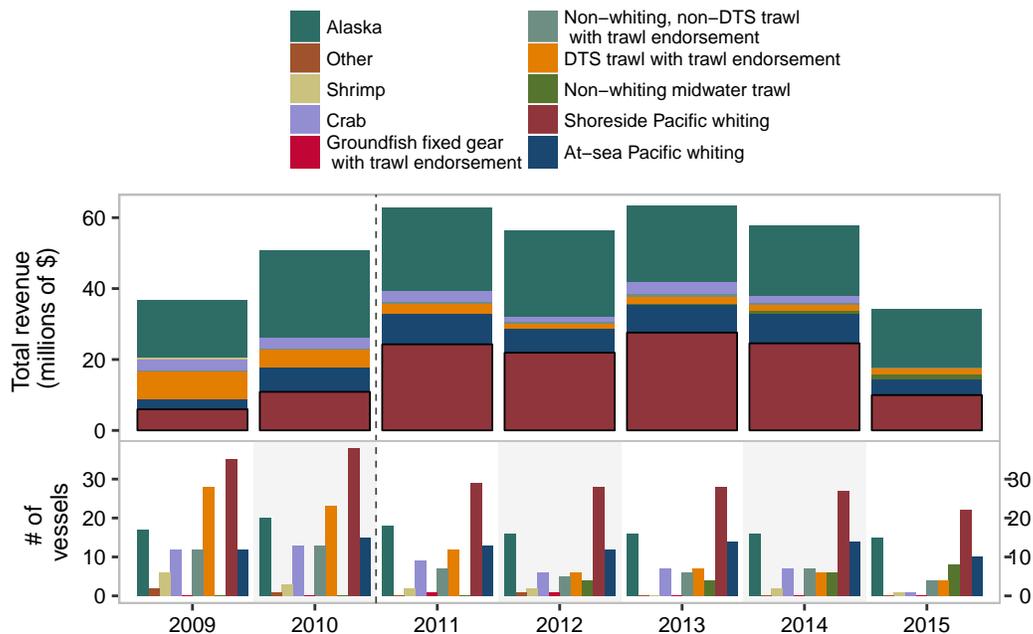


Figure 15: Total ex-vessel revenue earned by vessels that participated in the Shoreside Pacific whiting fishery (black outline) by fishery (millions of 2015 \$) (top) and number of vessels that participated in each fishery (bottom). Dashed line represents the beginning of the catch share program. *Some values are suppressed to protect confidential data.

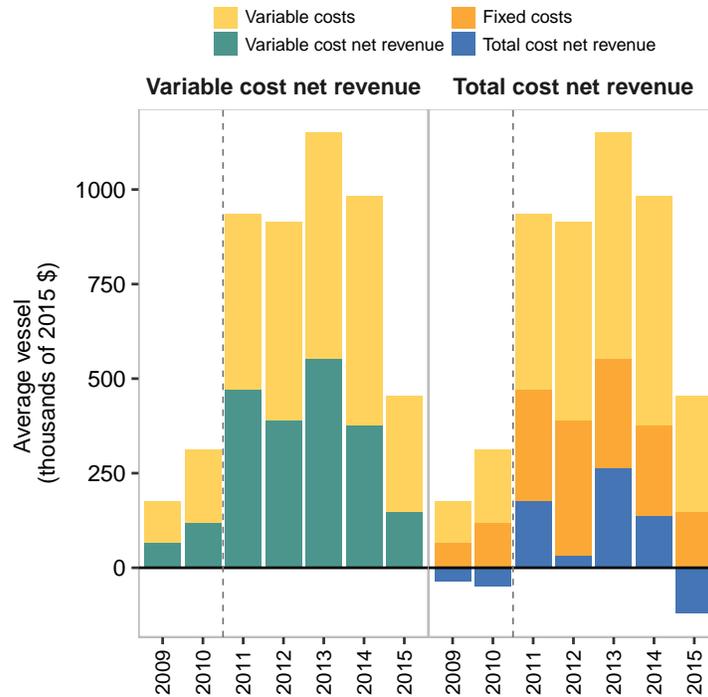


Figure 16: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the Shoreside Pacific whiting fishery (thousands of 2015 \$). Dashed line represents the beginning of the catch share program.

also earned revenue from fishing in Alaska (45.8% of total revenue) and fishing in the At-sea Pacific whiting fishery (12.7% of total revenue). The total revenue earned by Shoreside Pacific whiting vessels was lower than any year since 2009. This was a result of decreases in total ex-vessel revenue on the West Coast and in Alaska, and a decrease in the total number of vessels fishing in the fishery. The number of Shoreside Pacific whiting vessels decreased from an average of 28 vessels since the catch share program was implemented (2011-2014) to 22 in 2015.

Average Net Revenue

Average revenue from participating in the Shoreside Pacific whiting fishery was \$454,000, average variable cost net revenue was \$146,000, and average total cost net revenue was -\$120,000 in 2015 (Figure 16). Total cost net revenue was negative for the first time since the catch share program was implemented. The increases in ex-vessel revenue during the first four years of the catch share program was a result of an increase in the catch limit for Pacific whiting, especially in 2011, and steadily increasing ex-vessel prices paid by first receivers to the shoreside fleet. Ex-vessel revenue, variable cost net revenue, and total cost net revenue were all highest in 2013 from a combination of a high catch limit and relatively low fuel costs.

Average Costs

The single largest cost in 2015 was for vessel and on-board equipment (\$212,000 per vessel), followed by crew (\$93,600), and fuel (\$83,700) (Figure 17). The average amount spent on vessel and on-board equipment in 2015 was nearly triple compared to the pre-catch share period; and crew compensation and captain compensation in 2014 were five times the amount spent in 2009 and 2010. However, crew and compensation dropped 54% between

2014 and 2015, as a result of the decrease in ex-vessel revenue and net revenue. On a per unit basis (not shown in the figure), crew compensation increased from \$1.38 per hundred pounds delivered relative to the pre-catch share period to \$1.63 per hundred pounds in 2015, and captain compensation increased from \$0.91 per hundred pounds delivered in 2009 to \$1.06 per hundred pounds in 2015. In contrast, fuel cost per hundred pounds was just under \$1.50 in during the pre-catch share period as well as in 2015.

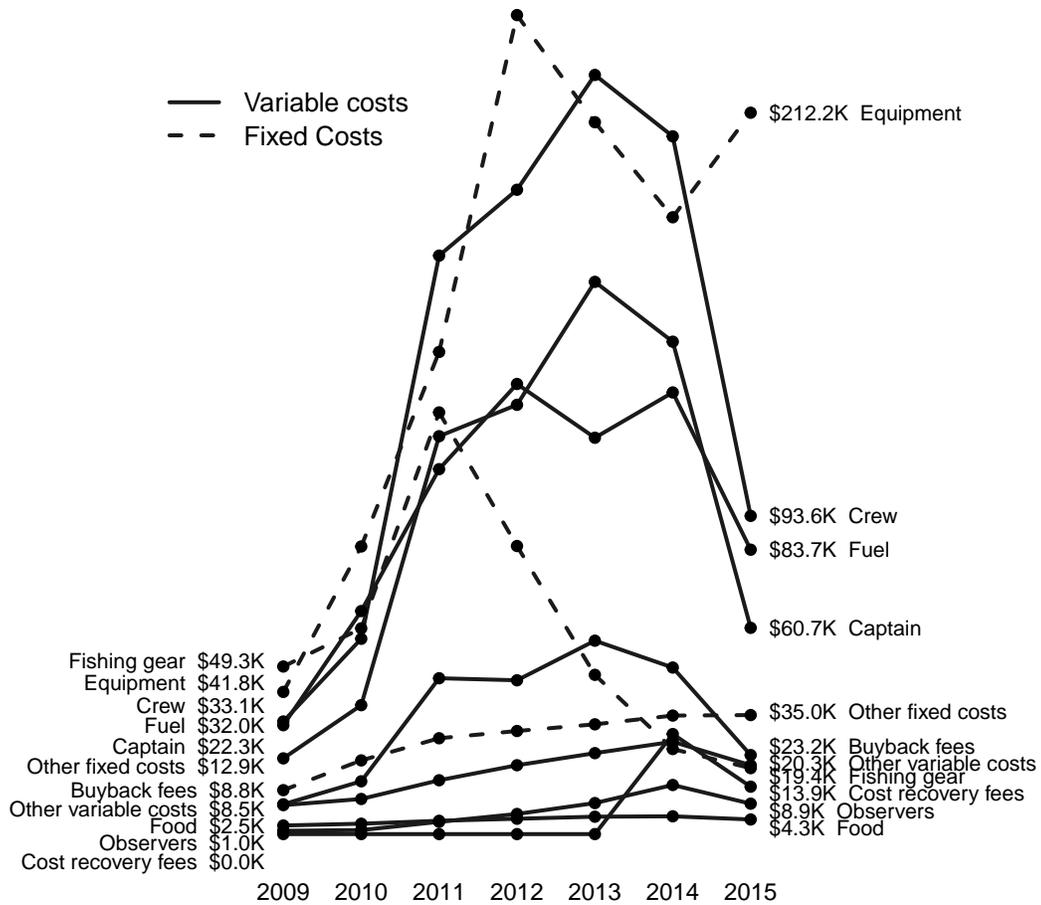
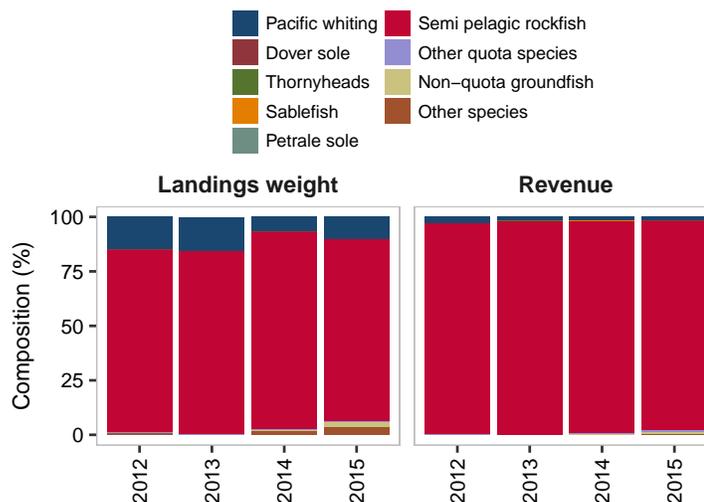


Figure 17: Average fixed (dashed line) and variable costs (solid line) per vessel in the Shoreside Pacific whiting fishery (thousands of 2015 \$).

Non-whiting midwater trawl

Vessels only began participating in the Non-whiting midwater trawl fishery in 2012, as a result of increased quota for widow rockfish. In 2015, thirteen vessels participated. This fishery targets mainly yellowtail rockfish (58% of catch) and widow rockfish (24% of catch in 2015) using midwater trawl gear. This is the same gear used to target Pacific whiting. Yellowtail rockfish constituted the largest revenue source (70% of revenue in 2015), followed by widow rockfish (24%) (Figure 18).



Revenue

The ex-vessel revenue from participating in the Non-whiting midwater trawl fishery makes up a small share (11.3%) of total revenue for those vessels. Vessels that participated in the Non-whiting midwater trawl fishery also earned revenue from the Shoreside Pacific whiting fishery (23.5% of revenue) as well as both bottom trawl fisheries (29.1%) (Figure 19). In 2015, there were four vessels that participated in both the Non-whiting midwater trawl fishery as well as in Alaska.

Figure 18: The species composition of catch (left) and revenue (right) in the Non-whiting midwater trawl (%). Vessels did not begin participating in this fishery until 2012.

Average Net Revenue

Average revenue from participating in the Non-whiting midwater trawl fishery was \$135,000, average variable cost net revenue was \$58,100, and average total cost net revenue was \$37,500 in 2015 (Figure 20). In 2015, the average ex-vessel revenue was higher than the previous three years. This was at least partially a result of vessels seeking new fishing opportunities when the whiting fishery was less profitable.

Average Costs

The single largest cost in 2015 was for crew compensation (\$26,700 per vessel), followed by captain compensation (\$20,400), and vessel and on-board equipment (\$10,600) (Figure 21).

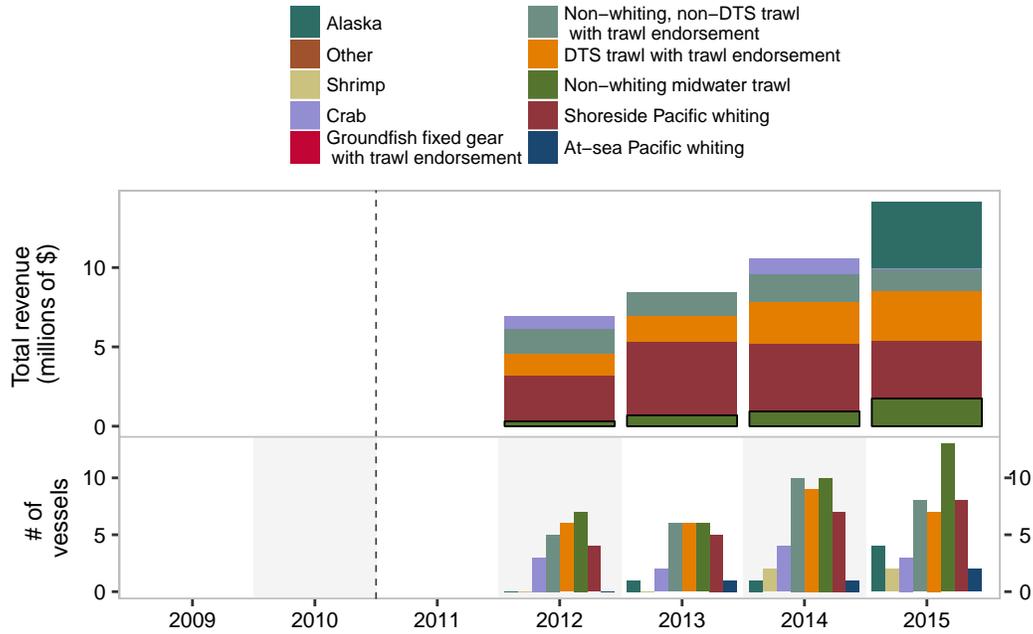


Figure 19: Total ex-vessel revenue earned by vessels that participated in the non-whiting midwater trawl fishery (black outline) by fishery (millions of 2015 \$) (top) and number of vessels that participated in each fishery (bottom). Vessels did not begin participating in this fishery until 2012. *Some values are suppressed to protect confidential data.

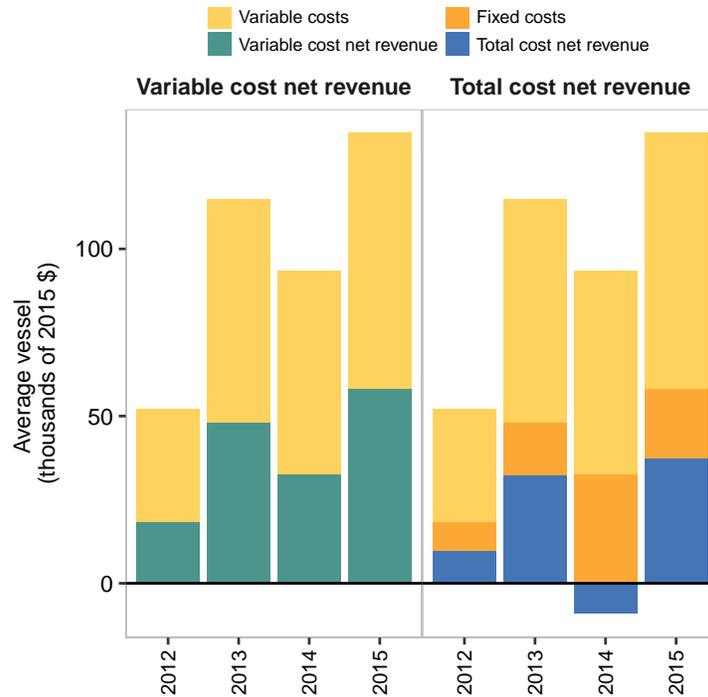


Figure 20: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the Non-whiting midwater trawl (thousands of 2015 \$). Vessels did not begin participating in this fishery until 2012.

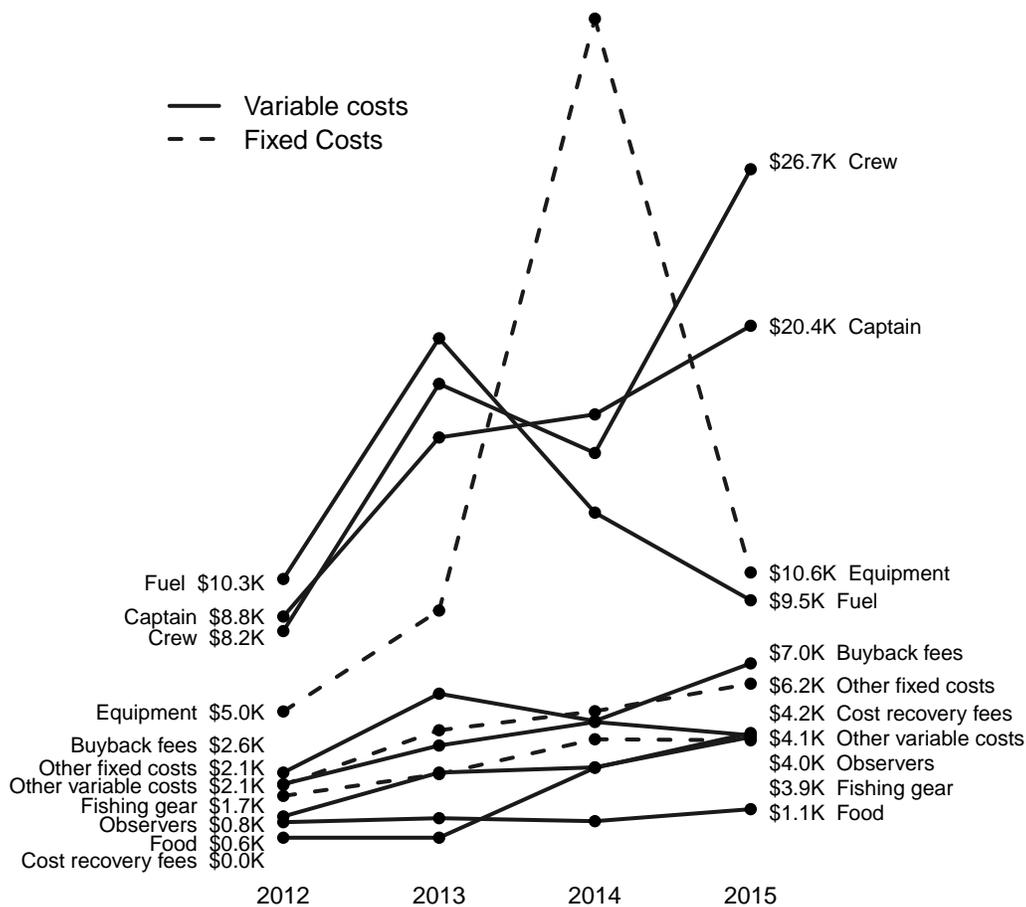


Figure 21: Average fixed (dashed line) and variable costs (solid line) per vessel in the Non-whiting midwater trawl fishery (thousands of 2015 \$).

DTS trawl with trawl endorsement

Fifty-one vessels participated in the DTS trawl with trawl endorsement fishery in 2015. The largest number of vessels exited the fishery between 2013 and 2014 (14 vessels), but the number remained constant between 2014 and 2015. In 2014 and 2015, there were less than half the number of vessels that fished in the fishery during the pre-catch share period. This fishery targets mainly dover sole (47.1% of catch in 2015), thornyheads (12%), and sablefish (11%) using trawl gear. Sablefish constituted the largest revenue source (35% of revenue in 2015) (Figure 22). The fishery catches smaller amounts of other quota species (including rockfish, 14.5% of catch), and marginal amounts of other non-quota groundfish and other species. The relative share of dover sole landings has stayed consistent through time, ranging from 48% to 53% of catch by weight. The relative share by ex-vessel revenue has varied more, ranging from 29% to 39%. The relative share of sablefish revenue has decreased since 2011, mainly due to a decrease in price compared to 2011.

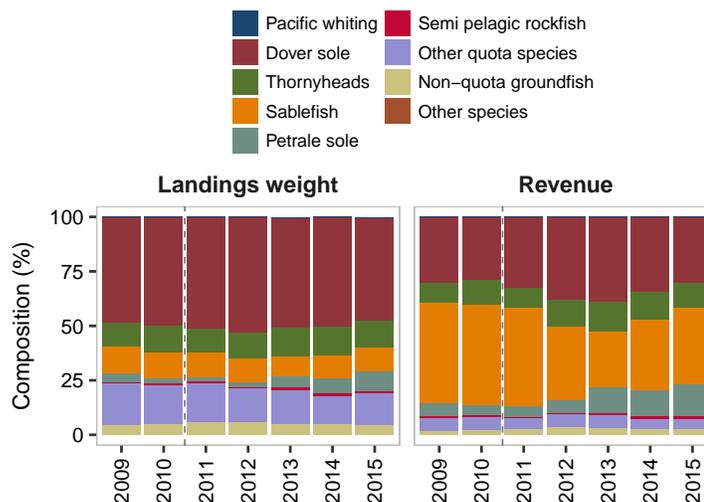


Figure 22: The species composition of catch (left) and revenue (right) in the DTS trawl with trawl endorsement fishery (%). Dashed line represents the beginning of the catch share program.

Revenue

Vessels that participated in the DTS trawl with trawl endorsement fishery also earn revenue from crab and shrimp, and to a much smaller extent, the Non-whiting non-DTS trawl and Shoreside Pacific whiting fisheries (Figure 23). In 2015, participation in the shrimp fishery made up 42% of total revenue. There was almost no fishing in the crab fishery in 2015 because the crab season did not open in most areas because of consumer safety concerns related to domoic acid. Of the vessels that participated in the DTS trawl with trawl endorsement fishery, 28 vessels also participated in the shrimp fishery. Although some vessels fished in Alaska in 2009-2011 (10-11 vessels), fewer than four vessels have fished in Alaska since 2011. The total revenue for all activities for DTS trawl with trawl endorsement vessels was highest in 2009 (\$62.4 million) and lowest in 2012 (\$44.8 million) (Figure 23). Total revenue was nearly the same in 2014 (\$46.2 million) and 2015 (\$47.1 million), despite the absence of the crab fishery and a much smaller shoreside whiting fishery. Decreases in earnings from those fisheries were largely offset by increases in earnings from the shrimp fishery.

Average Net Revenue

Average revenue from participating in the DTS trawl with trawl endorsement fishery was \$317,000, average variable cost net revenue was \$123,000, and average total cost net revenue was \$75,000 in 2015 (Figure 24). Average variable cost net revenue has been higher than the pre-catch share period (\$97,500) in every year since the catch share program was implemented. Average total cost net revenue has been higher than the pre-catch share period, with the exception of 2012 when it was \$105,000.

Average Costs

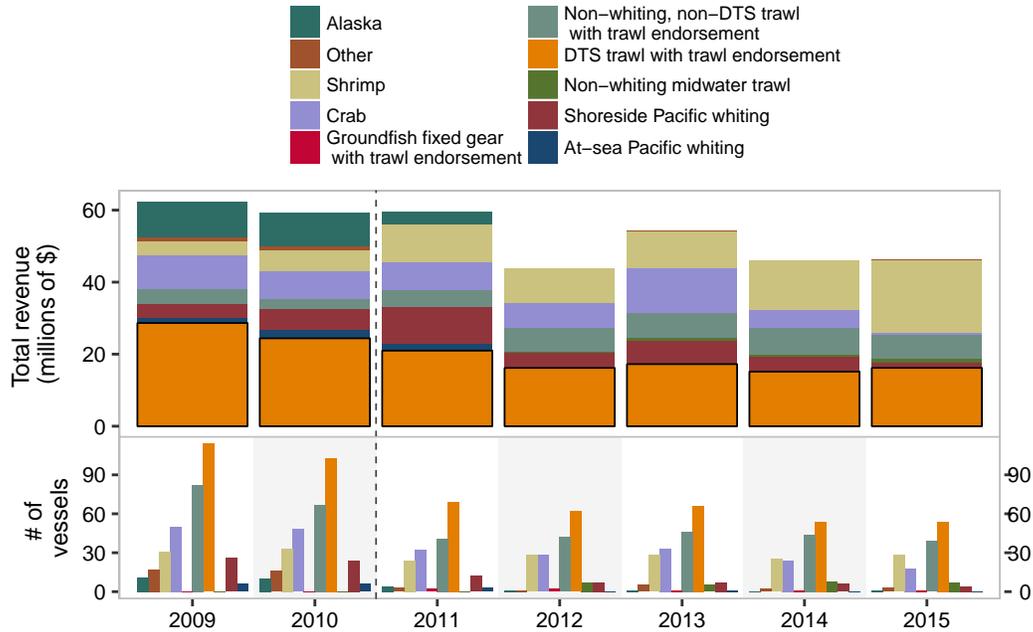


Figure 23: Total ex-vessel revenue earned by vessels that participated in the DTS trawl with trawl endorsement fishery (black outline) by fishery (millions of 2015 \$) (top) and number of vessels that participated in each fishery (bottom). Dashed line represents the beginning of the catch share program. *Some values are suppressed to protect confidential data.

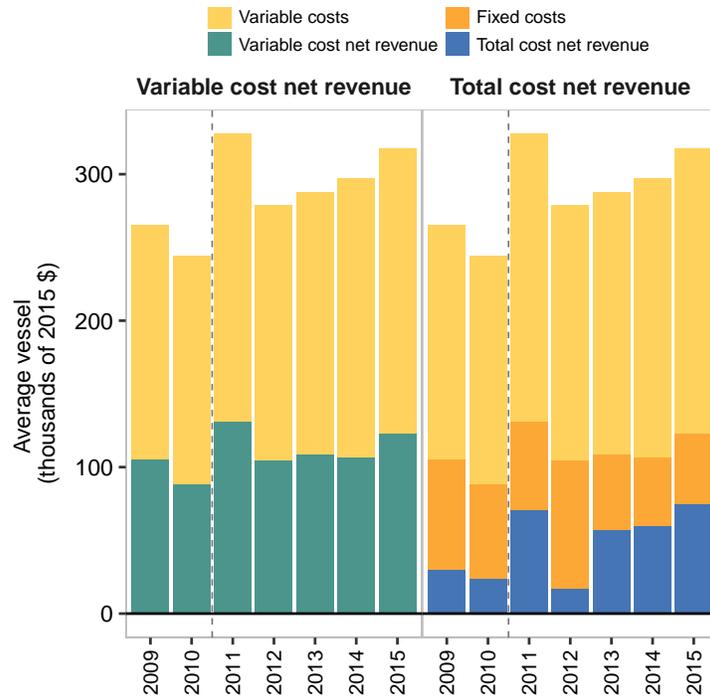


Figure 24: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the DTS trawl with trawl endorsement fishery (thousands of 2015 \$). Dashed line represents the beginning of the catch share program.

The single largest cost in 2015 was for crew compensation (\$67,400 per vessel) followed by captain compensation (\$50,600) (Figure 25). Average fuel and equipment expenses were both just over \$24,000. The cost per pound in the DTS trawl with trawl endorsement fishery has experienced very few increases since the implementation of the catch share program. In 2015, the average cost per pound for crew was 23% higher than during the pre-catch share period and captain wage costs were 17% higher. The largest percentage decrease was average cost per pound on fishing gear (53% decrease) from \$0.04 during the pre-catch share period to \$0.02 in 2015.

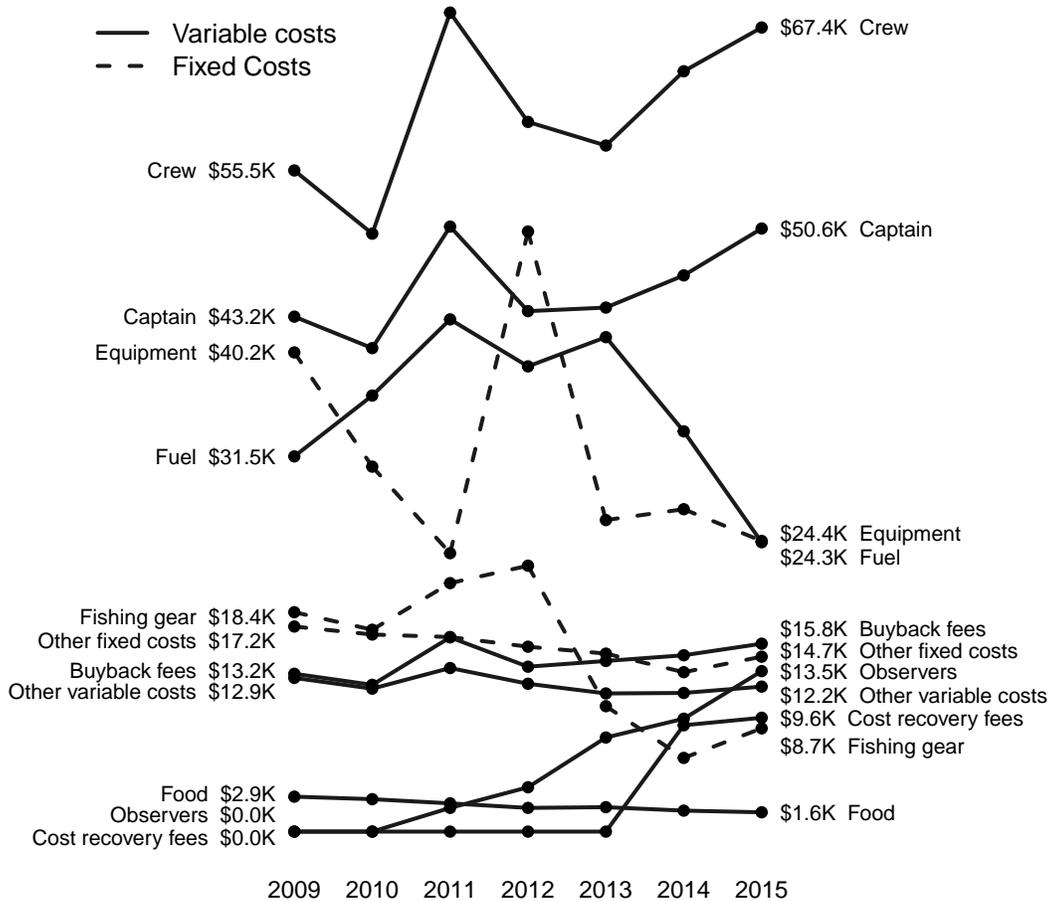


Figure 25: Average fixed (dashed line) and variable costs (solid line) per vessel in the DTS trawl with trawl endorsement fishery (thousands of 2015 \$).

Non-whiting, non-DTS trawl with trawl endorsement

Forty-six vessels participated in the Non-whiting, non-DTS trawl with trawl endorsement fishery in 2015. Overall, this fishery has a lower value (Figure 5) than the other catch share fisheries. Vessels in this fishery target mostly petrale sole (28.4%), other quota species (27.2%), and dover sole (22%). The most common “other quota species” are Pacific cod, arrowtooth flounder, and rex sole. Non-quota groundfish are also caught in relatively large volumes (Figure 26).

Revenue

Participation in the Non-whiting, non-DTS trawl with trawl endorsement fishery makes up a minor portion of total revenue for participants in that fishery (Figure 27) in most years. However in 2015, as a result of the closure of the crab fishery and very little participation in the Shoreside Pacific whiting fishery, vessels earned 24% of their total revenue from the Non-whiting, non-DTS trawl with trawl endorsement fishery. These vessels also participate in the DTS trawl with trawl endorsement, shrimp, and crab fisheries. A few vessels fished in Alaska in the early years of the program, but since 2013, none of the Non-whiting, non-DTS trawl vessels have fished in Alaska (Figure 27). In 2015, 67% of total revenue came from participation in the shrimp and DTS trawl with trawl endorsement fisheries.

Average Net Revenue

The average revenue, variable cost net revenue and total cost net revenue from participating in the Non-whiting, non-DTS trawl with trawl endorsement fishery have steadily increased since the implementation of the catch share program. Average revenue was \$188,000, variable cost net revenue was \$70,800, and total cost net revenue was \$47,800 in 2015 (Figure 28). Both net revenue measures were greater in the catch shares years, variable cost net revenue increased 6 fold between the pre-catch share period and 2015, and total cost net revenue was less than zero during the pre-catch share period.

Average Costs

The largest expense in 2015 was for crew compensation (\$37,600 per vessel), followed by captain compensation (\$31,000), and fuel (\$13,000). Costs on crew compensation and captain compensation per pound increased by 35% and 41%, respectively, in 2015 compared to the pre-catch share period. In contrast, the cost per pound for fuel decreased 51% between the pre-catch share period and 2015.

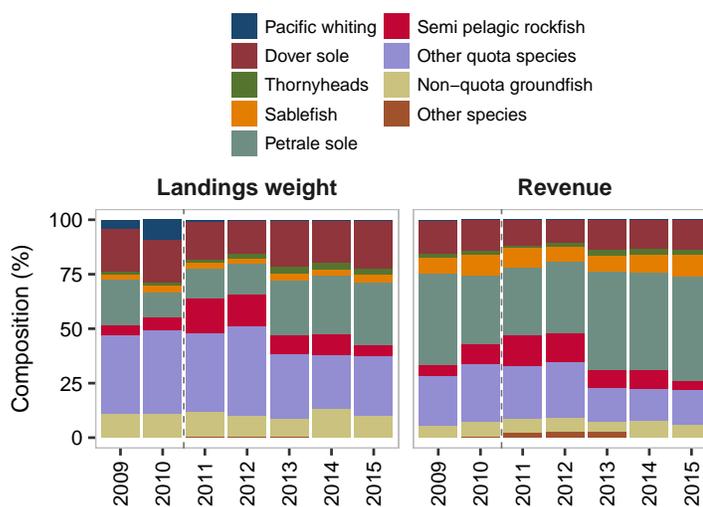


Figure 26: The species composition of catch (left) and revenue (right) in the Non-whiting, non-DTS trawl with trawl endorsement fishery (%). Dashed line represents the beginning of the catch share program.

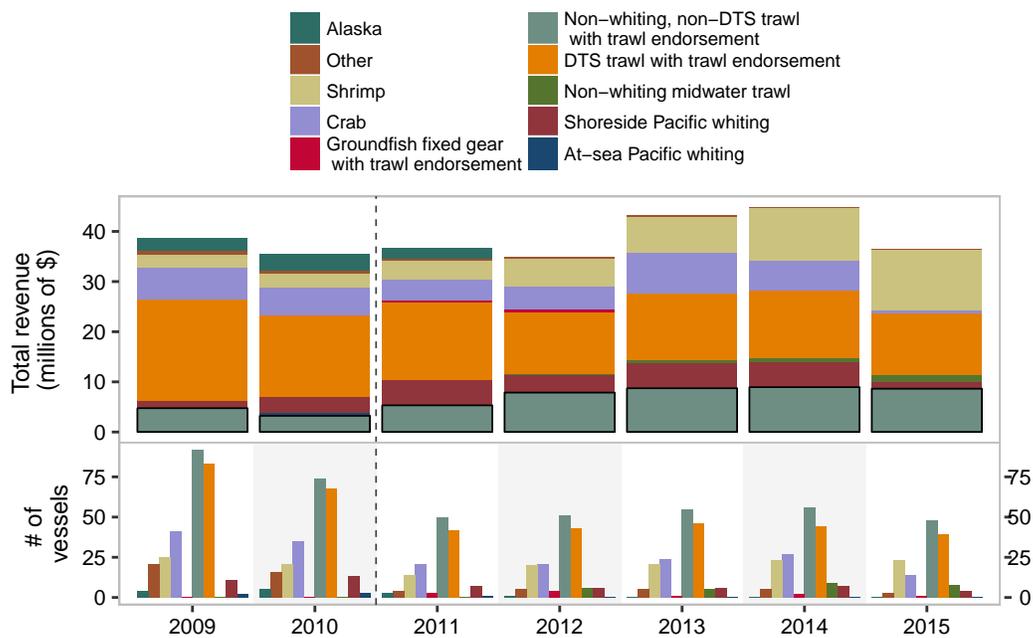


Figure 27: Total ex-vessel revenue earned by vessels that participated in the Non-whiting, non-DTS trawl with trawl endorsement fishery (black outline) by fishery (top) and number of vessels that participated in each fishery (bottom). Dashed line represents the beginning of the catch share program. *Some values are suppressed to protect confidential data.

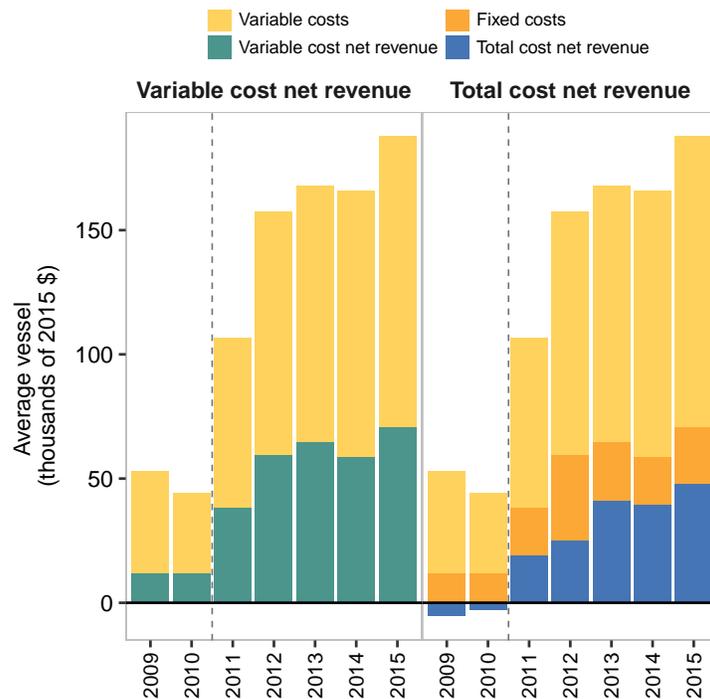


Figure 28: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the Non-whiting, non-DTS trawl with trawl endorsement fishery (thousands of 2015 \$). Dashed line represents the beginning of the catch share program.

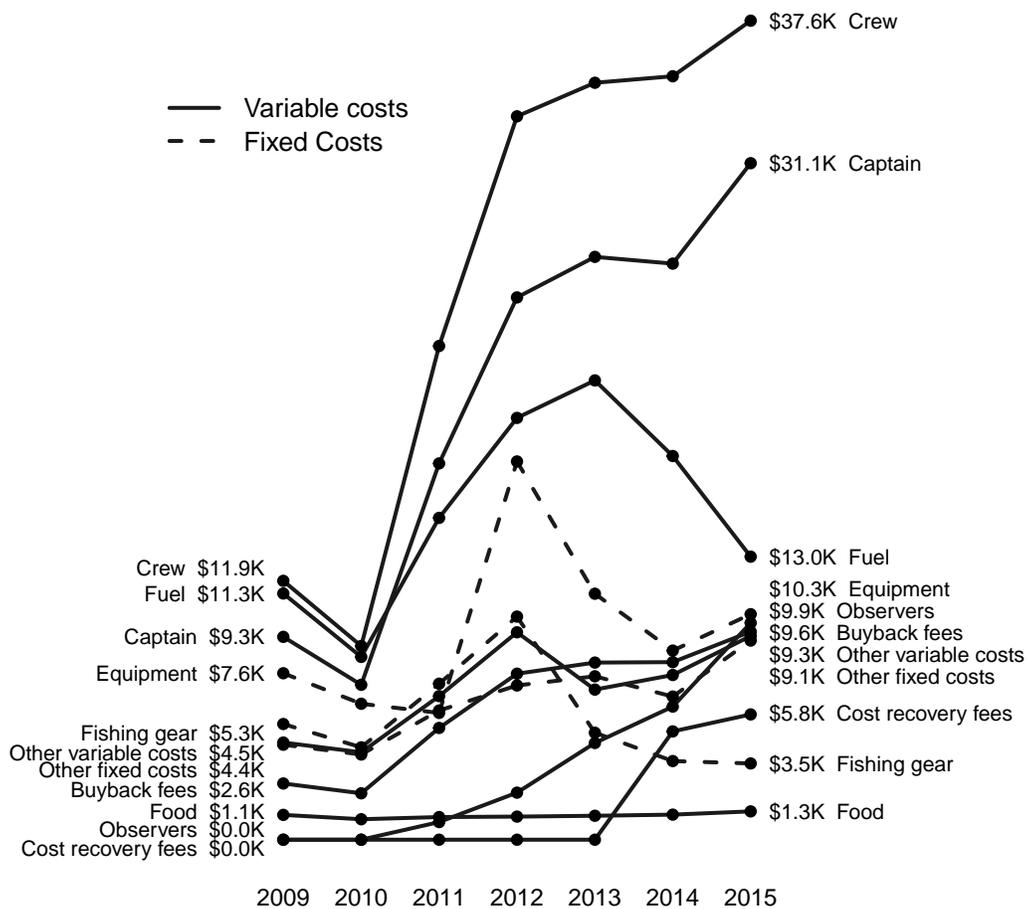


Figure 29: Average fixed (dashed line) and variable costs (solid line) per vessel in the Non-whiting, non-DTS trawl with trawl endorsement fishery (thousands of 2015 \$).

Groundfish fixed gear with trawl endorsement

In the first two years of the catch share program, 26 vessels fished with sablefish trawl quota using fixed gear. Since then, the number of vessels has ranged from 18 to 21. This fishery targets almost exclusively sablefish (96% of catch in 2015) (Figure 30). In 2009 and 2010, there was a small number of vessels that fished in an Exempted Fishing permit fishery, fishing with fixed gear with limited entry trawl permits. This program was sponsored by the Nature Conservancy.¹³

As described in the Fishery Participation section (page 13), unlike the other fisheries, this fishery uses fixed gear (either fish pots or longlines). Generally, the vessels fishing with fish pots are vessels that have historically fished with trawl gear and have switched to using fish pots to harvest groundfish, almost entirely sablefish. The vessels fishing with longline gear participate primarily in the limited entry fixed gear sablefish fishery and have acquired a limited entry trawl permit and quota in order to target sablefish allocated to the trawl fishery. Since the first year of the catch share program, the number of vessels fishing with fish pots decreased 28% to 13 vessels in 2015, and the number of vessels fishing with longlines has decreased 57% to six vessels (one vessel used both fixed gears).

Revenue

Vessels that participated in the Groundfish fixed gear with trawl endorsement fishery also earned revenue from fishing in Alaska, the limited entry fixed gear sablefish fishery, and fishing in Other fisheries (Figure 31 (top)). In 2011 and 2012, a large proportion of total revenue for the Groundfish fixed gear with trawl endorsement vessels came from fishing in Alaska. There are now too few vessels that fish in both Alaska and in the Groundfish fixed gear with trawl endorsement fishery to report the Alaskan revenue. Vessels earn revenue from participating in the Crab fishery (Figure 31). Of the vessels that participated in the Groundfish fixed gear with trawl endorsement fishery, 15 vessels also participated in the Other fisheries category (Figure 31 (bottom)), which is predominantly the Fixed gear with fixed gear endorsement fishery (75-90%).

Average Net Revenue

Average revenue from participating in the Groundfish fixed gear with trawl endorsement fishery was \$289,000, average variable cost net revenue was \$112,000, and average total cost net revenue was \$47,900 in 2015 (Figure 32). Average revenue was highest in 2011 due to high sablefish prices (Figure 8), but the average ex-vessel revenue in 2015 was only 8.1% less than 2011. The average ex-vessel price for sablefish was \$2.32, the highest it has been

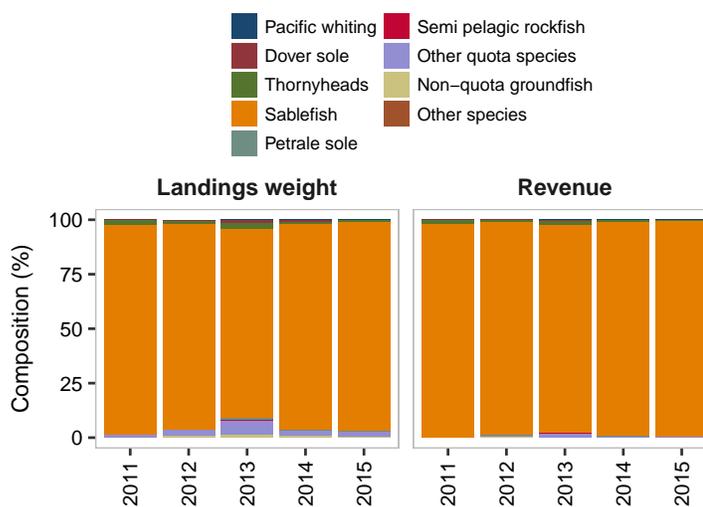


Figure 30: The species composition of catch (left) and revenue (right) in the Groundfish fixed gear with trawl endorsement fishery (%). The data for 2009 and 2010 are not shown because they represent a small group of vessels participating in an exempted fishery permit program.

¹³ For more information, see: www.opc.ca.gov/2010/05/central-coast-groundfish-project/.

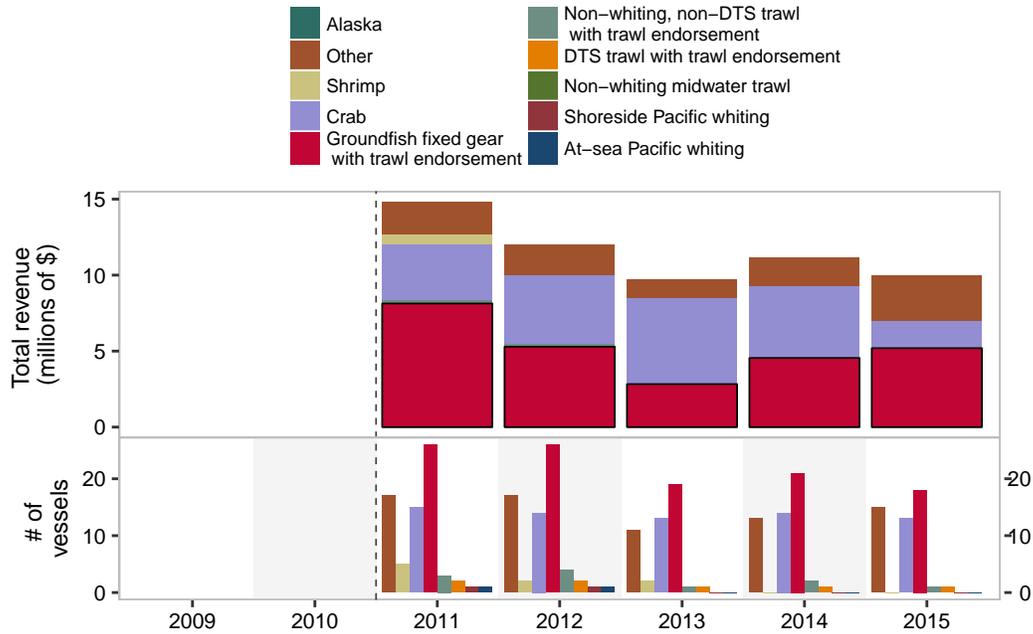


Figure 31: Total ex-vessel revenue earned by vessels that participated in the Groundfish fixed gear with trawl endorsement fishery (black outline) by fishery (millions of 2015 \$) (top) and number of vessels that participated in each fishery (bottom). *Some values are suppressed to protect confidential data.

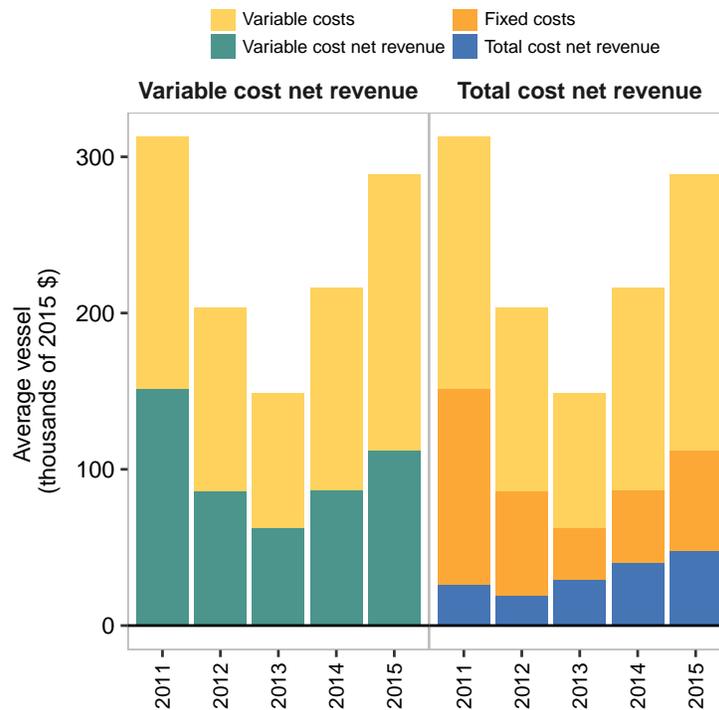


Figure 32: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the Groundfish fixed gear with trawl endorsement fishery (thousands of 2015 \$). Dashed line represents the beginning of the catch share program.

since 2011 (\$2.90). The total cost net revenue in 2015 was higher than 2011 as a result of lower average costs associated with vessel and on-board equipment in 2015.

Average Costs

The largest cost in 2015 was crew compensation (\$71,100 per vessel), followed by vessel and on-board equipment (\$26,900), and captain compensation (\$26,900) (Figure 33). Unlike the trawl fisheries, fixed gear vessels use less fuel, but incur costs on bait that is not required in the trawl fishery. Compared to the DTS trawl with trawl endorsement fishery that spent \$710 per day on fuel, the fixed gear vessels only spent \$445 per day. In 2015, the average expenses on bait were \$18,100 per vessel, or \$546 per day.

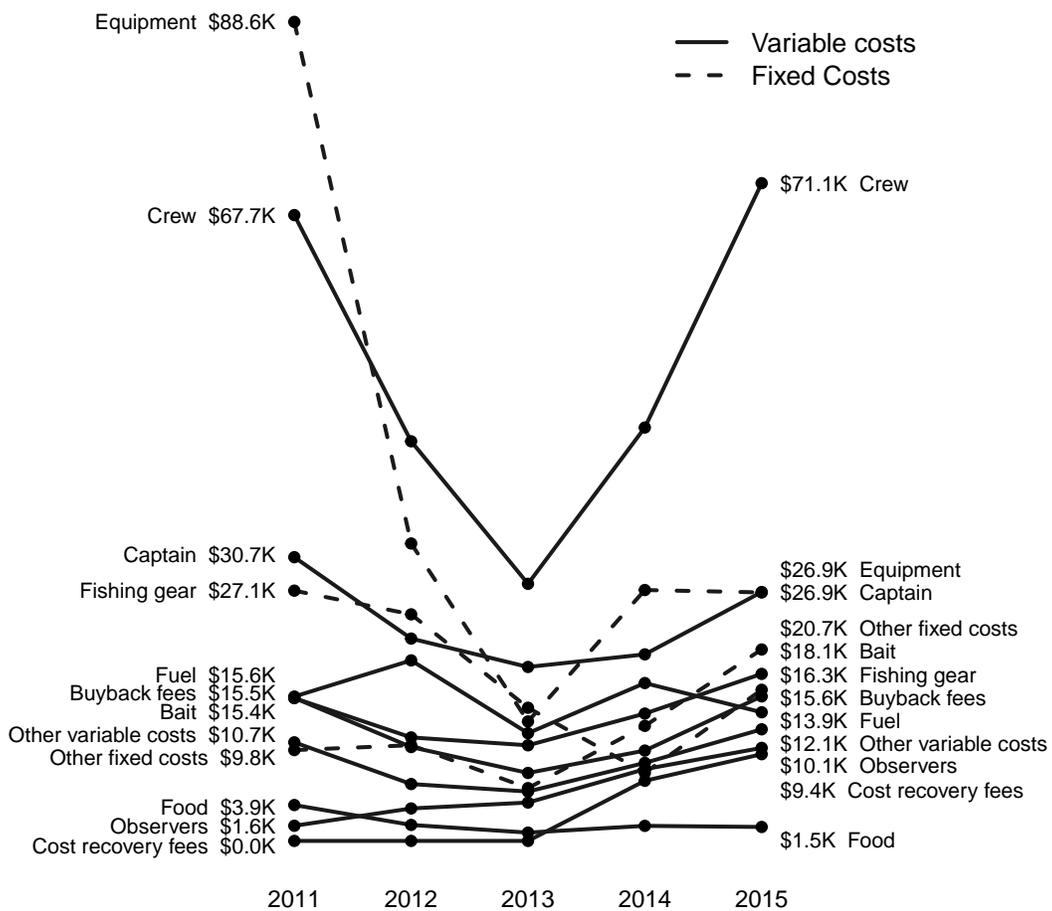


Figure 33: Average fixed (dashed line) and variable costs (solid line) per vessel in the Groundfish fixed gear with trawl endorsement fishery (thousands of 2015 \$). The costs for 2009 and 2010 are not shown here because they were collected from a small group of vessels participating in an exempted fishing permit fishery.

Regional Analysis

In addition to examining how the catch share program is affecting vessels by fishery, it is also important to understand how the effects of the catch share program are being experienced in different regions along the coast. For the purposes of this analysis, we analyze vessels by state: Washington (includes a very small number of vessels that listed Alaska as their home port), Oregon (Newport, Astoria, Tillamook, Brookings, Coos Bay) and California (Crescent City, Eureka, Fort Bragg, San Francisco, Monterey, Morro Bay). Similar to the rest of the Overview, vessels are included in the analysis for a specific year if they fished with a limited entry trawl permit in that year. Vessels were assigned to a state based on the home port declared on their EDC form.

Washington

The number of vessels with a home port in Washington has remained very consistent, ranging from 16 vessels (2012, 2013, 2015) to 19 vessels (2009) (Figure 34). In 2015, there were 16 vessels, nine of which fished in Alaska, a decline from 11 in 2010 and 2011 and 10 in 2013 and 2014.

In Washington, the majority of EDC vessels' earnings come from Alaska. Since the beginning of the EDC Program, the highest proportion of revenue from Alaska occurred in 2009 (67% of total revenue), a result of low West Coast revenue in the years leading up to the implementation of the catch share program. Total West Coast earnings for these vessels was lowest in 2009 (\$6.46 million) and highest in 2012 and 2014 when total revenue was approximately \$20 million in both years. In addition to Alaska revenue, trawl vessels in Washington earn a significant proportion of their income from the whiting fisheries (both at-sea and shoreside). In 2015, as a result of low catch in the whiting fisheries, Washington vessels total earnings on the West Coast were less than half (\$10.2 million) the revenue from the previous year. The total revenue from the DTS trawl fishery has steadily decreased from \$2.09 million during the pre-catch share period to \$410,000 in 2015. At its highest, the DTS trawl fishery made up 13% of revenue (2009), but has been less than 2% since 2013.

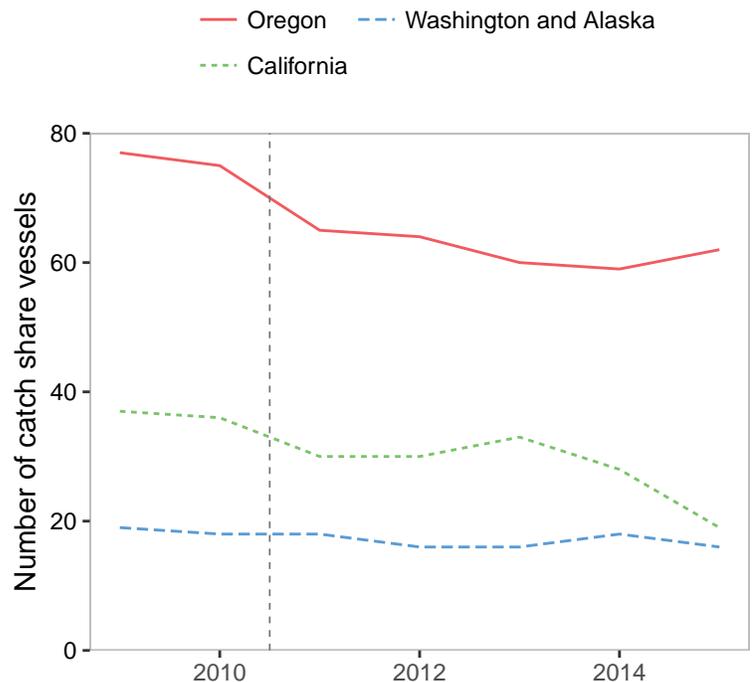


Figure 34: Number of catcher vessels participating in the catch share fisheries by home port region.

The average total cost net revenue from participation in West Coast fisheries for Washington vessels was \$173,000, a large increase over the pre-catch share period (\$5,150). The average total cost net revenue for these vessels was highest in 2013 (\$351,000). This large increase is mostly a result of higher revenue from whiting resulting from increases in the TAC compared to the pre-catch share period.

Oregon

In 2015, there were 62 vessels that fished in the catch share fisheries with home ports in Oregon, 12 of which also fished in Alaska (Figure 34). This was a 18% decrease from the 76 vessels during the pre-catch share period (Figure 34). There had been a steady decrease in the number of Oregon vessels fishing in catch share fisheries since 2009, however, in 2015, there were three more vessels that fished compared to 2014.

The vessels that have their home port in Oregon receive a large portion of their income from fishing in Alaska, but they also earn much more income from West Coast activities compared to Washington vessels. In contrast to Washington vessels, only 19% of Oregon vessels go to Alaska. In 2015, fishing in Alaska made up 20% of total revenue, a decrease from the pre-catch share period of 31%. Similar to Washington, this decrease in total share of revenue from Alaska is a result of relative increases in West Coast revenue. In 2009, total West Coast earnings for these vessels was \$34.4 million compared to \$62.7 million and \$59.7 million in 2013 and 2014, respectively. The total West Coast revenue for Oregon vessels in 2015 (\$56.1 million) was lower than any other year since the implementation of the catch share program, with the exception of 2012. In 2015, 28% of West Coast earnings came from shrimp, followed by the DTS trawl with trawl endorsement fishery (15%), and the shoreside whiting fishery (10%).

The average total cost net revenue for Oregon vessels increased compared to the pre-catch share period. It was highest in 2013 (\$265,000), a 7 fold increase compared to the pre-catch share period. Total cost net revenue in 2015 was 25% less than 2014, but still 115% higher than pre-catch share levels.

California

In 2015, there were 19 vessels with home ports in California, representing a 46% decrease from the 36 vessels during the pre-catch share period and a 32% decrease from 2014 (Figure 34). Total ex-vessel revenue has increased 17% for these vessels between the pre-catch share period and 2014, but decreased 35% between 2014 and 2015. This decrease was a result of a combination of a drop in number of vessels participating in the catch share program, as well as the absence of the crab fishery in 2015. In most years, crab earnings represent between 20% (2009) and 41% (2012) of total earnings, but in 2015, crab earnings only made up 8% of total earnings (end of the 2014-2015 crab season).

Throughout the time period 2009-2015, ex-vessel revenue from crab and DTS trawl with trawl endorsement has made up at least 60% of total revenue for California vessels. However, the relative importance of these fisheries depends on the status of the crab fishery. During the pre-catch share period the DTS fishery was dominant, making up 40-50% of total ex-vessel revenue for the vessels. This switched in 2012 and 2013 when crab earnings made up almost 40% of total revenue. Crab earnings decreased 35% between 2013 and 2014 and then another 81% in 2015, resulting in DTS earnings again dominating the ex-vessel revenue for California vessels. Earnings from fishing in the DTS trawl with trawl endorsement fishery decreased from 2009 through 2012, but has steadily increased since. Similarly, the Non-whiting, non-DTS trawl fishery decreased during the beginning of the catch share program, but has steadily increased since 2012. In 2015, non-whiting catch share earnings (DTS trawl with trawl endorsement and non-whiting, non-DTS trawl endorsement) represented 73% of total earnings of California vessels.

The average total cost net revenue per California vessel was higher than the pre-catch share period in all years since the program was implemented, except for 2012 when total cost net revenue was only \$3,030. This was the result of a spike in average fixed costs per vessel in 2012 (\$44,500 compared to \$21,300) during the pre-catch share period. Total cost net revenue was \$91,000 in both 2011 and 2014, but decreased to \$73,000 in 2015.

Catcher Vessel Report

CATCHER VESSEL REPORT

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Catcher Vessel Data Summaries

1 Introduction

1.1 Background

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

The Economic Data Collection (EDC) Program² was implemented as part of these new regulations to monitor the economic effects of the catch share program. Annual economic data submissions are required from all fishery participants: catcher vessels, motherships, catcher-processors, and first receivers and shorebased processors §50 CFR 660.114. Baseline, pre-catch share, data were submitted in 2011 for the 2009 and 2010 operating years. Data for the first year the fishery operated under the catch share program (2011) were submitted in 2012. The most recent data (2015) were collected in 2014.

This report summarizes the 2009-2015 EDC catcher vessel 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. Prior to the EDC Program, voluntary cost earnings surveys were available for 64% of the shoreside catcher vessels with limited entry groundfish permits with trawl endorsements (trawl fleet) (2003-2004 collection³) and 57% of the fleet for the 2007-2008 collection.⁴ Moreover, no costs and earnings data were available for catcher vessels that delivered to motherships.

¹ Information about the Catch Share Program is available at http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

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

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

⁴ Lian, C.E. 2012. West Coast limited entry groundfish cost earnings survey: Protocol and results for 2008. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-121, 62 p.

1.2 Understanding the report

It is important to remember that the information presented in this report is for all vessels that were required to complete the EDC form, as described above. Throughout the report, these vessels are referred to as EDC vessels. The EDC vessels include: 1) vessels that have historically participated in the trawl fishery and currently still participate; 2) vessels that no longer participate in the trawl fishery but still have a limited entry trawl permit; and 3) vessels that have not historically had a limited entry trawl permit, but have now obtained one to participate in the gear switching program (use of fixed gear is allowed under the program).

The unit of analysis identified in the summary tables varies by the information summarized. There are three different units of analysis, “entities”, “vessels”, and “participants”. An “entity” is defined as a unique combination of an owner or lessee and vessel, whereas a “vessel” refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel. Therefore, multiple forms could be submitted for one vessel, because there were multiple owners or lessees. Finally, “participants” refers to the individuals who actually completed the report. Each summary table states whether the count of individuals represents entities or participants.

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. For example, in Table 9.1, for the 96 vessels that had expenses on ice, the mean expense in 2012 was \$6,400. Therefore, to calculate the average expense for ice for the entire fleet, one would need to multiply the mean by 96 and then divide by the total number of vessels (129).

The one major difference between the baseline forms (2009 and 2010) and 2011-current forms is that vessels that did not fish during the survey period were only required to fill out the first few pages of the form during the baseline collection. The vessels that did not fish in 2009 and 2010 only provided the vessel name, vessel ID, home port, length of the vessel, fuel capacity, and horsepower of main engines, contact information, and permit numbers. Starting with the 2011 forms, all participants have been required to complete the entire form to capture information such as capital investments and earnings from lease or sale of quota or permits.

One last guideline when interpreting the aggregated data is the use of fiscal year. Although participants are identified on a calendar year basis, they complete the form using information based on the fiscal year of the entity. In previous reports, the data were reported by fiscal year. This report reallocates the costs reported on the form to calendar year, primarily accomplished by using information from outside of the EDC Program (primarily fish tickets and At-Sea Hake Observer Program data). For the seven years of data collected from catcher vessels, 91% of entities used a fiscal year that is the same as the calendar year.

There is a 3-year lag for fully finalized EDC data, so data from the most recent displayed year (2015) should be considered preliminary. EDC forms are submitted by September 1 each year for the previous fiscal year (FY2011 data are received in September of 2012), allowing companies to “close their books” and file taxes before completing their EDC forms. The QA/QC process requires approximately 6 months. This means that 2011 EDC data were available in March 2013; however, there is one additional complication. Participants submit data by fiscal year which varies by company and may not completely overlap by calendar year. Although the reports are released at a 2-year lag, the data are not considered finalized until the following year once the complete set of data have been received and processed. As a result, finalized calendar year 2015 data will not be available until Spring 2018.

In order to provide information about the level of variability within each measure reported, a symbol is presented along with all means to indicate the range of the coefficient of variation. The stacked dots included in the tables provide information about the coefficient of variation (CV) of the mean. We use the following scoring:

- represents $CV < 0.5$,
- represents $0.5 \leq CV < 1.0$,
- ◑ represents $1.0 \leq CV < 2.0$, and
- ◒ represents $2.0 \leq CV$.

For 2009-2015, the highest CV s was 3.2 for capitalized expenditures and expenses on vessel and on-board equipment in 2015. This is reasonable because in a given year there will be a mix of vessels that make very few investments in their vessel and companies that performed complete overhauls of their vessels. These types of fixed costs are inherently heterogeneous across vessels and time. Other types of costs with high variability are purchase of limited entry trawl permits and earnings from lease or sale of permits and quota.

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 entities in order to show a summary statistic. The 90-10 rule requires that no single entity's response should comprise over 90 percent of all relevant responses. The tables show a "****" for data points where there were less than three entities reporting the information, and/or if one entity's responses accounted for greater than 90 percent of the average value. Zeroes are shown if all entities only reported zeroes and/or NAs. More information about how confidential data are protected in the EDC Program can be found in the Administration and Operations Report. Simple means are reported for statistics that denote the performance of an average entity (i.e., net revenue) while weighted means are reported for statistics that describe characteristics of the fishery (i.e., ex-vessel prices, markup, recovery rates, etc.). Additionally, "—" is used to denote fields where the question was not asked on the form in that survey year.

Unlike the Overview, all numbers reported in the Data Summaries are generated from the raw responses received from participants and, therefore, are in nominal dollars.

1.3 Purpose of the report

This report, like the other four EDC reports,⁵ has multiple objectives. The first is to provide basic economic data summaries that can be used for a variety of purposes associated with fishery management. Since much of the data collected are confidential under the 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, 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 and underlying data and analyses are 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.

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

- Economic Data Collection Program, Administration and Operations Report (May 2016)
- Economic Data Collection Program, Catcher-Processor Draft Report, 2009-2015 (June 2017)
- Economic Data Collection Program, Mothership Draft Report, 2009-2015 (June 2017)
- Economic Data Collection Program, First Receiver and Shorebased Processor Draft Report, 2009-2015 (June 2017)

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

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

1.4 Catcher vessel form administration

Completion of EDC forms is mandatory for participants in the catch share program. Any owner, lessee, or charterer of a catcher vessel registered to a limited entry groundfish permit with a trawl endorsement (limited entry trawl permit) is required to complete an EDC form §660.114(b)(1). For a permit owner, a limited entry trawl permit application (including MS/CV-endorsed limited entry trawl permit) 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, vessel account actions, or if own QS permit, issuance of annual QP or IBQ pounds) 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) and §660.140(e). For a vessel lessee or charterer, participation in the groundfish fishery (including, but not limited to, issuance of annual QP or IBQ pounds if own QS or IBQ) 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 2016, data were collected from all owners, lessees, and charters of a catcher vessel registered to a limited entry trawl permit during 2015. 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. Participants are identified using contact information provided by the Northwest Regional Office - Permit Office (Permit Office).

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 Permit Office, state fish tickets, the At-Sea Hake Observer Program data, and the Coast Guard.

1.5 About the survey participants

The EDC catcher vessel participants are identified as any owner, lessee, or charterer of a vessel with a limited entry trawl permit. This includes catcher vessels that deliver Pacific whiting to motherships at sea (At-sea whiting fishery), catcher vessels that deliver whiting to shorebased facilities (Shorebased whiting fishery), and catcher

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.

vessels that delivery non-whiting groundfish to shorebased facilities (Non-whiting groundfish fishery). In addition to these fisheries, many vessels also participate in one or both of the state fisheries for shrimp and crab. The other prevalent activity is fishing in Alaska.

The individuals that complete the forms are as diverse as the types of fisheries in which the vessels participate. This adds to the complexity of developing the EDC forms, because the questions on the forms must be understood by fishermen, family members, accountants, bookkeepers, and chief financial officers, to name a few. Oftentimes, the forms are completed by multiple individuals since different people manage different parts of the business. For example, the captain of the vessel might know best how much fuel the vessel uses on a daily basis, but the bookkeeper might have the best information about how much was spent on fuel during the year.

2 Survey Response Rates

For the 2015 Catcher Vessel EDC forms, 99.3% of all required forms were complete.⁷ This is an increase from the 2009 and 2010 collection, when 88.1% and 92.6% were complete, respectively (Table 2.1). To date, no entity⁸ has been unable to renew a limited entry trawl groundfish permit due to a missing or incomplete EDC form. This means that the remaining forms that were received incomplete or never received correspond to participants that are no longer in any West Coast federal fishery.

Table 2.1: Form status. Number of complete forms, number of incomplete forms, and number of forms that were never received (N = number of forms, % = percent of all forms due in survey year).

Form status	2009		2010		2011		2012		2013		2014		2015	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Complete	148	88.1%	150	92.6%	166	96.5%	154	98.7%	150	98.7%	149	100.0%	145	99.3%
Incomplete	6	3.6%	1	0.6%	2	1.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Not received	14	8.3%	11	6.8%	4	2.3%	2	1.3%	2	1.3%	0	0.0%	1	0.7%

For most of the forms, there is a one-to-one relationship between a vessel, vessel owner, and vessel operator. In these cases, there are no lessees of the vessel and one form is submitted for the vessel each year. More than one form is submitted for a particular vessel when the vessel is leased by a third party, or when the vessel is sold during the survey year. The most common occurrence with two forms submitted for one vessel is when the owner of the vessel submits one form and the lessee of the vessel submits another form. Generally, only the lessee operated the vessel during the fiscal year, but occasionally both the owner and the lessee will operate the vessel (Table 2.2).

⁷ For explanation of the term complete, please refer to the Administration and Operations Report section regarding regulations for complete EDC forms.

⁸ An “entity” is defined as a unique combination of an owner or lessee and vessel, whereas a “vessel” refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Table 2.2: Number of forms, entities, and vessels by activity. Number of required forms, entities that fished, vessels that harvested, vessels that were leased, lease contracts, vessels that were fished by more than one entity, and vessels that were sold during the annual survey qualifying period. An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number of individuals who owned or leased the vessel.

Activity	2009	2010	2011	2012	2013	2014	2015
Required forms	168	162	172	156	152	149	146
Entities that fished	133	130	143	133	127	130	126
Vessels that fished on the West Coast or Alaska	132	129	138	132	124	128	119
Vessels that fished on the West Coast	132	131	132	128	124	125	117
Vessels that fished in Alaska	27	28	28	25	24	24	21
Vessels that were leased	11	8	9	7	7	6	7
Lease contracts	12	9	9	7	7	6	7
Vessels fished by multiple entities	1	1	5	1	2	3	5
Vessels sold	1	8	8	3	7	3	7

3 Vessel Participation on the West Coast and in Alaska

Participants provide the total number of days at sea by fishery on the West Coast and in Alaska. They are instructed to count partial days as full days. The current categories of West Coast fisheries are

- West Coast whiting trawl gear,
- West Coast midwater trawl gear,
- West Coast groundfish trawl gear,
- Groundfish fixed gear with trawl endorsement,
- Groundfish fixed gear with fixed gear endorsement,
- Shrimp,
- Crab,
- Pacific halibut,
- California halibut,
- Salmon,
- Tuna, and
- Other fisheries.

The categories on the EDC form remained unchanged from 2009-2013, but in response to feedback from participants as well as changes in fishing behavior, several changes to the question have been made.

Starting with the 2014 form, two subfisheries were each split into two additional categories; “West Coast groundfish fixed gear” was split out by permit endorsement (fixed gear or trawl); and “Halibut” was split into Pacific halibut and California halibut. The first change was made in response to participant feedback that fuel use differs between permit endorsements because there are different discard regulations for the two permit endorsements and therefore fisher behavior changes according to the permit they are fishing. The Halibut fishery was changed because EDC vessels fish in both the California halibut and Pacific halibut fisheries, but the original question was designed only for the Pacific halibut fishery. The Pacific halibut is a fixed gear fishery and so reporting the speed while fishing was not required, whereas the California halibut fishery is a trawl fishery and therefore participants need to provide their speed while fishing.

Starting with the 2015 form, an additional fishery was added, “West Coast midwater trawl gear”. In 2012, vessels began participating in the Non-whiting midwater trawl fishery. Historically there was a non-whiting midwater groundfish fishery, targeting semi-pelagic rockfish such as yellowtail and widow rockfish. The fishery was shut down after widow rockfish was declared overfished in 2001. In 2011, widow rockfish was taken off the overfished list.⁹ As a result, a few vessels reentered the fishery in 2012, and the annual catch limit for widow rockfish was raised starting in 2013. Between 2011 and 2015, the total quota for widow increased 4 fold from 755,000 pounds to 3.13 million pounds. The annual catch limit was increased again for 2017. In contrast, yellowtail rockfish quota, the other target species in the non-whiting midwater fishery, had remained relatively constant since the

⁹ NMFS 2011. Status of the widow rockfish resource in 2011: http://www.pcouncil.org/wp-content/uploads/Widow_2011_Assessment.pdf.

implementation of the catch share program (6.49 million pounds), but was increased by approximately 50% in 2015 to 10.1 million pounds.

Participants also provide the days spent fishing in all Alaskan fisheries. In the 2009-2011 data collection, participants provided the total number of days spent chartering or doing research on the West Coast and Alaska, combined. Starting in 2012, participants were requested to provide separate days at sea for chartering and research in Alaska and chartering and research on the West Coast.

Table 3.1: Average days at sea. Average days at sea by activity for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses. See above for explanations of changes to the data collection form across years.

Fishery	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pacific whiting	35 [‡]	40	46 [‡]	41	59 [‡]	33	65 [‡]	29	67 [‡]	30	79 [‡]	30	70 [‡]	26
Non-whiting midwater trawl	—	—	—	—	—	—	—	—	—	—	—	—	13 [‡]	15
Groundfish with trawl gear	68 [‡]	103	59 [‡]	98	51 [‡]	74	53 [‡]	67	56 [‡]	71	52 [‡]	64	49 [‡]	62
Groundfish with fixed gear	29 [‡]	7	63 [‡]	8	39 [‡]	25	45 [‡]	25	31 [‡]	20	—	—	—	—
Groundfish fixed gear with a trawl permit	—	—	—	—	—	—	—	—	—	—	29 [‡]	20	32 [‡]	18
Groundfish fixed gear with a fixed gear permit	—	—	—	—	—	—	—	—	—	—	29 [‡]	9	26 [‡]	11
Shrimp	33 [‡]	29	39 [‡]	33	44 [‡]	41	47 [‡]	39	44 [‡]	39	57 [‡]	41	68 [‡]	48
Crab	40 [‡]	55	38 [‡]	57	37 [‡]	65	35 [‡]	64	36 [‡]	66	39 [‡]	64	26 [‡]	56
Halibut	26 [‡]	6	30 [‡]	6	18 [‡]	6	23 [‡]	6	23 [‡]	5	—	—	—	—
Pacific halibut	—	—	—	—	—	—	—	—	—	—	—	—	0	2 [‡]
California halibut	—	—	—	—	—	—	—	—	—	—	50 [‡]	4	43 [‡]	3
Salmon	—	0	***	***	19 [‡]	5	28 [‡]	10	24 [‡]	6	23 [‡]	11	20 [‡]	3
Tuna	14 [‡]	9	21 [‡]	10	20 [‡]	5	16 [‡]	11	5 [‡]	6	7 [‡]	9	21 [‡]	9
Fishing in Alaska or other fisheries	102 [‡]	32	111 [‡]	31	—	—	—	—	—	—	—	—	—	—
Fishing in Alaska	—	—	—	—	125 [‡]	36	110 [‡]	30	117 [‡]	28	118 [‡]	28	124 [‡]	24
Steaming between West Coast and Alaska	19 [‡]	30	19 [‡]	32	19 [‡]	33	18 [‡]	31	15 [‡]	30	16 [‡]	30	18 [‡]	27
Other West Coast Fisheries	—	—	—	—	***	***	***	***	21 [‡]	5	***	***	***	***
Chartering or research	34 [‡]	11	33 [‡]	11	36 [‡]	12	—	—	—	—	—	—	—	—
Chartering, research, or tendering on the West Coast	—	—	—	—	—	—	46 [‡]	7	52 [‡]	9	63 [‡]	9	36 [‡]	10
Chartering, research, or tendering in Alaska	—	—	—	—	—	—	43 [‡]	5	60 [‡]	5	67 [‡]	7	57 [‡]	7

Table 3.2: Total days at sea. Total days at sea by activity for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses. See above for explanations of changes to the data collection form across years.

Fishery	2009		2010		2011		2012		2013		2014		2015	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
Pacific whiting	1,400	40	1,900	41	1,953	33	1,890	29	2,014	30	2,361	30	1,831	26
Non-whiting midwater trawl	—	—	—	—	—	—	—	—	—	—	—	—	197	15
Groundfish with trawl gear	6,977	103	5,739	98	3,740	74	3,578	67	3,978	71	3,314	64	3,009	62
Groundfish with fixed gear	201	7	507	8	984	25	1,122	25	611	20	—	—	—	—
Groundfish fixed gear with a trawl permit	—	—	—	—	—	—	—	—	—	—	580	20	571	18
Groundfish fixed gear with a fixed gear permit	—	—	—	—	—	—	—	—	—	—	265	9	288	11
Shrimp	952	29	1,289	33	1,790	41	1,816	39	1,733	39	2,348	41	3,278	48
Crab	2,204	55	2,159	57	2,420	65	2,210	64	2,352	66	2,507	64	1,481	56
Halibut	153	6	179	6	110	6	139	6	116	5	—	—	—	—
Pacific halibut	—	—	—	—	—	—	—	—	—	—	0	0	8	4
California halibut	—	—	—	—	—	—	—	—	—	—	198	4	128	3
Salmon	0	0	***	***	93	5	283	10	142	6	255	11	61	3
Tuna	129	9	208	10	98	5	173	11	30	6	65	9	189	9
Fishing in Alaska or other fisheries	3,273	32	3,456	31	—	—	—	—	—	—	—	—	—	—
Fishing in Alaska	—	—	—	—	4,488	36	3,304	30	3,285	28	3,314	28	2,964	24
Steaming between West Coast and Alaska	575	30	604	32	624	33	567	31	448	30	495	30	481	27
Other West Coast Fisheries	—	—	—	—	***	***	***	***	106	5	***	***	***	***
Chartering or research	376	11	366	11	434	12	—	—	—	—	—	—	—	—
Chartering, research, or tendering on the West Coast	—	—	—	—	—	—	324	7	466	9	569	9	360	10
Chartering, research, or tendering in Alaska	—	—	—	—	—	—	217	5	299	5	469	7	398	7

3.1 Trips to Alaska

The number of trips that were made between the West Coast and Alaska provide additional insight into the patterns of participation. Table 3.3 shows the number of vessels that took up to four one-way trips to Alaska.

Table 3.3: Trips to Alaska. The number of EDC vessels making the given number of one-way trips between the West Coast and Alaska.

Number of one-way trips	2009	2010	2011	2012	2013	2014	2015
1	0	3	1	1	2	1	0
2	21	19	25	23	24	24	22
3	1	2	1	1	1	2	1
4	5	6	3	3	1	1	3

4 Home Port

Vessel home port information is especially useful for understanding how the catch share program may affect communities. Among other uses, home port is commonly used as a method for assigning economic activity to communities. There are many ways to define home port, including the home port listed on Coast Guard registrations and the port where the vessel made the most landings. Table 4.1 shows the number of entities by home port according to information submitted by participants. Home ports provided on the EDC forms are mapped to the IO-PAC port groupings.¹⁰ These port groupings are also consistent with those used in the PFMC's biennial groundfish management specification process. The ports with the highest concentration of EDC entities are Newport, Astoria, and Coos Bay.

Table 4.1: Vessel home port. Number of entities by home port as reported on the EDC form (N = number of entities, % = percent of total entities in survey year. An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel).

Home port	2009		2010		2011		2012		2013		2014		2015	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Alaska	***	***	***	***	3	2%	***	***	***	***	***	***	***	***
Puget Sound	14	10%	14	10%	17	11%	13	9%	12	9%	15	11%	16	12%
South and central WA coast	4	3%	4	3%	4	3%	4	3%	4	3%	4	3%	3	2%
Astoria	20	14%	20	15%	26	17%	23	17%	23	17%	20	15%	24	19%
Tillamook	6	4%	6	4%	4	3%	5	4%	***	***	3	2%	***	***
Newport	23	16%	23	17%	25	17%	21	15%	23	17%	25	18%	28	22%
Coos Bay	20	14%	19	14%	19	13%	19	14%	17	13%	19	14%	18	14%
Brookings	7	5%	7	5%	8	5%	9	6%	8	6%	9	7%	9	7%
Crescent City	14	10%	14	10%	14	9%	12	9%	12	9%	10	7%	8	6%
Eureka	9	6%	9	7%	9	6%	7	5%	7	5%	8	6%	6	5%
Fort Bragg	7	5%	7	5%	7	5%	8	6%	7	5%	7	5%	6	5%
San Francisco	6	4%	8	6%	7	5%	7	5%	7	5%	6	4%	4	3%
Monterey	3	2%	***	***	***	***	4	3%	***	***	3	2%	***	***
Morro Bay	6	4%	4	3%	6	4%	6	4%	6	5%	5	4%	3	2%

In addition to understanding where vessels call their home port, it is important to examine how the home port relates to particular fisheries. Tables 4.2 through 4.17 show the average days at sea by home port and fishery. This provides information about how changes in management for a particular fishery could affect specific port communities. For example, changes in the Shoreside Pacific whiting fishery could have a strong effect on Coos Bay, but a change in the At-sea Pacific whiting fishery might not have a noticeable effect in that port.

¹⁰ 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.

Table 4.2: Pacific whiting fishery days at sea by home port. Average number of days vessels participated in the Pacific whiting fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Alaska	***	***	***	***		0		0	***	***	***	***	***	***
Puget Sound	29.4 [‡]	10	51.5 [‡]	12	66.5 [‡]	8	67.7 [‡]	7	67.1 [‡]	8	69.2 [‡]	9	55.5 [‡]	8
South and central WA coast	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Astoria	55.7 [‡]	3	69.0 [‡]	3	54.7 [‡]	3	***	***	***	***	***	***		0
Tillamook	***	***	***	***		0		0		0		0		0
Newport	31.4 [‡]	16	42.8 [‡]	16	65.7 [‡]	15	64.9 [‡]	14	67.6 [‡]	15	81.1 [‡]	15	76.0 [‡]	14
Coos Bay	28.3 [‡]	3	***	***	***	***	***	***		0		0		0
Brookings	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Crescent City	***	***	***	***		0		0		0		0		0
Eureka	***	***	***	***		0		0		0		0		0
San Francisco	***	***	***	***	***	***	***	***		0		0		0

Table 4.3: Non-whiting midwater trawl fishery days at sea by home port. Average number of days vessels participated in the Non-whiting midwater trawl fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Alaska	—	—	—	—	—	—	—	—	—	—	—	—	***	***
Puget Sound	—	—	—	—	—	—	—	—	—	—	—	—	***	***
South and central WA coast	—	—	—	—	—	—	—	—	—	—	—	—	***	***
Astoria	—	—	—	—	—	—	—	—	—	—	—	—	7.0 [‡]	5
Newport	—	—	—	—	—	—	—	—	—	—	—	—	12.2 [‡]	6
Brookings	—	—	—	—	—	—	—	—	—	—	—	—	***	***

Table 4.4: Groundfish with trawl gear fishery days at sea by home port. Average number of days vessels participated in the Groundfish with trawl gear fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska		0		0	***	***	***	***		0		0		0
Puget Sound	77.8 [†]	5	45.6 [†]	5	44.5 [†]	4	***	***	***	***	***	***	***	***
South and central WA coast	112.2 [†]	4	106.7 [†]	3	***	***	93.0 [†]	3	92.7 [†]	3	74.7 [†]	3	***	***
Astoria	87.9 [†]	18	85.1 [†]	17	76.7 [†]	17	89.9 [†]	15	98.5 [†]	15	90.2 [†]	13	75.1 [†]	15
Tillamook	83.2 [†]	5	65.8 [†]	5	***	***	***	***	***	***		0		0
Newport	56.0 [†]	15	45.1 [†]	15	21.1 [†]	9	26.6 [†]	8	37.7 [†]	7	37.4 [†]	7	40.6 [†]	10
Coos Bay	52.2 [†]	18	47.1 [†]	18	41.7 [†]	12	46.0 [†]	13	31.0 [†]	13	19.2 [†]	13	23.8 [†]	10
Brookings	55.0 [†]	7	59.1 [†]	7	46.5 [†]	6	55.2 [†]	4	86.8 [†]	5	50.0 [†]	6	40.7 [†]	6
Crescent City	51.1 [†]	7	43.7 [†]	6	22.7 [†]	3	29.5 [†]	4	27.2 [†]	4	33.3 [†]	3	***	***
Eureka	70.2 [†]	8	57.0 [†]	8	48.9 [†]	8	43.0 [†]	7	51.0 [†]	7	53.0 [†]	7	50.3 [†]	6
Fort Bragg	66.7 [†]	7	56.7 [†]	7	44.2 [†]	6	41.8 [†]	5	48.3 [†]	6	49.2 [†]	6	51.0 [†]	5
San Francisco	44.6 [†]	5	34.8 [†]	5	35.7 [†]	3	38.3 [†]	3	56.7 [†]	3	47.0 [†]	3	***	***
Monterey	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Morro Bay	***	***	***	***		0		0	***	***	***	***	***	***

Table 4.5: Groundfish with fixed gear fishery days at sea by home port. Average number of days vessels participated in the Groundfish with fixed gear fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Alaska		0		0	***	***		0		0	—	—	—	—
Puget Sound		0		0	67.7 [*]	3	66.0 [*]	5	32.0 [*]	3	—	—	—	—
Astoria	***	***	***	***	41.6 [*]	5	55.3 [*]	6	37.8 [‡]	6	—	—	—	—
Tillamook	***	***	***	***	***	***		0		0	—	—	—	—
Newport	***	***	***	***	42.0 [*]	3	53.3 [*]	3	***	***	—	—	—	—
Coos Bay		0		0	***	***	***	***		0	—	—	—	—
Brookings		0		0	***	***	***	***	***	***	—	—	—	—
Fort Bragg		0		0	***	***	***	***	***	***	—	—	—	—
San Francisco		0	***	***	***	***	***	***	***	***	—	—	—	—
Monterey		0		0		0	***	***		0	—	—	—	—
Morro Bay	31.0 [*]	4	85.3 [‡]	3	36.8 [‡]	6	31.6 [*]	5	37.2 [‡]	4	—	—	—	—

Table 4.6: Groundfish fixed gear with a trawl permit fishery days at sea by home port. Average number of days vessels participated in the Groundfish fixed gear with a trawl permit fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Alaska	—	—	—	—	—	—	—	—	—	—	***	***		0
Puget Sound	—	—	—	—	—	—	—	—	—	—	38.7 [‡]	3	28.2 [‡]	4
Astoria	—	—	—	—	—	—	—	—	—	—	41.5 [‡]	4	44.2 [‡]	5
Newport	—	—	—	—	—	—	—	—	—	—	51.7 [‡]	3	39.0 [‡]	4
Coos Bay	—	—	—	—	—	—	—	—	—	—		0	***	***
Eureka	—	—	—	—	—	—	—	—	—	—	***	***		0
Fort Bragg	—	—	—	—	—	—	—	—	—	—	***	***	***	***
San Francisco	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Monterey	—	—	—	—	—	—	—	—	—	—	***	***		0
Morro Bay	—	—	—	—	—	—	—	—	—	—	18.2 [‡]	4	***	***

Table 4.7: Groundfish fixed gear with a fixed gear permit fishery days at sea by home port. Average number of days vessels participated in the Groundfish fixed gear with a fixed gear permit fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Alaska	—	—	—	—	—	—	—	—	—	—	***	***		0
Puget Sound	—	—	—	—	—	—	—	—	—	—	40.7 [‡]	3	32.7 [‡]	3
Astoria	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Tillamook	—	—	—	—	—	—	—	—	—	—		0	***	***
Newport	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Coos Bay	—	—	—	—	—	—	—	—	—	—		0	***	***
Morro Bay	—	—	—	—	—	—	—	—	—	—	***	***	***	***

Table 4.8: Shrimp fishery days at sea by home port. Average number of days vessels participated in the Shrimp fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Alaska		0		0		0	***	***		0		0		0
Puget Sound	***	***	***	***		0		0		0	***	***	***	***
South and central WA coast		0	***	***		0	***	***		0	***	***	***	***
Astoria	45.3 [‡]	3	56.8 [‡]	4	60.2 [‡]	6	80.7 [‡]	3	69.8 [‡]	4	84.3 [‡]	3	100.0 [‡]	7
Tillamook	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Newport	11.0 [‡]	3	***	***	41.3 [‡]	7	59.2 [‡]	6	55.7 [‡]	6	92.4 [‡]	5	63.8 [‡]	6
Coos Bay	32.8 [‡]	12	35.8 [‡]	13	38.8 [‡]	12	43.4 [‡]	11	42.5 [‡]	12	45.6 [‡]	14	50.0 [‡]	13
Brookings	***	***	31.2 [‡]	4	52.5 [‡]	4	34.4 [‡]	5	49.8 [‡]	5	50.2 [‡]	6	77.3 [‡]	7
Crescent City	29.8 [‡]	4	49.8 [‡]	4	42.3 [‡]	6	40.2 [‡]	6	39.6 [‡]	5	39.2 [‡]	5	67.0 [‡]	4
Eureka	28.5 [‡]	4	26.5 [‡]	4	28.5 [‡]	4	35.5 [‡]	4	18.5 [‡]	4	47.8 [‡]	4	55.3 [‡]	3
Fort Bragg		0		0		0		0		0		0	***	***

Table 4.9: Crab fishery days at sea by home port. Average number of days vessels participated in the Crab fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Alaska		0		0		0	***	***		0	***	***		0
Puget Sound	***	***	***	***	***	***	***	***	***	***	***	***	***	***
South and central WA coast	***	***	47.7 [‡]	3	25.7 [‡]	3	21.7 [‡]	3	***	***	***	***	***	***
Astoria	59.3 [‡]	6	52.0 [‡]	5	43.0 [‡]	8	50.3 [‡]	9	40.7 [‡]	10	36.1 [‡]	10	23.8 [‡]	12
Tillamook	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Newport	30.3 [‡]	10	28.1 [‡]	10	39.2 [‡]	10	23.1 [‡]	10	33.1 [‡]	10	30.4 [‡]	9	26.5 [‡]	8
Coos Bay	33.9 [‡]	10	34.4 [‡]	9	32.9 [‡]	11	31.7 [‡]	12	33.0 [‡]	12	39.5 [‡]	13	27.6 [‡]	13
Brookings	25.4 [‡]	5	14.0 [‡]	5	14.3 [‡]	6	14.6 [‡]	5	18.0 [‡]	6	7.0 [‡]	3	***	***
Crescent City	49.2 [‡]	4	33.8 [‡]	6	34.3 [‡]	7	34.0 [‡]	5	42.8 [‡]	5	33.2 [‡]	5	30.2 [‡]	4
Eureka	63.6 [‡]	7	63.6 [‡]	7	59.5 [‡]	6	37.5 [‡]	6	43.2 [‡]	6	53.4 [‡]	7	18.7 [‡]	6
Fort Bragg	27.0 [‡]	3	36.5 [‡]	4	49.0 [‡]	4	53.8 [‡]	4	40.5 [‡]	4	43.5 [‡]	4	39.3 [‡]	3
San Francisco	25.7 [‡]	3	37.5 [‡]	4	42.5 [‡]	4	34.3 [‡]	3	33.5 [‡]	4	34.8 [‡]	4	9.2 [‡]	4
Monterey	***	***		0		0		0		0	***	***		0
Morro Bay	***	***	***	***	47.0 [‡]	3	42.0 [‡]	3	***	***	***	***	***	***

Table 4.10: Halibut fishery days at sea by home port. Average number of days vessels participated in the Halibut fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Puget Sound		0		0		0		0	***	***	—	—	—	—
Astoria		0		0		0	***	***		0	—	—	—	—
Newport	***	***	***	***	***	***	***	***	***	***	—	—	—	—
Coos Bay		0		0	***	***		0		0	—	—	—	—
San Francisco	26.7 [*]	3	37.0 [†]	3	20.0 [‡]	3	27.7 [‡]	3	20.7 [‡]	3	—	—	—	—
Monterey	***	***	***	***		0		0		0	—	—	—	—

Table 4.11: Pacific halibut fishery days at sea by home port. Average number of days vessels participated in the Pacific halibut fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Puget Sound	—	—	—	—	—	—	—	—	—	—	0	***	***	***
Newport	—	—	—	—	—	—	—	—	—	—	0	***	***	***
Coos Bay	—	—	—	—	—	—	—	—	—	—	0	***	***	***

Table 4.12: California halibut fishery days at sea by home port. Average number of days vessels participated in the California halibut fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Newport	—	—	—	—	—	—	—	—	—	—	***	***	***	***
San Francisco	—	—	—	—	—	—	—	—	—	—	55.7 [*]	3	***	***

Table 4.13: Salmon fishery days at sea by home port. Average number of days vessels participated in the Salmon fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Astoria	0		0		***	***	0		0		0		0	
Coos Bay	0	***	***	***	***	***	***	***	***	***	26.7 [‡]	3	***	***
Brookings	0		0			0	0		0		***	***		0
Eureka	0		0			0	0		0		***	***		0
Fort Bragg	0	***	***	***	***	***	36.7 [‡]	3	***	***	***	***	***	***
San Francisco	0		0		***	***	***	***	***	***	***	***		0
Monterey	0		0			0	0		0		***	***		0
Morro Bay	0		0		***	***	21.2 [*]	4	***	***	***	***	***	***

Table 4.14: Tuna fishery days at sea by home port. Average number of days vessels participated in the Tuna fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Puget Sound	0		0			0	0		0		0		***	***
South and central WA coast	0	***	***			0	0		0		0			0
Astoria	***	***	***	***	***	***	***	***		0		0	***	***
Tillamook	0	***	***			0	***	***		0	***	***	***	***
Newport	***	***	***	***		0	***	***	***	***	***	***	***	***
Coos Bay	3.3 [*]	3	***	***	9.0 [‡]	3	5.0 [*]	4	7.7 [‡]	3	4.8 [*]	4	18.5 [‡]	4
Brookings	0		0		***	***	***	***		0	***	***		0
Crescent City	0		0			0	0		***	***		0		0
Eureka	***	***	***	***		0	0		0		0			0
Fort Bragg	***	***	***	***		0	***	***		0		0		0
Monterey	0		0			0	0		0		***	***		0

Table 4.15: Fishing in Alaska or other fisheries fishery days at sea by home port. Average number of days vessels participated in the Fishing in Alaska or other fisheries by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Puget Sound	108.3 [†]	11	130.6 [†]	10	—	—	—	—	—	—	—	—	—	—
Astoria	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Tillamook	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Newport	107.9 [‡]	13	120.2 [‡]	13	—	—	—	—	—	—	—	—	—	—
Coos Bay	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Brookings	***	***	***	***	—	—	—	—	—	—	—	—	—	—
San Francisco	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Morro Bay	***	***	***	***	—	—	—	—	—	—	—	—	—	—

Table 4.16: Other West Coast Fisheries days at sea by home port. Average number of days vessels participated in the Other West Coast Fisheries by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Puget Sound	—	—	—	—	0	0	0	0	0	0	0	0	***	***
Crescent City	—	—	—	—	0	0	***	***	0	0	0	0	0	0
Monterey	—	—	—	—	0	0	0	0	0	***	***	0	0	0
Morro Bay	—	—	—	—	***	***	***	***	21.5 [‡]	4	0	0	0	0

Table 4.17: Chartering or research days at sea by home port. Average number of days vessels participated in Chartering or research by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska		0		0	***	***	—	—	—	—	—	—	—	—
Puget Sound	***	***	***	***	***	***	—	—	—	—	—	—	—	—
Astoria	***	***	***	***	***	***	—	—	—	—	—	—	—	—
Tillamook		0	***	***		0	—	—	—	—	—	—	—	—
Newport	35.5 [‡]	4	36.0 [‡]	4	48.8 [‡]	4	—	—	—	—	—	—	—	—
Coos Bay	21.2 [‡]	4	***	***	***	***	—	—	—	—	—	—	—	—
Brookings	***	***	***	***	***	***	—	—	—	—	—	—	—	—
Fort Bragg		0		0	***	***	—	—	—	—	—	—	—	—

Table 4.18: Chartering, research, or tendering on the West Coast fishery days at sea by home port. Average number of days vessels participated in the Chartering, research, or tendering on the West Coast fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
South and central WA coast	—	—	—	—	—	—		0	***	***		0	***	***
Astoria	—	—	—	—	—	—	***	***		0	***	***	***	***
Tillamook	—	—	—	—	—	—	***	***		0		0		0
Newport	—	—	—	—	—	—	29.3 [‡]	3	32.2 [‡]	4	15.0 [‡]	3	39.2 [‡]	4
Coos Bay	—	—	—	—	—	—		0		0	***	***	***	***
Brookings	—	—	—	—	—	—	***	***	***	***	***	***	***	***
San Francisco	—	—	—	—	—	—		0	***	***		0		0
Monterey	—	—	—	—	—	—	***	***		0		0		0
Morro Bay	—	—	—	—	—	—		0	***	***	***	***	***	***

Table 4.19: Chartering, research, or tendering in Alaska fishery days at sea by home port. Average number of days vessels participated in the Chartering, research, or tendering in Alaska by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Puget Sound	—	—	—	—	—	—	***	***	***	***	***	***	***	***
Astoria	—	—	—	—	—	—	43.3	3	***	***	82.7	3	63.0	3
Tillamook	—	—	—	—	—	—	***	***	***	***	***	***	***	0
Newport	—	—	—	—	—	—		0	***	***	***	***	***	***

Table 4.20: Fishing in Alaska fishery days at sea by home port. Average number of days vessels participated in the Fishing in Alaska by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	***	***		0	***	***	***	***	***	***
Puget Sound	—	—	—	—	141.6	14	120.9	10	117.1	9	122.2	10	131.0	10
Astoria	—	—	—	—	***	***	***	***		0		0		0
Tillamook	—	—	—	—	***	***	***	***	***	***	***	***	***	0
Newport	—	—	—	—	121.4	12	90.8	11	109.3	12	119.8	13	125.8	12
Coos Bay	—	—	—	—	***	***	***	***		0		0		0
Brookings	—	—	—	—	***	***	***	***	***	***	***	***	***	***
San Francisco	—	—	—	—	***	***	***	***		0		0		0

Table 4.21: Steaming between West Coast and Alaska fishery days at sea by home port. Average number of days vessels steamed between the West Coast and Alaska by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 57 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Alaska	***	***	***	***	***	***		0	***	***	***	***	***	***
Puget Sound	20.1 [†]	10	18.2 [†]	10	16.2 [†]	10	15.2 [†]	9	15.2 [†]	9	13.9 [†]	9	17.5 [†]	8
Astoria	***	***	16.0 [†]	3	***	***	16.8 [†]	4	***	***	18.7 [†]	3	19.3 [†]	3
Tillamook	***	***	***	***	***	***	***	***	***	***		0		0
Newport	19.8 [†]	13	21.9 [†]	13	19.6 [†]	12	20.0 [†]	11	16.8 [†]	13	17.5 [†]	15	17.7 [†]	14
Coos Bay	***	***	***	***	***	***	***	***		0		0		0
Brookings	***	***	***	***	***	***	***	***	***	***	***	***	***	***
San Francisco	***	***	***	***	***	***	***	***		0		0		0

5 Vessel Physical Characteristics

5.1 Average market value, replacement value, vessel length, fuel capacity, and horsepower of main engines

Survey participants are asked to provide basic information about the vessel and its physical characteristics, including market value, replacement value, vessel length, horsepower of main engines, and fuel capacity from the most recent marine survey (Table 5.1 and Figures 35, 36, 37, and 38). Marine surveys are done on a regular basis and are often required for insurance, financing, and other purposes.

The market value is the marine surveyor's estimate of what the vessel could be sold for in its current condition, and the replacement value is the estimate of what it would cost to replace the current vessel with a new vessel.

Table 5.1: Average vessel characteristics. Average market value (\$ millions), replacement value (\$ millions), length (feet), fuel capacity (thousand gallons), and horsepower of main engines (N = number of EDC vessels with non-zero, non-NA responses).

Characteristic	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Market value	1.1 [‡]	123	1.1 [‡]	121	1.2 [‡]	138	1.1 [‡]	135	1.2 [‡]	131	1.3 [‡]	132	1.4 [‡]	124
Replacement value	2.0 [‡]	121	2.0 [‡]	120	2.2 [‡]	135	2.2 [‡]	131	2.4 [‡]	126	2.6 [‡]	129	2.7 [‡]	123
Vessel length	72.8 [†]	140	72.6 [†]	143	72.2 [†]	153	68.5 [†]	149	68.8 [†]	143	69.8 [†]	142	70.9 [†]	135
Vessel fuel capacity	12.4 [‡]	139	12.2 [‡]	142	12.1 [‡]	154	11.4 [‡]	143	11.4 [‡]	140	11.6 [‡]	141	12.1 [‡]	131
Horsepower	650.1 [†]	140	635.8 [†]	143	634.4 [†]	151	624.0 [†]	143	634.0 [†]	136	662.7 [†]	139	663.4 [†]	131

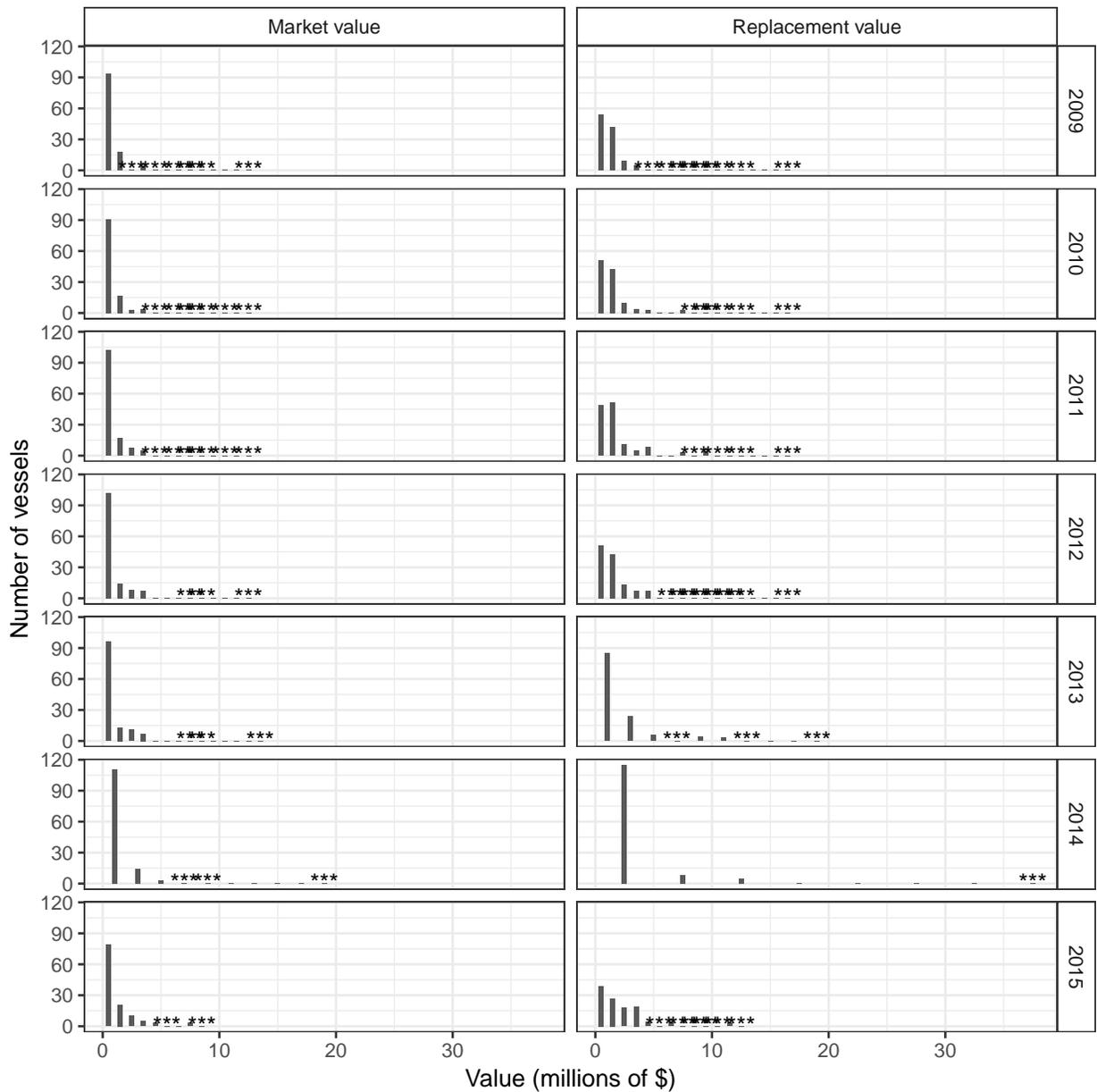


Figure 35: Market value and replacement value (millions of dollars) of all vessels that completed a survey. *** indicate that values were suppressed for confidentiality reasons.

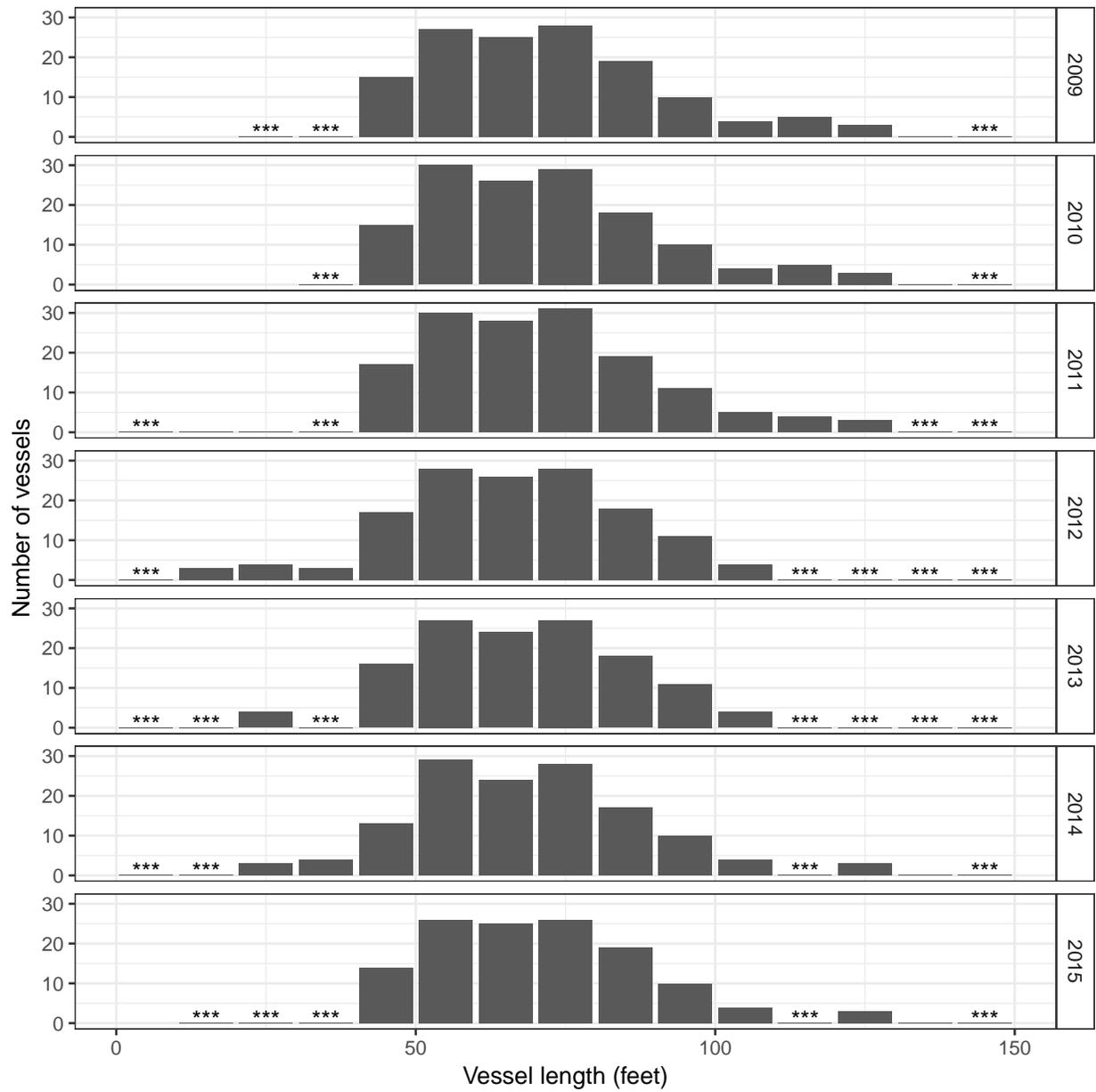


Figure 36: Vessel length (feet) of all vessels that completed a survey. *** indicate that values were suppressed for confidentiality reasons.

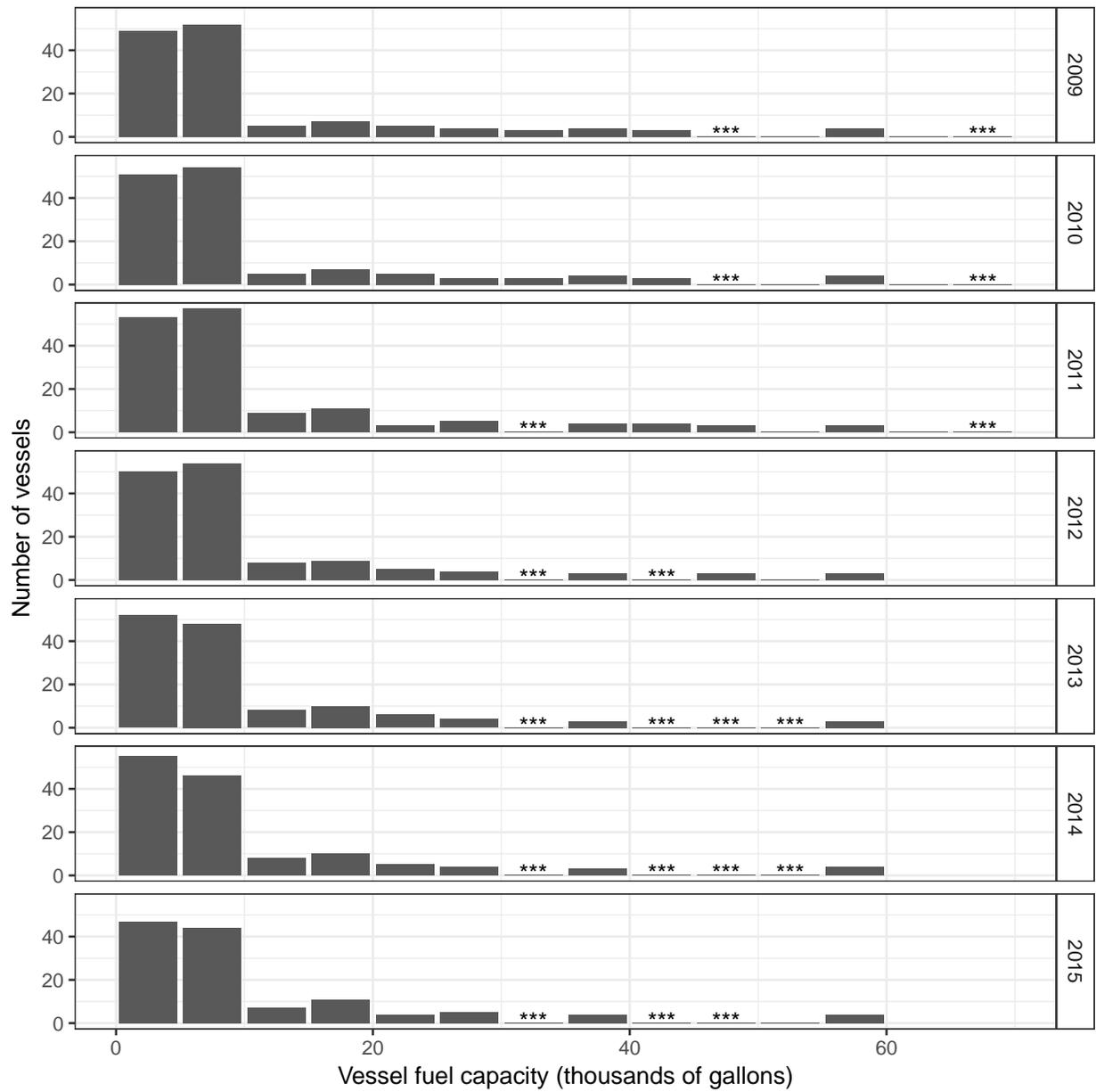


Figure 37: Vessel fuel capacity (thousands of gallons) of all vessels that completed a survey. *** indicate that values were suppressed for confidentiality reasons.

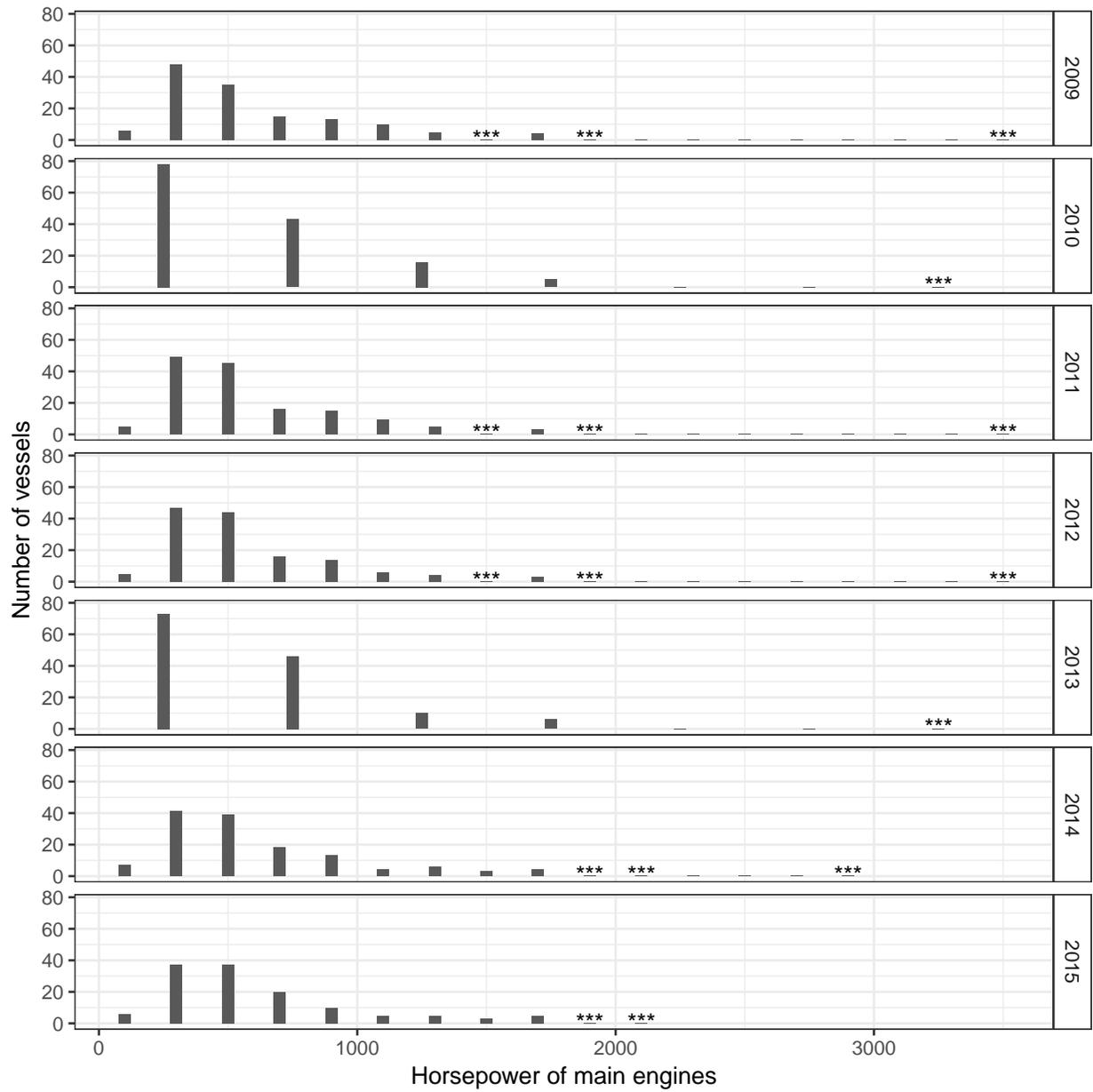


Figure 38: Horsepower of main engines of all vessels that completed a survey. *** indicate that values were suppressed for confidentiality reasons.

Participants provide information about whether the vessel was hauled out (vessel was removed from the water for maintenance and repairs). Each year, a significant portion of all active fishing vessels are hauled out. The information shown below in Table 5.2 provides context that may be used to explain major costs associated with vessel repair and maintenance.

Participants also note whether they process fish at-sea, which has increased over time (Table 5.3). The most common occurrence of at-sea processing is heading and gutting sablefish before delivering the fish.

Table 5.2: Haul outs. Number (N) and percentage (%) of EDC vessels that hauled the vessel during the year.

Haul out	2009		2010		2011		2012		2013		2014		2015	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	82	64%	65	50%	85	63%	81	63%	60	48%	79	63%	70	59%
No	46	36%	62	48%	49	37%	47	37%	63	51%	46	37%	48	41%
No response	0	0%	3	2%	0	0%	0	0%	***	***	0	0%	0	0%

Table 5.3: Catcher vessels that processed at-sea. Number (N) and percentage (%) of EDC vessels that processed or headed and gutted fish on-board the vessel in survey year.

Processed at-sea	2009		2010		2011		2012		2013		2014		2015	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	6	4.7%	7	5.4%	15	11.2%	17	13.3%	13	10.6%	14	11.1%	15	12.7%
No	122	95.3%	120	92.3%	117	87.3%	111	86.7%	108	87.8%	111	88.1%	89	75.4%
No response	0	0.0%	3	2.3%	2	1.5%	0	0.0%	2	1.6%	1	0.8%	14	11.9%

5.2 Vessel characteristics by whether the vessel fished on the West Coast and in Alaska, only fished on the West Coast, only fished in Alaska, or did not fish

The physical characteristics of vessels can vary depending on fishery participation and where the vessel operates. Vessel characteristics have been delineated based on whether vessels fished on the West Coast, Alaska, both, or did not fish at all in a given year (Tables 5.4 through 5.8).

Table 5.4: Average horsepower. Average horsepower of EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
WC only	455	108	441	107	452	112	464	107	482	103	505	106	536	105
AK only	1,483	3	***	***	1,092	6	1,055	6	1,010	5	1,342	6	1,084	4
WC and AK	1,255	32	1,267	32	1,120	34	1,206	26	1,262	25	1,268	24	1,284	22
Did not fish	814	7	756	9	874	9	643	8	480	10	514	9	546	10

Table 5.5: Average replacement value. Average replacement value (millions of \$) of EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses). In 2009 and 2010, there was no question specifically for Alaska and if the vessel did not fish in 2009 and 2010, the owner was not required to provide the market value of the vessel.

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
WC only	\$1.0	91	\$1.0	90	\$1.3	97	\$1.4	95	\$1.5	96	\$1.6	99	\$2.1	100
AK only	\$6.1	3	***	***	\$6.2	6	\$3.5	6	\$2.4	5	\$8.0	6	\$3.2	4
WC and AK	\$4.5	29	\$5.0	30	\$4.5	32	\$5.3	26	\$6.2	26	\$5.9	25	\$6.0	22
Did not fish		0		0	\$2.1	8	\$0.4	6	\$0.3	4	***	***	\$2.1	6

Table 5.6: Average market value. Average market value (millions of \$) if EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses). In 2009 and 2010, if the vessel did not fish in 2009 and 2010, the owner was not required to provide the replacement value of the vessel.

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
WC only	\$0.4	93	\$0.4	91	\$0.5	98	\$0.6	98	\$0.6	99	\$0.7	100	\$1.0	100
AK only	\$4.2	3	***	***	\$3.9	6	\$1.9	6	\$1.5	5	\$4.6	6	\$1.9	4
WC and AK	\$2.8	29	\$3.3	30	\$2.9	33	\$3.1	26	\$3.7	26	\$3.4	25	\$3.4	22
Did not fish		0		0	\$0.7	9	\$0.1	7	\$0.2	6	\$0.2	5	\$1.3	7

Table 5.7: Average vessel fuel capacity. Average vessel fuel capacity (thousands of gallons) of EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
WC only	6.6	108	6.7	107	7.1	112	7.4	107	7.9	105	7.6	107	8.7	106
AK only	29.8	3	***	***	33.5	6	18.5	6	15.0	5	22.2	6	21.5	4
WC and AK	28.7	32	31.2	32	24.3	34	27.4	26	29.1	26	29.6	25	28.3	22
Did not fish	26.4	6	14.1	8	18.3	9	10.0	8	5.4	11	6.7	9	9.7	10

Table 5.8: Average vessel length. Average length (feet) if EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
WC only	65	108	65	107	65	112	65	107	65	106	66	107	67	108
AK only	98	3	***	***	98	6	93	6	90	4	104	4	95	4
WC and AK	98	32	100	32	93	34	95	26	96	26	95	25	93	22
Did not fish	81	7	71	9	70	12	41	14	41	13	44	12	54	13

6 Vessel Fuel Use, Speed, and Crew Size

6.1 Fuel use

Participants provide information about fuel use, which can be delineated according to fishery participation and vessel size. There have been two changes to this question since the implementation of the survey. Through 2013, participants were asked to report their average fuel use per day for all fishing for groundfish with fixed gear; starting in 2014, participants were asked to provide average fuel use separately for fixed gear with a trawl permit and fixed gear with a fixed gear permit. Similarly, in 2014, participants reported fuel use for Pacific halibut separately from California halibut. Similarly, as a result of changes in fishing behavior, a new question was added in 2015, requesting fuel use for the Non-whiting midwater fishery. More information about these changes can be found on page 57.

Average fuel use per day by fishery

Table 6.1: Daily fuel use. Average daily fuel use (gallons per day) by fishery. See above for explanation of changes to the data collection across years (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pacific whiting	791 [‡]	39	822 [‡]	41	824 [‡]	33	814 [‡]	30	781 [‡]	32	741 [‡]	31	792 [‡]	29
Groundfish with midwater trawl gear	—	—	—	—	—	—	—	—	—	—	—	—	552 [‡]	19
Groundfish with trawl gear	299 [‡]	104	305 [‡]	98	326 [‡]	81	321 [‡]	73	324 [‡]	76	327 [‡]	70	306 [‡]	62
Groundfish with fixed gear	156 [‡]	8	143 [‡]	9	142 [‡]	26	168 [‡]	24	167 [‡]	21	—	—	—	—
Groundfish fixed gear with a trawl permit	—	—	—	—	—	—	—	—	—	—	137 [‡]	20	175 [‡]	18
Groundfish fixed gear with a fixed gear permit	—	—	—	—	—	—	—	—	—	—	212 [‡]	8	167 [‡]	11
Crab	173 [‡]	55	178 [‡]	56	170 [‡]	66	185 [‡]	65	196 [‡]	66	182 [‡]	66	189 [‡]	58
Halibut	271 [‡]	7	206 [‡]	6	141 [‡]	7	203 [‡]	6	152 [‡]	5	—	—	—	—
Pacific halibut	—	—	—	—	—	—	—	—	—	—	***	***	132 [‡]	4
California halibut	—	—	—	—	—	—	—	—	—	—	160 [‡]	4	49 [‡]	3
Salmon	***	***	39 [‡]	4	70 [‡]	5	45 [‡]	10	46 [‡]	5	49 [‡]	11	48 [‡]	3
Shrimp	241 [‡]	36	229 [‡]	36	223 [‡]	43	242 [‡]	41	256 [‡]	40	244 [‡]	43	250 [‡]	49
Tuna	129 [‡]	15	120 [‡]	14	78 [‡]	8	102 [‡]	12	109 [‡]	7	71 [‡]	10	102 [‡]	9
Steaming between West Coast and Alaska	875 [‡]	28	871 [‡]	31	804 [‡]	31	817 [‡]	28	759 [‡]	26	778 [‡]	28	795 [‡]	23

Average fuel use per day by fishery and vessel length class

Table 6.2: Pacific whiting fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Pacific whiting fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***		0		0		0		0
Medium vessel	399	9	407	9	396	5	481	5	487	5	487	5	598	4
Large vessel	908	30	939	32	924	27	880	25	835	27	790	26	823	25

Table 6.3: Groundfish with midwater trawl gear fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish with midwater trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	—	—	—	—	—	—	—	—	—	—	—	—	—	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	—	—	—	444
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	—	678

Table 6.4: Groundfish with trawl gear fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish with trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	180	35	189	30	241	20	220	19	224	19	223	18	202	16
Medium vessel	288	48	289	48	286	45	304	42	303	44	305	39	307	36
Large vessel	522	21	516	20	543	16	541	12	543	13	535	13	470	10

Table 6.5: Groundfish with fixed gear fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish with fixed gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	91 [*]	6	84 [*]	7	116 [‡]	18	102 [*]	14	133 [*]	14	—	—	—	—
Medium vessel	***	***	***	***	200 [‡]	7	231 [*]	8	235 [*]	7	—	—	—	—
Large vessel	***	***	***	***	***	***	***	***	0	—	—	—	—	

Table 6.6: Groundfish fixed gear with a trawl permit fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish fixed gear with a trawl permit fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Small vessel	—	—	—	—	—	—	—	—	—	—	98 [‡]	14	128 [*]	11
Medium vessel	—	—	—	—	—	—	—	—	—	—	227 [*]	6	247 [*]	6
Large vessel	—	—	—	—	—	—	—	—	—	—	0	***	***	***

Table 6.7: Groundfish fixed gear with a fixed gear permit fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish fixed gear with a fixed gear permit fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Small vessel	—	—	—	—	—	—	—	—	—	—	127 [‡]	3	112 [*]	6
Medium vessel	—	—	—	—	—	—	—	—	—	—	264 [*]	5	230 [*]	4
Large vessel	—	—	—	—	—	—	—	—	—	—	0	***	***	***

Table 6.8: Crab fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Crab fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	96 [‡]	29	99 [‡]	29	99 [‡]	33	97 [‡]	31	101 [‡]	31	94 [‡]	34	103 [‡]	29
Medium vessel	235 [‡]	20	239 [‡]	21	224 [‡]	26	250 [‡]	27	262 [‡]	26	254 [‡]	25	252 [‡]	22
Large vessel	342 [‡]	6	350 [‡]	6	303 [‡]	7	324 [‡]	7	330 [‡]	9	350 [‡]	7	343 [‡]	7

Table 6.9: Halibut fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	100 [‡]	4	50 [‡]	3	54 [‡]	4	***	***	82 [‡]	3	—	—	—	—
Medium vessel	***	***	363 [‡]	3	258 [‡]	3	272 [‡]	4	***	***	—	—	—	—
Large vessel	***	***	0	0	0	0	0	0	—	—	—	—	—	—

Table 6.10: Pacific halibut fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Pacific halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Small vessel	—	—	—	—	—	—	—	—	—	—	0	93 [‡]	3	
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	0	
Large vessel	—	—	—	—	—	—	—	—	—	—	0	***	***	

Table 6.11: California halibut fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the California halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Small vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Large vessel	—	—	—	—	—	—	—	—	—	—		0		0

Table 6.12: Salmon fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Salmon fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	***	***	39 [†]	4	70 [†]	5	45 [†]	10	46 [†]	5	49 [†]	11	48 [†]	3
Medium vessel			0	0	0	0	0	0	0	0	0	0	0	0
Large vessel			0	0	0	0	0	0	0	0	0	0	0	0

Table 6.13: Shrimp fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Shrimp fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	160 [†]	11	153 [†]	10	169 [†]	13	167 [†]	11	175 [†]	11	156 [†]	12	159 [†]	14
Medium vessel	263 [†]	21	239 [†]	21	239 [†]	25	257 [†]	22	278 [†]	22	257 [†]	23	272 [†]	27
Large vessel	350 [†]	4	340 [†]	5	285 [†]	5	306 [†]	8	314 [†]	7	338 [†]	8	338 [†]	8

Table 6.14: Tuna fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Tuna fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	98 [‡]	12	98 [‡]	12	75 [‡]	7	79 [‡]	9	88 [‡]	5	75 [‡]	8	92 [‡]	6
Medium vessel	251 [‡]	3	***	***	***	***	168 [‡]	3	***	***	***	***	***	***
Large vessel		0		0		0		0		0		0	***	***

Table 6.15: Steaming between West Coast and Alaska fishery fuel use. Average fuel use (gallons per day) of vessels that steamed between West Coast and Alaska by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***	***	***	***	***	***	***	***	***
Medium vessel	488 [‡]	3	483 [‡]	3	321 [‡]	4	327 [‡]	5	376 [‡]	4	482 [‡]	6	419 [‡]	4
Large vessel	922 [‡]	25	912 [‡]	28	918 [‡]	25	985 [‡]	21	884 [‡]	20	917 [‡]	20	945 [‡]	17

Average total fuel use

Table 6.16: Average total fuel use. Average total fuel use (gallons) per entity (N = number of EDC vessels with non-zero, non-NA responses). An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Total diesel	24.8 [‡]	127	27.9 [‡]	126	25.4 [‡]	133	27.0 [‡]	129	27.9 [‡]	124	27.8 [‡]	126	27.0 [‡]	120
Other	0.3 [‡]	7	0.3 [‡]	6	***	***	0.1 [‡]	4	***	***	0.1 [‡]	4	0.1 [‡]	3

6.2 Speed while fishing or steaming

Participants provide the average speed of the vessel while participating in each fishery (Table 6.17). This value is only required for trawl fisheries, and therefore, no speed is provided for halibut, crab, or groundfish with fixed gear. These data are delineated by fishery and vessel length class, as summarized in Tables 6.18 through 6.25. Speed data are not available for all fisheries across all years due to changes in the survey data collection. Starting in 2014, participants began reporting average speed for California halibut, and in 2015 participants began reporting fuel use for the Groundfish with midwater trawl gear fishery separately from Groundfish with trawl gear. More information about these form changes can be found on page 57.

Average speed by fishery

Table 6.17: Average speed. Average speed (knots) by fishery. See above for explanation of changes to the data collection across years (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Fishery	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pacific whiting	3.1 [*]	39	3.1 [*]	41	3.2 [*]	33	3.1 [*]	30	3.4 [*]	32	3.3 [*]	31	3.3 [*]	29
Groundfish with midwater trawl gear	—	—	—	—	—	—	—	—	—	—	—	—	2.8 [*]	19
Groundfish with trawl gear	2.6 [‡]	104	2.6 [‡]	98	2.8 [‡]	80	2.7 [‡]	72	2.9 [‡]	72	2.8 [‡]	69	2.4 [*]	61
California halibut	—	—	—	—	—	—	—	—	—	—	2.8 [*]	4	2.8 [*]	3
Salmon	***	***	2.5 [*]	4	2.5 [*]	5	2.8 [‡]	10	2.6 [*]	5	2.7 [*]	11	2.8 [*]	3
Shrimp	2.0 [*]	36	1.9 [*]	36	2.7 [‡]	42	2.7 [‡]	40	2.1 [*]	39	2.2 [‡]	43	2.2 [*]	49
Tuna	5.0 [*]	15	5.2 [*]	15	5.2 [*]	8	5.3 [*]	12	5.5 [*]	7	6.2 [*]	10	5.4 [*]	9
Steaming between West Coast and Alaska	9.0 [*]	28	9.0 [*]	30	8.9 [*]	31	9.0 [*]	28	9.0 [*]	26	9.2 [*]	26	9.0 [*]	23

Average speed by fishery and vessel length class

Table 6.18: Pacific whiting fishery fishing speed. Average speed (knots) of vessels that fished in the Pacific whiting fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***		0		0		0		0
Medium vessel	2.9	9	2.9	9	3.8	5	3.2	5	3.2	5	3.2	5	3.0	4
Large vessel	3.1	30	3.1	32	3.1	27	3.1	25	3.4	27	3.3	26	3.3	25

Table 6.19: Groundfish with midwater trawl gear fishery fishing speed. Average speed (knots) of vessels that fished in the Groundfish with midwater trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	—	—	—	—	—	—	—	—	—	—	—	—	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	—	—	2.7	8
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	2.9	10

Table 6.20: Groundfish with trawl gear fishery fishing speed. Average speed (knots) of vessels that fished in the Groundfish with trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	2.8	35	2.9	30	2.6	20	2.1	19	2.2	18	2.2	17	2.5	15
Medium vessel	2.4	48	2.4	48	2.9	44	3.0	41	3.1	42	3.2	39	2.4	36
Large vessel	2.6	21	2.6	20	2.6	16	2.5	12	3.0	13	2.4	13	2.3	10

Table 6.21: California halibut fishery fishing speed. Average speed (knots) of vessels that fished in the California halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Small vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Large vessel	—	—	—	—	—	—	—	—	—	—		0		0

Table 6.22: Salmon fishery fishing speed. Average speed (knots) of vessels that fished in the Salmon fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	***	***	2.5	4	2.5	5	2.8	10	2.6	5	2.7	11	2.8	3
Medium vessel			0	0	0	0	0	0	0	0	0	0	0	0
Large vessel			0	0	0	0	0	0	0	0	0	0	0	0

Table 6.23: Shrimp fishery fishing speed. Average speed (knots) of vessels that fished in the Shrimp fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	2.3	11	1.9	10	2.2	12	2.3	10	2.3	10	2.7	12	2.6	14
Medium vessel	1.8	21	1.9	21	3.0	25	3.2	22	2.0	22	2.1	23	2.0	27
Large vessel	1.9	4	2.0	5	1.9	5	1.9	8	2.0	7	2.0	8	2.0	8

Table 6.24: Tuna fishery fishing speed. Average speed (knots) of vessels that fished in the Tuna fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	4.9	12	5.1	12	5.1	7	5.1	9	5.6	5	6.3	8	5.4	6
Medium vessel	5.7	3	5.7	3	***	***	5.8	3	***	***	***	***	***	***
Large vessel		0		0		0		0		0		0	***	***

Table 6.25: Steaming between West Coast and Alaska fishery fishing speed. Average speed (knots) of vessels that steamed between West Coast and Alaska by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***	***	***	***	***	***	***	***	***
Medium vessel	9.0	3	8.7	3	8.5	4	8.4	5	8.1	4	8.5	5	7.3	4
Large vessel	9.0	25	9.1	27	9.0	25	9.1	21	9.1	20	9.4	20	9.3	17

6.3 Crew size

Participants submit information about crew size for each fishery in which they participate (Table 6.26). These data provide information about the total number of jobs or positions on vessels; they do not reflect the total number of individuals who worked as crew members in any given year. A new question was added for the 2013 data collection that asks participants to provide the total number of individuals that worked on the vessel during the year (Table 6.41), also delineated by vessel length (Table 6.42). The total number of individuals employed across all vessels serves as an upper bound of the total number of individuals employed in the fishery (Table 6.43).

Crew size data are not available for all fisheries across all years due to changes in fishery participation and the survey data collection. Starting in 2014, participants were asked to provide average crew size for both fixed gear with a trawl permit and fixed gear with a fixed gear permit rather than reporting them as combined. Similarly, starting in 2014, participants report crew size for Pacific halibut separately from California halibut. Crew size is reported by fishery and vessel length class in Tables 6.27 through 6.40. Similarly, as a result of changes in fishing behavior, a new question was added in 2015, requesting crew size for the Non-whiting midwater fishery. More information about these form changes can be found on page 57.

Average crew size by fishery

Table 6.26: Average crew size. Average crew size (excluding captain) by fishery. See above for explanation of changes to the data collection across years (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pacific whiting	2.5	40	2.6	42	2.7	33	2.8	30	2.9	31	2.8	31	2.9	29
Groundfish with midwater trawl gear	—	—	—	—	—	—	—	—	—	—	—	—	2.6	19
Groundfish with trawl gear	2.0	104	2.0	98	2.0	81	2.1	73	2.1	75	2.1	70	2.1	60
Groundfish with fixed gear	1.9	8	2.0	8	2.6	26	2.8	24	2.7	20	—	—	—	—
Groundfish fixed gear with a trawl permit	—	—	—	—	—	—	—	—	—	—	2.4	20	2.9	18
Groundfish fixed gear with a fixed gear permit	—	—	—	—	—	—	—	—	—	—	3.6	8	3.3	11
Crab	2.9	55	2.9	57	2.9	66	3.0	63	2.9	65	2.9	65	2.9	58
Halibut	1.8	7	1.6	6	1.9	7	2.1	6	2.5	4	—	—	—	—
Pacific halibut	—	—	—	—	—	—	—	—	—	—	***	***	2.8	4
California halibut	—	—	—	—	—	—	—	—	—	—	1.2	4	1.0	3
Salmon	***	***	1.7	3	1.7	3	1.4	7	1.7	3	1.0	8	***	***
Shrimp	2.0	37	2.0	37	2.0	43	2.1	41	2.1	40	2.2	43	2.3	49
Tuna	1.5	15	1.6	14	1.5	7	1.6	11	1.9	7	1.3	9	1.7	9
Steaming between West Coast and Alaska	2.9	28	3.0	31	3.0	30	2.9	28	3.0	26	2.9	28	2.9	23

Average crew size by fishery and vessel length class

Table 6.27: Pacific whiting fishery crew size. Average crew size (not including captain) on vessels that fished in the Pacific whiting fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***		0		0		0		0
Medium vessel	2.2	10	2.2	10	2.2	6	2.6	5	2.6	5	2.6	5	2.5	4
Large vessel	2.6	30	2.8	32	2.8	26	2.8	25	3.0	26	2.9	26	2.9	25

Table 6.28: Groundfish with midwater trawl gear fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish with midwater trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medium vessel	—	—	—	—	—	—	—	—	—	—	—	—	2.9	8
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	2.6	10

Table 6.29: Groundfish with trawl gear fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish with trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	1.8	34	1.8	29	1.8	20	1.9	19	1.8	19	1.9	18	1.9	14
Medium vessel	2.1	49	2.1	49	2.1	45	2.1	42	2.2	44	2.2	39	2.2	36
Large vessel	2.3	21	2.3	20	2.4	16	2.3	12	2.3	13	2.4	13	2.2	10

Table 6.30: Groundfish with fixed gear fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish with fixed gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	1.3 [†]	6	1.5 [†]	6	2.1 [†]	18	2.1 [†]	14	2.5 [†]	13	—	—	—	—
Medium vessel	***	***	***	***	3.6 [†]	7	3.5 [†]	8	3.1 [†]	7	—	—	—	—
Large vessel	***	***	***	***	***	***	***	***		0	—	—	—	—

Table 6.31: Groundfish fixed gear with a trawl permit fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish fixed gear with a trawl permit fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Small vessel	—	—	—	—	—	—	—	—	—	—	2.1 [†]	14	2.6 [†]	11
Medium vessel	—	—	—	—	—	—	—	—	—	—	3.2 [†]	6	3.2 [†]	6
Large vessel	—	—	—	—	—	—	—	—	—	—	0	***	***	

Table 6.32: Groundfish fixed gear with a fixed gear permit fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish fixed gear with a fixed gear permit fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Small vessel	—	—	—	—	—	—	—	—	—	—	2.7 [†]	3	2.7 [†]	6
Medium vessel	—	—	—	—	—	—	—	—	—	—	4.2 [†]	5	3.8 [†]	4
Large vessel	—	—	—	—	—	—	—	—	—	—	0	***	***	

Table 6.33: Crab fishery crew size. Average crew size (not including captain) on vessels that fished in the crab fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	2.3 [*]	28	2.4 [*]	29	2.4 [*]	33	2.5 [*]	30	2.5 [*]	30	2.4 [*]	33	2.3 [*]	29
Medium vessel	3.4 [*]	21	3.4 [*]	22	3.3 [*]	26	3.3 [*]	26	3.2 [*]	26	3.4 [*]	25	3.4 [*]	22
Large vessel	3.6 [*]	6	3.3 [*]	6	3.5 [*]	7	3.5 [*]	7	3.6 [*]	9	3.4 [*]	7	3.6 [*]	7

Table 6.34: Halibut fishery crew size. Average crew size (not including captain) on vessels that fished in the halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	1.6 [†]	4	1.5 [†]	3	1.6 [†]	4	***	***	***	***	—	—	—	—
Medium vessel	***	***	1.7 [*]	3	2.2 [*]	3	2.8 [*]	4	***	***	—	—	—	—
Large vessel	***	***		0		0		0		0	—	—	—	—

Table 6.35: Pacific halibut fishery crew size. Average crew size (not including captain) on vessels that fished in the Pacific halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Small vessel	—	—	—	—	—	—	—	—	—	—		0	2.0 [*]	3
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***		0
Large vessel	—	—	—	—	—	—	—	—	—	—		0	***	***

Table 6.36: California halibut fishery crew size. Average crew size (not including captain) on vessels that fished in the California halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Small vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Large vessel	—	—	—	—	—	—	—	—	—	—		0		0

Table 6.37: Salmon fishery crew size. Average crew size (not including captain) on vessels that fished in the salmon fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	***	***	1.7*	3	1.7*	3	1.4*	7	1.7*	3	1.0*	8	***	***
Medium vessel			0		0		0		0		0		0	
Large vessel			0		0		0		0		0		0	

Table 6.38: Shrimp fishery crew size. Average crew size (not including captain) on vessels that fished in the shrimp fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Small vessel	1.8*	11	1.7*	10	1.9*	13	2.1*	11	2.0*	11	2.1*	12	2.1*	14
Medium vessel	2.0*	22	2.0*	22	2.1*	25	2.0*	22	2.2*	22	2.3*	23	2.3*	27
Large vessel	2.1*	4	2.1*	5	2.0*	5	2.1*	8	2.1*	7	2.1*	8	2.4*	8

Table 6.39: Tuna fishery crew size. Average crew size (not including captain) on vessels that fished in the tuna fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	1.5 [*]	11	1.6 [*]	11	1.4 [*]	6	1.8 [*]	8	1.8 [*]	5	1.3 [*]	7	1.3 [*]	6
Medium vessel	1.8 [*]	4	1.7 [*]	3	***	***	1.3 [*]	3	***	***	***	***	***	***
Large vessel		0		0		0		0		0		0	***	***

Table 6.40: Steaming between West Coast and Alaska fishery crew size. Average crew size (not including captain) on vessels that steamed between West Coast and Alaska by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***	***	***	***	***	***	***	***	***
Medium vessel	3.0 [*]	3	3.0 [*]	3	3.2 [*]	4	2.6 [*]	5	2.8 [*]	4	2.5 [*]	6	2.0 [*]	4
Large vessel	2.9 [*]	25	3.0 [*]	28	2.9 [*]	24	2.9 [*]	21	2.8 [*]	20	3.0 [*]	20	2.9 [*]	17

Average total number of individuals employed

Table 6.41: Average number of individuals employed. Average total number of individuals who worked as captain or crew on EDC vessels while fishing on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Total number of individuals who worked as captain or crew	—	—	—	—	—	—	—	—	6.6 [‡]	122	6.5 [‡]	125	6.8 [‡]	117

Average total number of individuals employed by vessel length class

Table 6.42: Average number of individuals employed. Average total number of individuals who worked as captain or crew on EDC vessels while fishing on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses).

Vessel length category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	6.6 [‡]	122	6.5 [‡]	125	6.8 [‡]	117
Medium vessel	—	—	—	—	—	—	—	—	6.6 [‡]	122	6.5 [‡]	125	6.8 [‡]	117
Large vessel	—	—	—	—	—	—	—	—	6.6 [‡]	122	6.5 [‡]	125	6.8 [‡]	117

Total number of crew positions and individuals

Table 6.43: Total number of crew positions and individuals employed. Total number of crew positions and individuals employed by EDC vessels in West Coast Fisheries (N = number of EDC vessels with non-zero, non-NA responses). See above for explanation of changes to the data collection across years.

	2009		2010		2011		2012		2013		2014		2015	
	Total	N												
Positions	278	127	281	127	314	133	304	127	305	122	307	125	298	117
Individuals	—	—	—	—	—	—	—	—	801	122	812	125	798	117

7 At-Sea Deliveries and Shoreside Landings

Vessels in the catch share fishery participate in both shorebased and at-sea fisheries, with total landings summarized in Table 7.1 and Figure 39. The only fishery for which vessels deliver at-sea is the whiting fishery. There is also a shorebased whiting fleet. Information about the weight of landings or deliveries is not requested on the EDC forms because this information is obtained from other sources.

Landings and deliveries information are primarily obtained from state fish ticket data and the At-Sea Hake Observer Program database, respectively, accessed through PacFIN. The weight of landings and deliveries made while fishing in Alaska are obtained from the EDC forms. Species composition is available for West Coast fisheries, but not for Alaska fisheries. Alaska landings weights are provided here because they are used for cost disaggregation in Section 9.

Table 7.1: Total shoreside landings and at-sea deliveries. Total landings and deliveries in West Coast at-sea and shoreside fisheries and Alaska (thousands of round metric tons) (N = number of EDC vessels with non-zero, non-NA responses).

Location	2009		2010		2011		2012		2013		2014		2015	
	Total	N												
At-sea	24.3	19	35.9	21	50.3	18	38.6	16	52.9	18	62.3	19	27.9	14
Shoreside	73.0	126	95.7	125	126.5	127	99.6	124	136.0	119	136.7	120	95.4	113
Alaska	81.9	27	94.2	28	101.0	27	90.3	25	99.1	24	102.9	24	88.7	21
Total landings	179.1	132	225.9	131	277.9	132	228.6	128	288.0	124	301.9	125	211.9	117

7.1 At-sea deliveries

The catcher vessels that deliver at-sea to motherships on the West Coast target Pacific whiting, with very little bycatch (Table 7.2).

Table 7.2: At-sea landings and deliveries. Total at-sea deliveries (metric tons) by species group (N = number of EDC vessels with non-zero, non-NA responses).

Species group	2009		2010		2011		2012		2013		2014		2015	
	Total	N	Total	N	Total	N								
Arrowtooth flounder	1	19	3	20	7	18	2	16	3	18	2	19	1	14
Coastal pelagics	***	***	0	14	14	10	10	15	86	16	20	16	24	13
English sole	0	0	***	***	***	***	***	***	0	4	0	0	0	0
Pacific halibut	0	13	1	13	0	5	0	7	0	12	0	8	***	***
Pacific herring	0	11	***	***	***	***	***	***	***	***	0	14	0	9
Pacific whiting	24,090	19	35,713	21	50,051	18	38,480	16	52,450	18	62,098	19	27,660	14
Rex sole	0	0	2	12	2	9	0	10	1	14	1	15	0	11
Rockfish	1	19	22	21	13	17	24	16	16	18	15	19	13	14
Sablefish	0	5	5	15	2	14	1	9	3	16	1	14	2	10
Salmon	1	18	2	20	4	18	7	16	6	18	7	18	1	13
Sanddab	0	0	0	0	0	0	0	0	***	***	0	0	0	3
Semi pelagic rockfish	191	19	96	21	81	18	50	16	208	18	88	19	106	14
Sharks, skates and rays	7	19	57	21	111	18	36	16	45	18	36	19	18	14
Squid	4	19	22	21	20	18	28	16	56	18	31	19	11	14
Thornyheads	0	0	0	9	1	9	1	10	6	15	2	16	2	13
Other flatfish	0	4	***	***	0	4	0	7	0	8	0	5	0	3
Other groundfish	0	0	0	0	0	5	0	5	0	6	0	10	***	***
Other species	1	19	10	20	24	18	3	16	4	18	31	19	13	14
Total deliveries	24,296	19	35,934	21	50,330	18	38,643	16	52,885	18	62,333	19	27,851	14

7.2 Shoreside landings

Pacific whiting makes up the largest part of the total catch by weight in the shoreside groundfish trawl fisheries (Table 7.3). The next most common species by weight are dover sole, sablefish, petrale sole, and thornyheads. Between 2009 and 2015, there were 9 species grouped into the “other groundfish” species category. By weight, the most common were grenadier, spotted ratfish, and unspecified groundfish. Crab and shrimp comprise the largest component of total shoreside deliveries by weight (Table 7.4).

Table 7.3: Shoreside landings and deliveries: groundfish. Total shoreside landings (metric tons) by species group of groundfish (N = number of EDC vessels with non-zero, non-NA responses).

Species group	2009		2010		2011		2012		2013		2014		2015	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
Arrowtooth flounder	3,792	102	3,253	98	2,280	84	2,280	88	1,988	86	1,225	82	1,332	81
Dover sole	11,494	118	10,398	112	7,665	92	7,213	91	7,969	85	6,226	82	6,306	87
English sole	266	112	158	104	110	70	117	71	198	69	194	60	245	64
Lingcod	110	123	74	108	253	88	355	90	336	92	247	93	198	89
Pacific cod	105	50	143	46	263	44	396	28	154	27	166	31	377	38
Pacific whiting	39,808	36	59,090	44	89,137	62	65,850	66	95,731	62	103,109	58	60,551	60
Petrale sole	1,682	116	777	108	789	75	1,065	76	2,099	77	2,244	76	2,503	71
Rex sole	529	118	445	111	364	82	366	83	468	81	380	75	471	77
Rockfish	434	131	481	121	291	106	475	105	447	102	378	99	448	92
Sablefish	3,277	131	2,934	119	3,071	112	2,690	108	2,199	99	2,310	99	2,688	95
Sanddab	294	58	152	42	141	30	148	32	203	36	258	47	157	28
Semi pelagic rockfish	541	122	688	116	1,225	91	1,471	88	1,550	93	2,150	88	2,533	80
Sharks, skates and rays	1,370	121	1,361	114	1,314	92	1,305	90	1,098	94	1,282	87	1,222	81
Thornyheads	2,435	118	2,486	115	1,617	95	1,605	100	1,881	94	1,528	90	1,461	90
Other flatfish	128	68	109	60	101	60	98	51	38	50	63	43	45	44
Other groundfish	88	36	116	57	92	47	85	51	58	45	35	42	21	54
Total landings	66,352	133	82,664	126	108,711	118	85,520	111	116,416	110	121,795	107	80,555	98

Table 7.4: Shoreside landings and deliveries: non-groundfish. Total shoreside landings (metric tons) by species group of non-groundfish species (N = number of EDC vessels with non-zero, non-NA responses).

Species group	2009		2010		2011		2012		2013		2014		2015	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
California halibut	48	7	56	10	48	6	38	4	41	6	38	5	25	4
Coastal pelagics	1	32	4	26	24	30	46	30	126	26	314	26	257	27
Crab	2,572	78	2,315	76	2,658	89	2,045	76	3,990	79	1,832	73	330	60
Echinoderms	0	8	***	***	***	***	0	8	0	6	***	***	0	0
Pacific halibut	2	15	***	***	6	25	5	25	4	30	2	27	11	28
Pacific herring	0	6	48	12	1	11	0	5	0	8	14	18	44	22
Salmon	1	30	17	35	33	31	37	37	34	34	46	38	16	37
Sharks, skates and rays	1	26	32	44	7	52	21	41	3	22	6	27	17	35
Shrimp	5,323	34	7,515	40	12,921	43	11,710	39	13,163	38	17,122	41	18,265	47
Squid	34	63	118	51	18	45	25	41	19	36	31	39	41	31
Sturgeon	0	3	***	***	0	0	0	0	0	0	0	0	0	0
Tuna	127	20	171	17	59	9	101	17	18	7	64	8	168	12
Other shellfish	3	33	2	32	1	32	2	25	2	24	2	20	3	23
Other species	68	59	31	59	13	64	154	63	81	63	56	58	163	52
Total landings	8,182	126	10,314	125	15,816	117	14,186	118	17,480	116	19,528	115	19,339	113

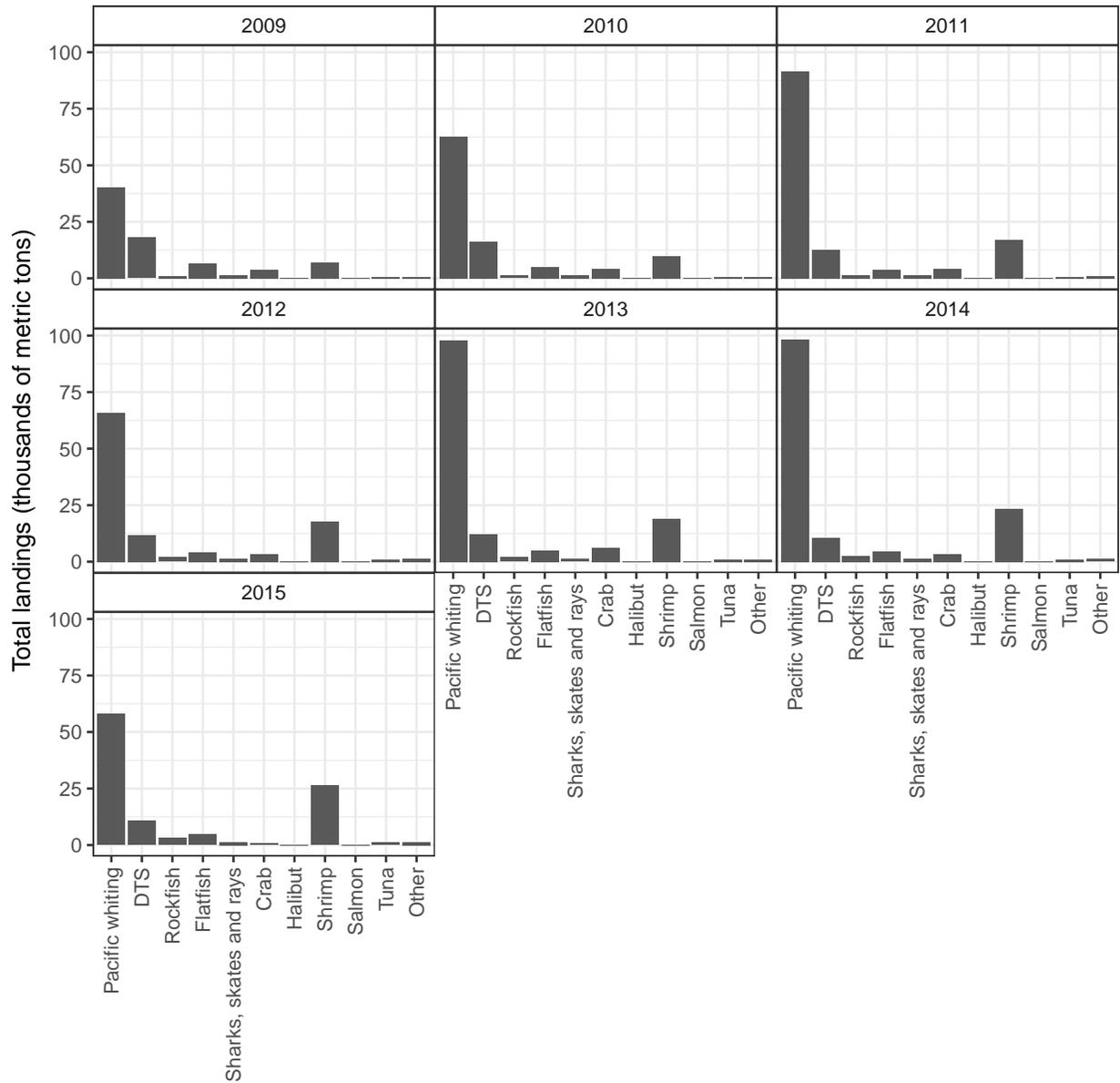


Figure 39: Total landings by species group (thousands of metric tons).

8 Revenues

There are several sources of earnings for vessels on the West Coast. The primary source is revenue from sale of fish. Ex-vessel revenue is available for all shoreside deliveries (Figure 40), but is not available for at-sea deliveries. EDC data are used for all at-sea delivery revenues. Additionally, the EDC Program has information about revenue from sale or lease of permits, quota shares, and quota pounds, and from other activities like chartering and research. The full suite of earnings sources can be found in Table 8.1.

Table 8.1: Average annual revenue. Annual average revenue (thousands of \$) for all categories by survey year (N = number of EDC vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Alaska shoreside landings and at-sea deliveries	\$1,227	31	\$1,321	31	\$1,841	34	\$1,836	28	\$1,681	26	\$1,680	27	\$1,587	25
At-sea deliveries	\$308	20	\$412	20	\$576	18	\$568	16	\$537	19	\$668	18	\$478	15
Shoreside deliveries	\$382	139	\$404	133	\$660	131	\$629	125	\$805	119	\$773	120	\$703	114
Sale of quota shares	***	***	0	0	***	***	***	***	***	***	\$726	4	\$113	3
Lease of quota shares	0	0	0	0	\$60	11	\$83	12	\$97	5	\$52	18	\$37	13
Sale of quota pounds	***	***	***	***	\$54	12	\$20	16	\$40	37	—	—	—	—
Lease of quota pounds	0	0	***	***	\$67	48	\$73	41	\$18	10	—	—	—	—
Sale or lease of quota pounds	—	—	—	—	—	—	—	—	—	—	\$31	42	\$35	40
Sale of West Coast limited entry trawl permits	***	0	\$403	3	***	***	***	***	***	0	***	***	***	0
Lease of West Coast limited entry trawl permits	***	***	***	***	\$82	7	\$39	6	\$52	4	***	***	***	***
Sale of other permits	\$136	3	\$85	3	\$181	5	***	***	***	0	—	—	—	—
Lease of other permits	***	***	***	***	\$142	6	***	***	***	***	—	—	—	—
Sale of West Coast limited entry fixed gear permits	—	—	—	—	—	—	—	—	—	—	***	***	***	0
Lease of West Coast limited entry fixed gear permits	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Leasing the vessel	—	—	—	—	—	—	***	***	***	***	—	—	—	—
Salmon disaster payments	\$26	16	\$2	3	***	***	0	0	***	0	0	0	0	0
Insurance settlements	—	—	—	—	—	—	—	—	***	***	\$41	4	\$116	8
Other	\$89	16	\$117	9	\$135	11	\$103	8	\$118	20	\$91	15	\$213	11
Chartering or leasing the vessel	\$117	11	\$157	11	\$180	13	—	—	—	—	\$165	5	\$329	3
Chartering, research, or tendering on the West Coast	—	—	—	—	—	—	\$163	10	\$85	11	\$143	11	\$147	10
Chartering, research, or tendering in Alaska	—	—	—	—	—	—	\$303	3	\$199	7	\$238	5	\$360	7
Average total revenue	\$688	147	\$768	141	\$1,202	142	\$1,127	133	\$1,285	126	\$1,254	129	\$1,143	122

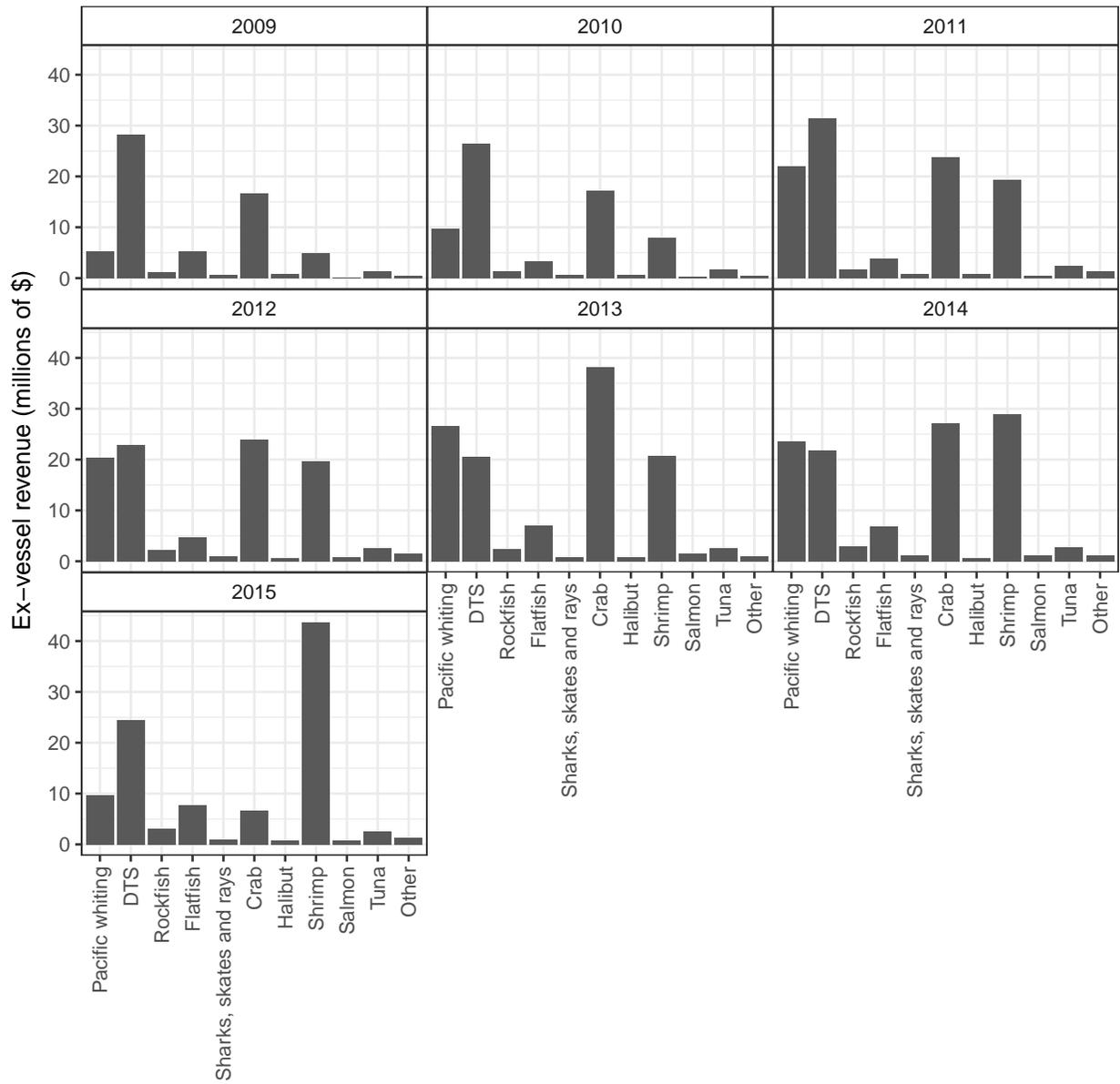


Figure 40: Total ex-vessel shoreside revenue (millions of dollars).

9 Costs

This section summarizes data reported by participants on variable costs, fixed costs, total costs, and how those costs are disaggregated to estimate the proportion of each cost that was incurred for West Coast fisheries.

For the purposes of the EDC Program, 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 as directly with the level of fishery participation, and generally include items such as vessel capital improvements. The designation of a cost as variable or fixed depends on many factors, including the relevant time horizon and use of the data. While some costs would clearly be considered fixed (*e.g.*, the purchase of a new engine), others are more difficult to categorize as fixed versus variable. For the purposes of this report, we consider the costs listed in the costs listed in Table 9.1 to be variable, and the costs listed in Tables 9.2, 9.3 and 9.5 to be fixed.

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 business’ accounting system.

In order to conduct economic analyses of specific fisheries, it is important to have costs broken out by fishery. 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 or groups of fisheries. Each cost item was assigned to one or more fishery-group 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.

Some costs that are required for economic analysis are not asked for on the EDC forms because they are available through other sources, or can be calculated through fish ticket or permit office data. These include fish landings taxes and fees.

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

9.1 Variable costs

Variable costs were collected for all West Coast activities, including chartering or research. Unlike fixed costs, variable costs are directly related to fishing operations, and therefore, it was possible for vessels to separate expenses for activities on the West Coast from other activities. In all years, crew compensation made up the largest portion of total variable expenses, followed by captain compensation, and fuel and lubrication (Table 9.1). Together, these expenses made up 78.4% of all variable costs on the West Coast in 2015.

Table 9.1: Variable expenses. Average variable costs on the West Coast for EDC vessels (thousands of \$) (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Bait	\$9.4	66	\$9.9	63	\$14.9	74	\$17.2	70	\$18.2	69	\$18.8	63	\$13.9	52
Buyback fees	\$15.4	143	\$18.2	139	\$29.9	113	\$27.6	109	\$32.2	108	\$32.4	105	\$24.2	97
Captain	\$64.4	134	\$69.0	128	\$107.7	124	\$108.4	116	\$131.4	116	\$131.4	117	\$116.8	109
Communication	\$2.2	121	\$2.6	114	\$2.5	130	\$2.4	125	\$3.1	124	\$3.2	123	\$3.5	116
Cost recovery fees		0		0		0		0		0	\$18.8	105	\$13.8	97
Crew	\$82.5	142	\$91.3	137	\$146.1	134	\$148.7	128	\$172.9	122	\$177.4	125	\$155.9	118
Fishing association dues	\$4.0	85	\$3.9	79	\$6.0	94	\$7.6	86	\$8.0	87	\$9.4	100	\$9.7	98
Food	\$5.4	126	\$5.6	119	\$6.5	106	\$7.1	91	\$7.3	94	\$6.9	95	\$7.1	84
Freight	\$0.6	30	\$0.7	26	\$2.3	24	\$1.1	23	\$1.6	24	\$1.3	23	\$1.0	24
Fuel and lubrication	\$50.3	144	\$68.8	136	\$81.3	134	\$92.5	129	\$91.5	124	\$94.3	125	\$65.0	118
Ice	\$6.4	109	\$5.7	104	\$5.9	102	\$6.4	96	\$7.4	92	\$10.2	90	\$11.4	84
License fees	***	***	\$0.3	14	\$3.3	129	\$3.8	125	\$3.5	122	\$2.6	121	\$3.5	116
Observers	\$5.2	23	\$5.4	26	\$3.0	102	\$5.7	103	\$10.4	106	\$15.1	102	\$17.9	95
Offloading	\$4.0	58	\$4.6	53	\$5.4	57	\$8.0	38	\$5.2	35	\$5.0	38	\$4.3	39
Supplies	\$8.6	110	\$9.8	101	\$5.9	100	\$6.4	98	\$6.9	94	\$8.7	89	\$8.7	86
Travel	\$1.7	47	\$1.8	40	\$1.7	28	\$2.2	24	\$2.1	29	\$3.1	37	\$3.2	33
Trucking of fish	***	***	\$1.4	13	\$3.7	9	\$4.5	6	\$3.9	4	\$4.2	8	\$1.8	7
Washington fish taxes	\$3.0	21	\$3.0	26	\$5.6	31	\$6.1	24	\$7.4	22	\$6.5	30	\$6.4	30
Average total	\$235.2	144	\$266.2	140	\$385.5	136	\$404.9	129	\$463.8	124	\$496.0	125	\$419.3	118

9.2 Fixed costs

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

Survey participants are asked to provide capitalized expenditures (Table 9.2) and expenses (Table 9.3) for the survey year associated with the following categories:

- New and used vessel and on-board equipment: Includes all electronics, safety equipment, and machinery not used to harvest fish, but not fishing gear or processing equipment
- Fishing gear: Includes nets, doors, traps, pots, cables, and fishing machinery used for the West Coast fisheries
- Processing Equipment: Includes any equipment used to process or head and gut fish on-board the vessel

From 2009-2013, participants were asked to report capitalized expenditures and expenses separately (Tables 9.2 and 9.3). Beginning in 2014, the EDC survey was changed and participants now report total costs (capitalized expenditures and expenses combined) 9.4). This information is reported in three tables to document exactly what data were collected and how, a summary table of the West Coast portion of these costs is also available (first three rows of Table 12.1).

Table 9.2: Capitalized expenditures on vessel and on-board equipment, fishing gear, and processing equipment. Average capitalized expenditures (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment. See above for explanation of changes to the data collection across years, and the resulting new summary in Table 12.1 (N = number of EDC vessels with non-zero, non-NA responses).

Expenditure category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Vessel and on-board equipment in all fisheries	\$69.5:	92	\$63.6:	83	\$71.3:	104	\$148.3:	92	\$111.7:	78	—	—	—	—
Fishing gear shared between the West Coast and other fisheries	\$37.5:	32	\$45.7:	29	\$91.8:	29	\$86.0:	16	\$59.3:	11	—	—	—	—
Fishing gear used only on the West Coast	\$22.4:	83	\$22.8:	75	\$40.5:	94	\$26.8:	81	\$30.5:	34	—	—	—	—
Processing equipment shared between the West Coast and other fisheries		0		0	***	***		0	***	***	—	—	—	—
Processing equipment used only on the West Coast	\$20.5:	15	\$22.2:	10	\$3.0:	7	***	***	***	***	—	—	—	—
Average total	\$85.7:	114	\$84.5:	101	\$111.3:	125	\$165.3:	104	\$111.9:	93	—	—	—	—

Table 9.3: Expenses on vessel and on-board equipment, fishing gear, and processing equipment. Average expenses (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment. See above for explanation of changes to the data collection across years, and the resulting new summary in Table 12.1 (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Vessel and on-board equipment in all fisheries	\$62.1	134	\$57.4	125	\$95.9	117	\$98.0	116	\$79.9	101	—	—	—	—
Fishing gear shared between the West Coast and other fisheries	\$34.2	44	\$48.5	40	\$95.7	35	\$146.3	28	\$141.7	16	—	—	—	—
Fishing gear used only on the West Coast	\$19.0	118	\$20.7	109	\$25.3	109	\$35.8	106	\$34.4	65	—	—	—	—
Processing equipment shared between the West Coast and other fisheries	0	0	\$0.9	9	\$16.3	5	\$10.3	5	\$2.0	5	—	—	—	—
Average total	\$82.7	146	\$82.4	138	\$128.0	136	\$145.1	133	\$111.3	113	—	—	—	—

Table 9.4: Capitalized expenditures and expenses on vessel and on-board equipment, fishing gear, and processing equipment. Average expenses (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment. Beginning in 2014, participants reported combined capitalized expenditures and expenses, the costs collected in the original format can be found in Tables 9.2 and 9.3 (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N								
Vessel and on-board equipment in all fisheries	—	—	—	—	—	—	—	—	—	—	\$168.8:	102	\$146.7:	105
Fishing gear shared between the West Coast and other fisheries	—	—	—	—	—	—	—	—	—	—	\$104.0:	14	\$74.2:	18
Fishing gear used only on the West Coast	—	—	—	—	—	—	—	—	—	—	\$36.5:	67	\$40.2:	66
Processing equipment shared between the West Coast and other fisheries	—	—	—	—	—	—	—	—	—	—	0	0	0	0
Processing equipment used only on the West Coast	—	—	—	—	—	—	—	—	—	—	***	***	\$0.7:	3
Average total	—	—	—	—	—	—	—	—	—	—	\$182.1:	116	\$170.2:	114

Other fixed costs

Table 9.5: Other fixed expenses. Average fixed expenses (thousands of \$) on all other categories (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Insurance	\$33.3	134	\$34.4	129	\$37.6	131	\$38.6	126	\$42.0	122	\$44.8	124	\$43.4	118
Lease of vessel	\$86.3	12	\$107.7	10	\$89.9	10	\$65.9	8	\$95.2	9	\$94.9	9	\$156.9	8
Moorage	\$5.4	144	\$5.9	134	\$6.1	139	\$6.8	132	\$7.1	127	\$7.4	129	\$7.3	121
Average total	\$42.6	147	\$45.1	140	\$47.3	141	\$47.3	133	\$53.7	128	\$56.6	130	\$59.5	122

Table 9.6: Depreciation. Average depreciation (thousands of \$) taken during the survey year (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Depreciation	\$75.9	101	\$68.5	92	\$107.1	98	\$103.5	89	\$92.0	87	\$84.5	91	\$99.7	89

9.3 Quota and permit costs on the West Coast

EDC participants are asked to provide information about the costs related to purchasing or leasing permits, quota shares, and quota pounds. Up until 2014, participants were asked to report total expenses related to purchase of quota pounds separately from the expenses related to lease of quota pounds. This question caused confusion among participants because they use those terms interchangeably. The change in the question format can be seen in Table 9.7 where “—” indicates years in which the question was not asked.

Table 9.7: Quota and permit costs. Average costs (thousands of \$) related to lease and purchase of quota shares, quota pounds, and limited entry groundfish permits. See above for explanation of changes to the data collection across years (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Purchase of trawl limited entry permit	\$28.9	8	***	***	***	***	***	***	***	***	***	***	***	***
Lease of trawl limited entry permit	\$15.7	9	\$14.1	8	\$25.4	11	\$17.9	10	\$10.1	7	\$25.4	10	\$8.8	11
Purchase of fixed gear limited entry permit		0		0	***	***		0	***	***	***	***		0
Lease of fixed gear limited entry permit		0		0	***	***	\$101.4	5	\$57.7	3	***	***	\$51.0	3
Purchase of quota shares		0		0	***	***	***	***	***	***	***	***	***	***
Lease of quota shares		0	***	***	\$22.1	3	\$41.6	5	\$97.0	9	\$65.6	21	\$50.9	15
Purchase of quota pounds		0	***	***	\$16.5	16	\$18.6	15	\$26.8	9	—	—	—	—
Lease of quota pounds	***	***	\$35.1	6	\$86.9	64	\$67.3	60	\$49.8	60	—	—	—	—
Purchase or lease of quota pounds	—	—	—	—	—	—	—	—	—	—	\$63.4	52	\$61.8	64
Average total quota and permit costs	\$21.5	18	\$30.0	24	\$101.2	80	\$65.3	80	\$108.0	78	\$70.4	78	\$72.8	77

9.4 Landings taxes and fees

Costs associated with landings taxes were not requested on the catcher vessel forms because it can be calculated based on gross shoreside landings information. These tax costs were calculated according to the table provided in Leonard and Watson (2011).¹¹ Beginning in 2014, NMFS began collecting “Cost Recovery fees” as authorized by the MSA to “recover the actual cost directly related to the management, data collection, and enforcement of any limited access privilege program.” The shoreside fleet currently pays cost recovery fees of 3% (the maximum allowed by the MSA) of total ex-vessel revenue. The mothership sector paid 2.1% (average 2014-2015) and catcher-processors paid 0.8% of the value of the fish processed. Since the mothership sector does not report ex-vessel prices at the time of delivery and there is no ex-vessel price for the catcher-processor catch, the cost recovery fees are based on prices estimated by PacFIN.

Table 9.8: Landings taxes. Average fees and Washington state taxes (thousands of \$) paid by vessels (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Buyback fees	\$16.0 [‡]	131	\$19.2 [‡]	130	\$29.9 [‡]	112	\$27.6 [‡]	109	\$32.2 [‡]	108	\$32.4 [‡]	105	\$23.7 [‡]	97
Cost recovery fees		0		0		0		0		0	\$18.7 [‡]	105	\$13.4 [‡]	99
WA fish taxes	\$3.0 [‡]	20	\$3.1 [‡]	25	\$5.5 [‡]	29	\$6.1 [‡]	24	\$7.4 [‡]	22	\$6.5 [‡]	30	\$6.3 [‡]	30
Average total	\$16.4 [‡]	131	\$19.8 [‡]	130	\$30.0 [‡]	117	\$28.2 [‡]	112	\$32.5 [‡]	112	\$49.7 [‡]	112	\$37.3 [‡]	102

10 Crew Share System

The most common system for remunerating crew is the crew share system where crew are paid a percentage of the total revenue earned by the vessel after certain expenses are deducted. Most vessels in the groundfish trawl fishery use this system (Table 10.1).

Table 10.1: Frequency of crew share systems. Number of entities who used a crew share system, did not use a crew share system, or did not respond to the question. An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Crew share system	2009	2010	2011	2012	2013	2014	2015
YES	121	120	113	108	102	98	99
NO	1	1	2	1	6	6	1
No response	0	1	0	0	3	2	0

Participants are asked to provide the percentage of fishing trips in which the vessel owner served as captain in West Coast groundfish fisheries (Table 10.2). Average crew share distributions when the vessels were owner-operated

¹¹ 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.

and when they were operated by a hired captain are summarized in Tables 10.3 and 10.4, respectively. In 2012, 11 participants provided the response “NA”. These responses are most commonly a result of ownership of a vessel by an LLC that is not identified with a specific person who could operate the vessel as a captain.

Table 10.2: Percent of trips with owner-operated vessels. Average percentage of trips when the vessel owner served as captain (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Percentage of trips vessel owner served as captain	87.1	49	81.9	51	88.9	51	80.7	42	86.4	37	84.1	39	80.7	37

Table 10.3: Average crew shares when vessels were owner-operated. Average share (percent of ex-vessel revenue after deducting certain costs) paid to captain, crew, vessel, and other on trips when the vessel owner served as captain (N = number of EDC vessels with non-zero, non-NA responses).

Share	2009		2010		2011		2012		2013		2014		2015	
	Mean %	N												
Captain share	24.5	40	20.5	36	22.8	40	19.3	33	22.5	29	20.0	28	16.9	28
Crew share	24.1	51	22.9	52	25.0	51	24.9	45	25.5	37	24.0	38	25.9	38
Vessel share	59.1	50	62.3	51	59.7	50	60.5	45	61.4	38	61.4	37	60.2	37
Other share	—	—	—	—	12.7	3	24.0	5	14.0	5	24.3	3	10.0	3

Table 10.4: Average crew shares when using a hired captain. Average share (percent of ex-vessel revenue after deducting certain costs) paid to captain, crew, vessel, and other on trips when the vessel owner did not serve as captain (N = number of EDC vessels with non-zero, non-NA responses).

Share	2009		2010		2011		2012		2013		2014		2015	
	Mean %	N												
Captain share	17.8	92	17.8	92	18.0	89	18.0	87	17.9	84	18.6	84	17.6	80
Crew share	21.8	96	21.2	95	22.2	91	22.4	89	22.4	86	23.8	86	22.8	82
Vessel share	60.2	94	61.0	93	59.2	90	59.3	89	59.2	85	58.4	88	59.8	83
Other share	—	—	—	—	7.5	4	8.0	8	14.2	9	5.6	7	7.2	5

Catcher Vessel Data Analysis

The data summaries above provide important information about the vessels that participate in the catch share program. To analyze the effect of the program on vessels, additional analysis is necessary. The following sections combine the EDC data with additional data sources such as fish ticket data and observer data to calculate fishery level costs and subsequently, net revenue. The final section presents these measures as rates in order to better understand how changes observed are related to changes in TAC and fishing effort.

11 Days at Sea by Fishery

Although the data provided on the EDC forms provide most of the information necessary for examining fishery participation, several of the days at sea need to be further split into subfisheries using information from state fish tickets obtained from the PacFIN database, data collected by the At-Sea Hake Observer Program (A-SHOP) obtained from the NORPAC database, and EDC data (ex-vessel revenue from at-sea deliveries).

The days at sea question remained constant from 2009-2013. For these years, the “West Coast whiting trawl gear (not including other groundfish)” (whiting) days are split into At-sea Pacific whiting and Shoreside Pacific whiting fisheries. The “West Coast groundfish trawl gear” days are split into Dover-thornyhead-sablefish (DTS) with trawl gear and Non-whiting, non-DTS groundfish with trawl gear, and the “West Coast groundfish fixed gear” days are split into Groundfish fixed gear with fixed gear endorsement and Groundfish fixed gear with trawl endorsement fisheries.

Although the days at sea question was not changed until 2014, fishing behavior began changing in 2012. As described in Section 3, the Non-whiting midwater trawl fishery resumed in 2012. Therefore, for three years (2012-2014), the days were manually split using the whiting and groundfish trawl days reported on the forms. Whether days at sea for the midwater trawl fishery were derived by subtracting from the reported days for whiting or non-whiting groundfish was determined on a case by case basis because there were no specific instructions about how to report this “new” fishery for participants. In 2015, the “West Coast midwater trawl gear” category was added to the forms and can now be used as it is submitted.

The number of EDC participants fishing in “Other fisheries” (halibut, salmon, tuna, open access groundfish, fixed gear groundfish without a limited entry permit) has decreased over time from a maximum of 27 in 2010 and 2012, to 18 in 2014 and 2015. In terms of active catch share participants (or Limited Entry Trawl in 2009 and 2010), the number dropped from 20 in 2009 and 2010 to 11 in 2015. Other fisheries with the highest total ex-vessel revenue

were tuna (\$455,000 in 2015) and halibut (\$337,000 in 2015). Tuna had the largest number of participating vessels, ranging from 6 (2013) to 15 (2010).

Allocation of the reported days at sea into the subfisheries is a two-step process. First, ex-vessel revenue is used to categorize each delivery into a subfishery (At-sea Pacific whiting, Shoreside Pacific whiting, Non-whiting midwater trawl, DTS trawl with trawl endorsement, Non-whiting, non-DTS with trawl endorsement, Groundfish fixed gear with trawl endorsement). Fish ticket data are used to designate each unique delivery to a fishery by compiling data from the start date of the vessel's fiscal year through one full year. A delivery is assigned to a particular fishery based on the species or species group that resulted in the highest revenue for that delivery. For example, if a fish ticket for a particular vessel on a specific day had a mix of rockfish and Pacific whiting, and the Pacific whiting landings accounted for the majority of the revenue, then all landings associated with that trip are designated as "Pacific whiting fishery".

Once each landing/delivery is classified into a subfishery, the reported days at sea are distributed to the subfisheries proportional to the ex-vessel revenue of landings/deliveries in each subfishery. The average and total fleet-wide allocated days at sea in each of the subfisheries is summarized in Tables 11.1 and 11.2, respectively. Days at sea are not available for all fisheries and all years due to changing conditions within the fishery and/or changes in survey data collection. Vessels did not begin participating in the non-whiting midwater trawl fishery until 2012.

Landings weight was explored as an alternative to using revenue to classify deliveries by subfishery. We compared the results of two approaches: using the highest revenue method versus the highest landings weight method for designating the subfishery. The two methods resulted in identification of the same fishery for 95% of all cases. Given that there were few differences in identification of the fisheries, revenue was selected over landings weight because it is assumed to represent the target species more accurately.

Table 11.1: Average days at sea by fishery. Average days at sea by fishery for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses). The Other fisheries category includes salmon, tuna, halibut, and groundfish caught without a limited entry permit.

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
At-sea Pacific whiting	20.9	19	30.0	21	38.0	18	41.7	16	37.5	18	41.5	19	42.4	14
Shoreside Pacific whiting	27.4	34	39.5	35	51.9	26	54.9	24	57.7	24	63.7	25	54.4	22
Non-whiting midwater trawl		0		0		0	9.1	6	13.6	6	11.5	10	12.5	13
DTS trawl with trawl endorsement	55.4	99	51.4	93	44.6	64	40.4	58	42.0	60	36.9	51	35.2	51
Non-whiting, non-DTS trawl with trawl endorsement	22.1	80	15.4	69	18.4	50	24.5	50	25.3	52	23.2	54	25.3	46
Groundfish fixed gear with trawl endorsement	***	***	49.1	5	30.4	25	32.8	26	19.0	19	30.5	21	31.7	18
Groundfish fixed gear with fixed gear endorsement	37.3	4	23.7	3	20.0	8	25.4	10	30.6	9	60.4	9	26.8	10
Crab	44.9	58	41.7	59	38.3	65	39.9	61	40.7	67	41.5	61	28.2	51
Shrimp	31.2	32	36.9	36	43.3	41	46.5	39	44.4	38	57.5	41	70.3	47
Alaska	96.0	27	105.0	28	113.3	28	93.6	25	106.0	24	101.9	24	105.0	21
Other fisheries	19.8	24	28.0	27	18.1	25	25.5	27	19.5	20	29.7	19	23.1	19
Chartering, research, or tendering	34.2	11	33.3	11	40.2	13	45.1	12	54.6	14	62.9	21	47.3	22

Table 11.2: Total days at sea by fishery. Total days at sea for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses). The Other fisheries category includes salmon, tuna, halibut, and groundfish caught without a limited entry permit.

Activity	2009		2010		2011		2012		2013		2014		2015	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
At-sea Pacific whiting	398	19	631	21	684	18	667	16	676	16	788	19	594	14
Shoreside Pacific whiting	933	34	1,383	35	1,350	26	1,318	24	1,385	24	1,593	25	1,196	22
Non-whiting midwater trawl	0	0	0	0	0	0	54	6	82	6	115	10	163	13
DTS trawl with trawl endorsement	5,483	99	4,779	93	2,855	64	2,343	58	2,520	60	1,879	51	1,797	51
Non-whiting, non-DTS trawl with trawl endorsement	1,768	80	1,066	69	920	50	1,227	50	1,316	52	1,251	54	1,162	46
Groundfish fixed gear with trawl endorsement	***	***	246	5	759	25	853	26	361	19	641	21	571	18
Groundfish fixed gear with fixed gear endorsement	149	4	71	3	160	8	254	10	275	9	544	9	268	10
Crab	2,603	58	2,462	59	2,490	65	2,436	61	2,729	67	2,531	61	1,439	51
Shrimp	999	32	1,327	36	1,775	41	1,812	39	1,686	38	2,359	41	3,306	47
Alaska	2,592	27	2,939	28	3,173	28	2,341	25	2,545	24	2,446	24	2,205	21
Other fisheries	474	24	756	27	452	25	689	27	390	20	564	19	438	19
Chartering, research, or tendering	376	11	366	11	522	13	541	12	765	14	1,321	21	1,041	22

11.1 Vessel participation in multiple fisheries

A key characteristic of vessels on the West Coast is participation in multiple fisheries. In 2015, only 11% of all entities participated in just one fishery. There are several reasons why a vessel would participate in several fisheries. These reasons include maintaining employment throughout different seasonal fisheries and diversification of participation to protect individuals or communities from variability in the abundance of target species. Table 11.3 and Figures 41 - 47 provide additional insight into the portfolio of fisheries in which vessels participate.

Table 11.3: Participation in multiple fisheries. Number of entities that participated in one or more fisheries by year (N = number of entities, % = percent of total entities in survey year. An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel).

Number of fisheries	2009		2010		2011		2012		2013		2014		2015	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	9	7%	4	3%	8	6%	11	9%	6	5%	14	11%	13	11%
2	36	27%	43	33%	52	39%	44	34%	50	40%	52	39%	45	37%
3	53	40%	50	38%	44	33%	48	37%	41	33%	37	28%	36	29%
4	27	20%	25	19%	22	17%	19	15%	24	19%	21	16%	23	19%
4+	8	6%	9	7%	6	5%	7	5%	5	4%	8	6%	6	5%

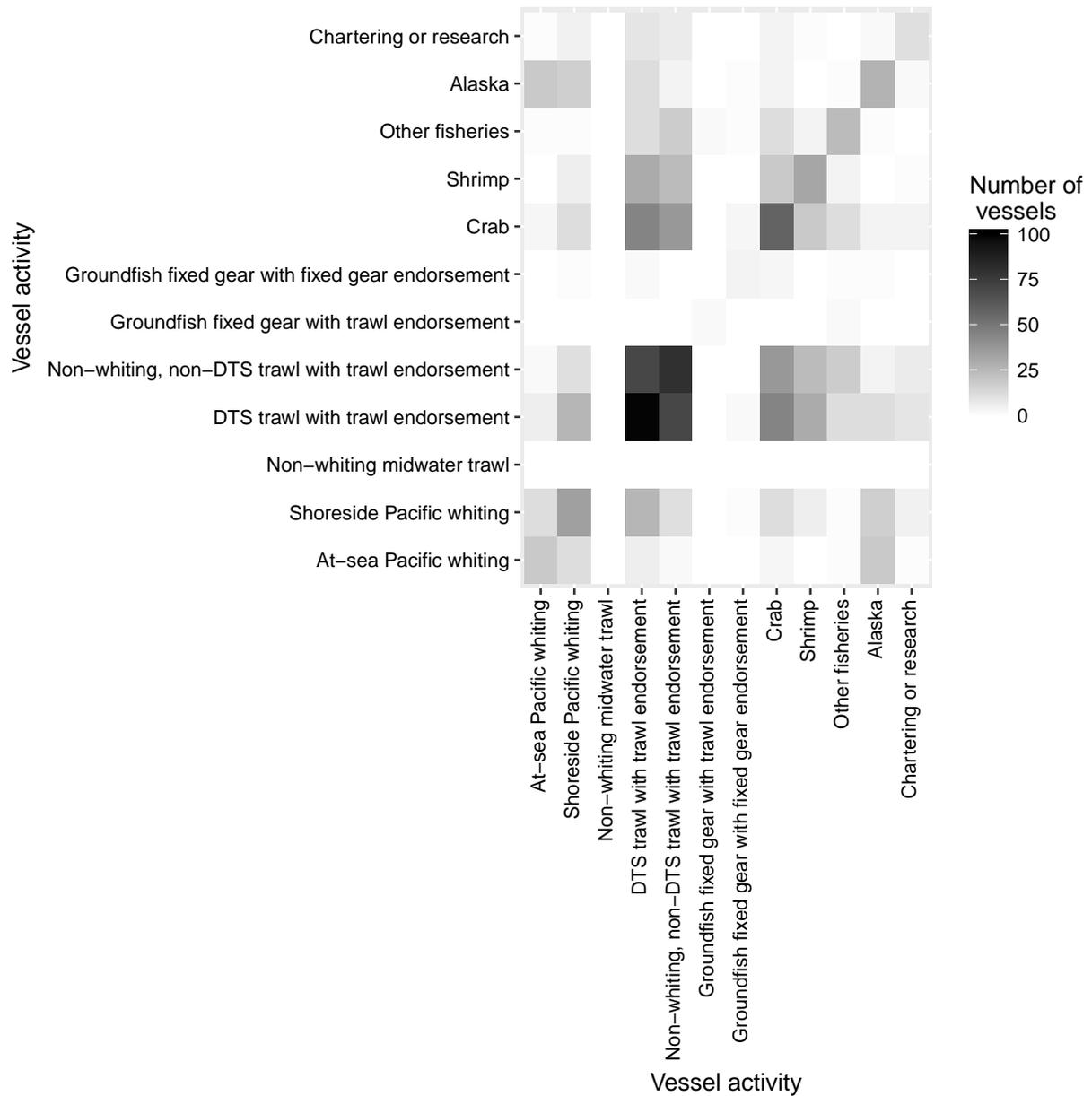


Figure 41: Participation in multiple fisheries - 2009. Frequency of participation in multiple fisheries during 2009 fiscal year.

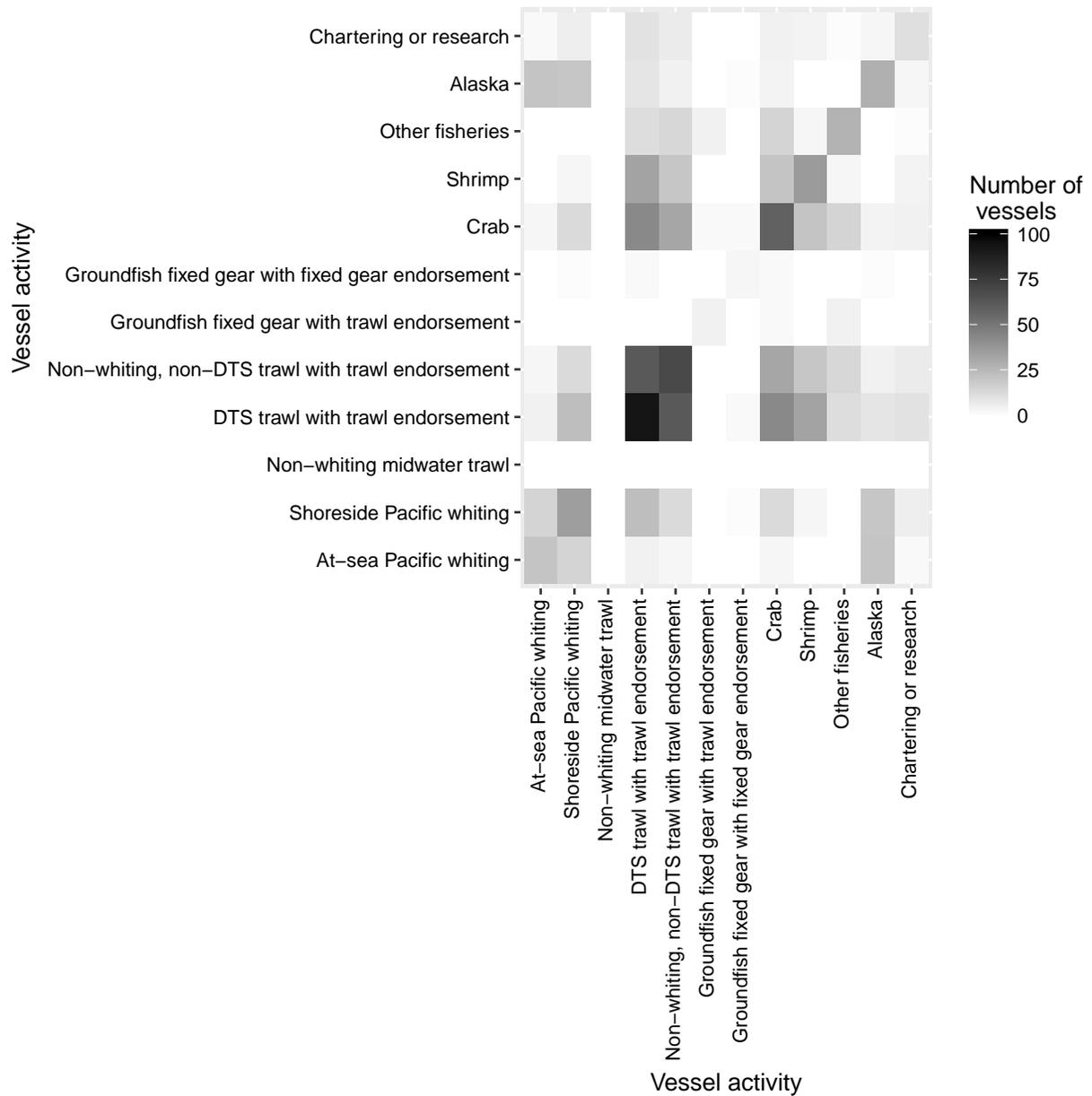


Figure 42: Participation in multiple fisheries - 2010. Frequency of participation in multiple fisheries during 2010 fiscal year.

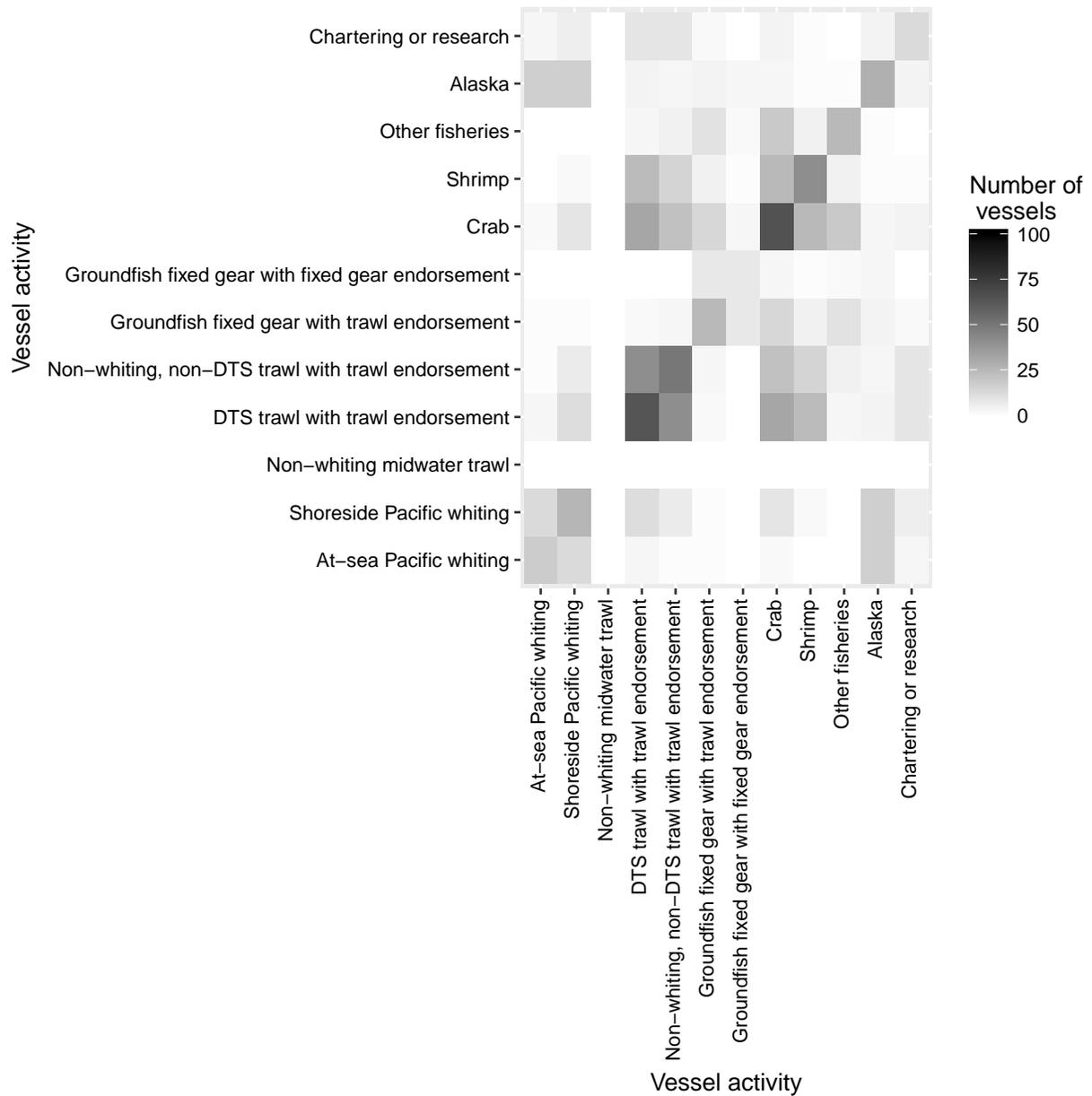


Figure 43: Participation in multiple fisheries - 2011. Frequency of participation in multiple fisheries during 2011 fiscal year.

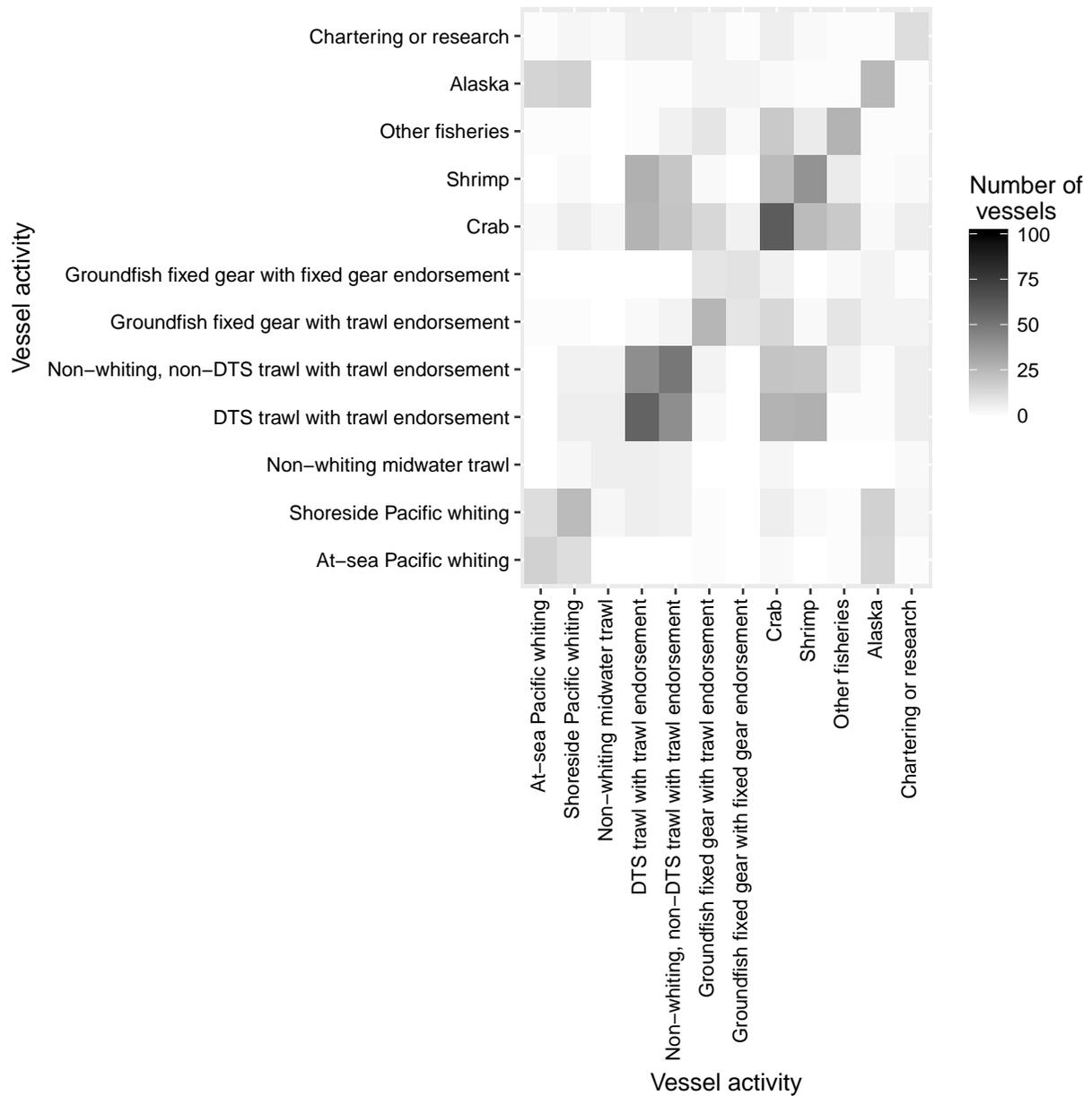


Figure 44: Participation in multiple fisheries - 2012. Frequency of participation in multiple fisheries during 2012 fiscal year.

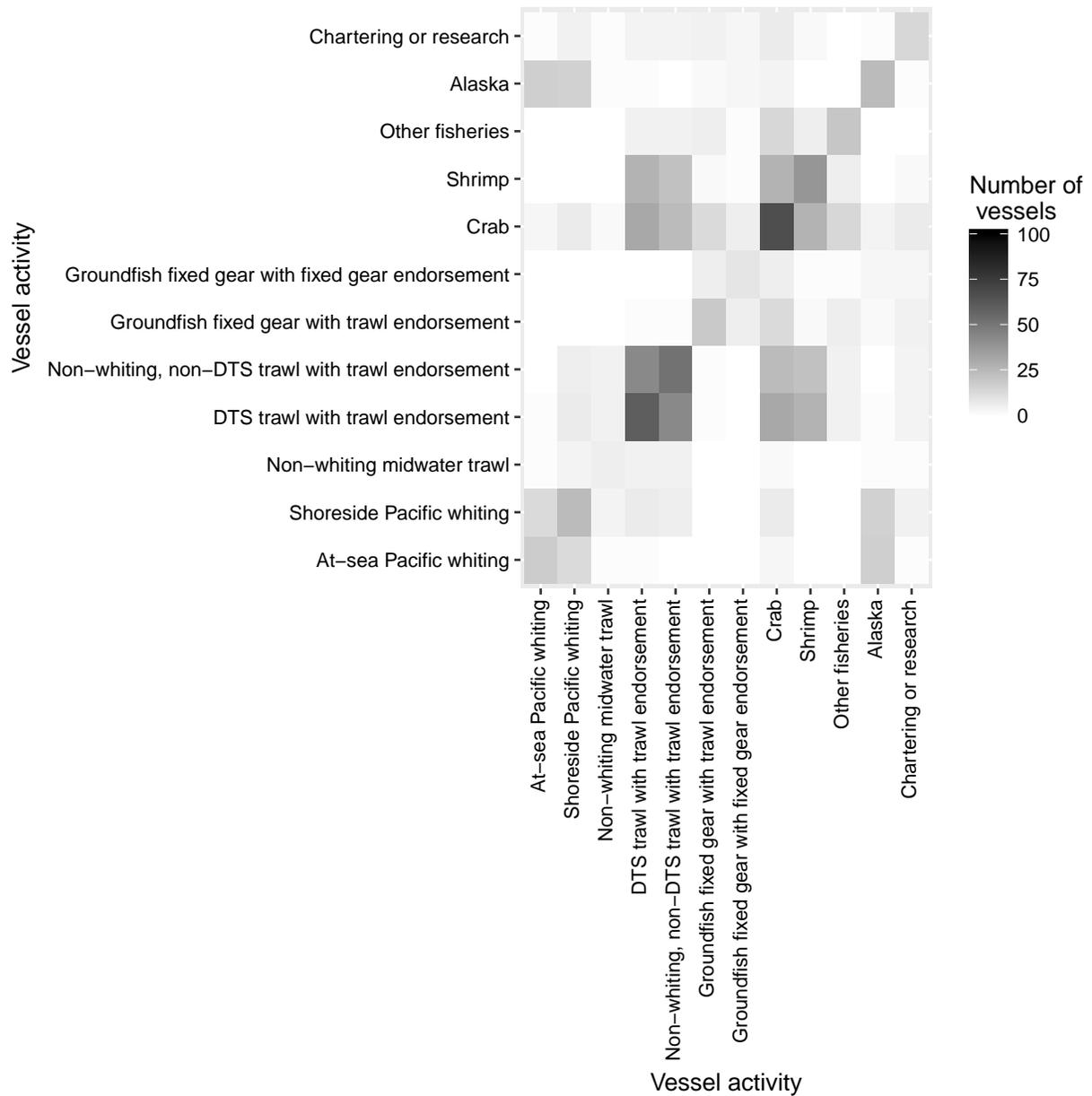


Figure 45: Participation in multiple fisheries - 2013. Frequency of participation in multiple fisheries during 2013 fiscal year.

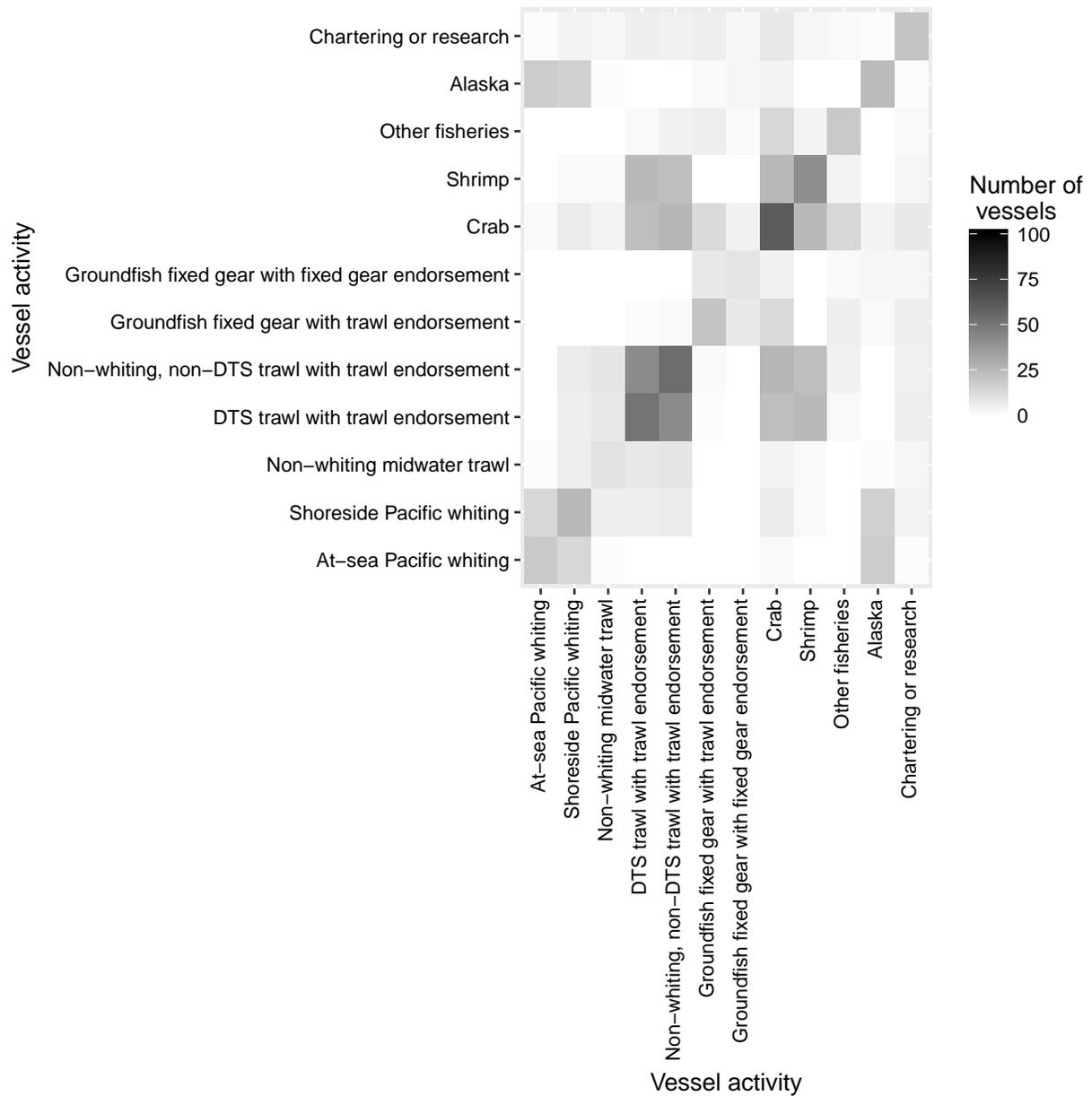


Figure 46: Participation in multiple fisheries - 2014. Frequency of participation in multiple fisheries during 2014 fiscal year.

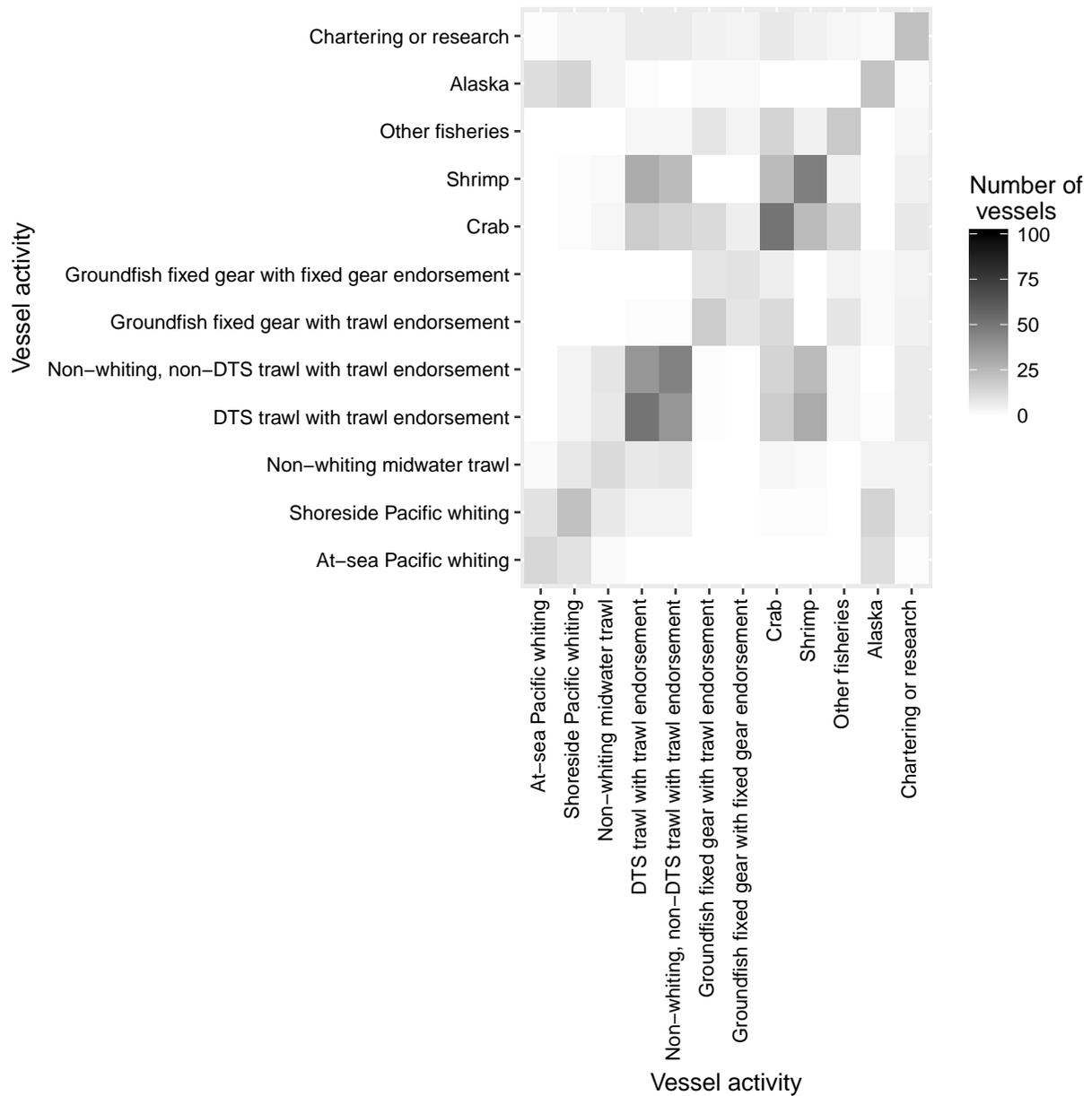


Figure 47: Participation in multiple fisheries - 2015. Frequency of participation in multiple fisheries during 2015 fiscal year.

12 Cost Disaggregation

It is important to conduct economic analyses of specific fisheries. Many vessels and processors that participate in the catch share program also participate in other fisheries, including fishing in Alaska. In order to perform analysis at the West Coast, the catch share program, or fishery level, costs must be broken out by fishery. However, EDC participants incur several types of costs that are aggregated across all fisheries. These are called "joint" costs in the economics and accounting literature and include fixed costs (*e.g.*, new vessel equipment), or variable costs (*e.g.*, fuel). The former are joined by the nature of the costs themselves, while the latter are often joined due to observational limitations. It is difficult to assign fixed costs to a particular fishery because the level of the cost does not vary with business activity (at least over the short run). Many variable costs can theoretically be tracked by fishery, but it would be difficult or costly to do so. For example, although an EDC participant could theoretically set up a system to track expenditures on fuel by fishery, doing so would be costly.

Vessels report variable costs for West Coast activities only, but report fixed costs for all activities (including Alaska). The following sections report the fixed costs that have been allocated using cost disaggregation to West Coast activities (removing the portion of costs that have been allocated to Alaska activities).

12.1 West Coast portion of fixed costs

Table 12.1: All West Coast fixed costs. All fixed costs (thousands of \$) on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Vessel and on-board equipment	\$106.0	139	\$94.3	132	\$145.6	128	\$196.9	127	\$149.0	116	\$167.5	103	\$146.7	105
Fishing gear	\$48.3	141	\$54.8	132	\$92.5	136	\$89.3	128	\$68.8	91	\$52.3	75	\$51.1	78
Processing equipment	\$20.5	15	\$23.1	10	\$12.5	9	\$10.4	4	\$2.1	5	***	***	\$0.7	3
Insurance	\$23.1	131	\$24.5	127	\$26.5	125	\$28.6	121	\$30.6	118	\$32.5	119	\$33.9	114
Lease of vessel	\$22.4	12	\$47.1	10	\$37.9	10	\$30.9	7	\$24.1	8	\$38.1	8	\$70.4	8
Moorage	\$3.7	141	\$4.0	132	\$4.4	134	\$5.0	127	\$5.2	123	\$5.6	124	\$5.8	117
Average total	\$174.6	147	\$171.6	140	\$250.8	142	\$304.5	134	\$218.7	128	\$203.4	128	\$202.5	121

Table 12.2: Summary of costs on the West Coast. Average capitalized expenditures and expenses (thousands of \$) 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).

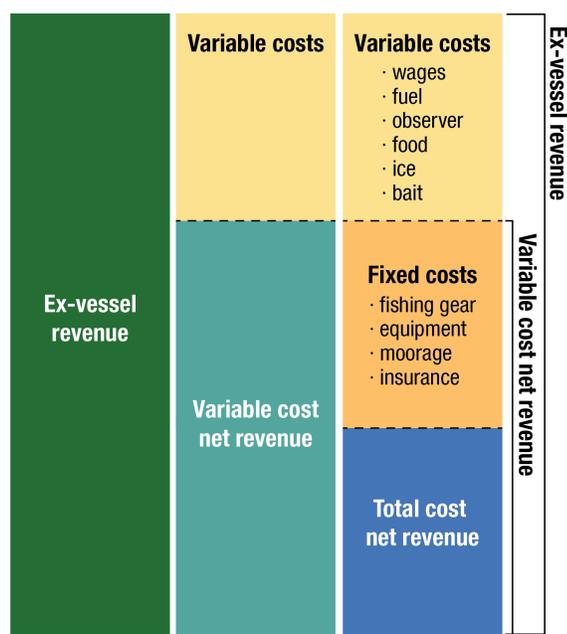
Category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Total costs on vessel and on-board equipment, fishing gear, and processing equipment	\$98.0	144	\$104.0	136	\$163.4	134	\$199.3	129	\$145.1	119	\$138.2	113	\$138.9	111
Total variable costs	\$219.4	144	\$251.2	138	\$362.1	135	\$380.5	129	\$434.4	124	\$451.5	125	\$386.4	118
Total other fixed costs	\$26.4	144	\$29.8	138	\$31.8	135	\$33.7	128	\$35.8	124	\$38.9	125	\$43.3	118
Taxes and fees	\$15.9	143	\$18.7	139	\$29.8	119	\$28.2	112	\$32.5	112	\$49.7	112	\$38.7	100
Average total costs	\$359.6	144	\$396.6	140	\$578.1	136	\$637.7	129	\$638.8	124	\$659.8	125	\$593.2	118

13 Net Economic Benefits

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

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

Net revenue is calculated two ways: using only variable costs, and using variable costs plus fixed costs (total costs).² The first calculation is called variable cost net revenue, while the second is called total cost net revenue (Figure 48). Variable cost net revenue is useful for examining changes in fishery operations that likely do not affect fixed costs. For example, the cost of processing an additional metric ton of fish is most representative of the true costs when only variable costs are considered. Total cost net revenue is generally a better measure of financial gain or loss for an entire year, season, or fishery.



There are two caveats associated with the net revenue calculations in this report. First, as noted in Section 4, there are certain costs associated with operating a vessel that are not requested on the EDC form either because it is difficult to determine the share of the cost associated with the vessel, because costs pertain to items used for activities other than catching or processing fish, or are too difficult to allocate to a particular vessel in a multi-vessel company. These costs include office space, vehicles and transport trucks, storage of equipment, professional fees, and income taxes. Therefore, the net revenue presented here is likely an overestimate of true net revenue.

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

² See Section 9 for a more complete discussion of variable and fixed costs used in this report.

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

13.1 Net revenue for all West Coast fishing activities

Average net revenue is calculated for all activities on the West Coast for EDC vessels, and it is reported by fishery for EDC vessels. West Coast revenue includes all revenue from at-sea deliveries and shoreside landings. The variable and fixed costs do not include costs related to acquiring limited entry permits, quota shares, or quota pounds.

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

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

The following pages contain tables and figures depicting revenue, costs, variable cost net revenue, and total cost net revenue for all of the fisheries combined (Table 13.2) and different fishery combinations (Tables 13.3 through 13.16 and Figures 50 through 63), including All West Coast fisheries (only catch share vessels), All West Coast fisheries (all EDC vessels³), Whiting (shoreside and at-sea), All catch share vessels⁴ (whiting and non-whiting groundfish), and Non-whiting catch share groundfish (see Table 13.1 for a list of where to find each of these individual tables).

Table 13.1: Table of contents for net revenue tables. An EDC vessel is defined as any vessel that had a limited entry trawl permit on the vessel in the designated year. A catch share vessel is any vessel that participated in the West Coast Groundfish Trawl Catch Share Program at any time in the designated year.

Fishery	Table
All West Coast fisheries (all EDC vessels)	Table 13.2
All West Coast fisheries (only catch share vessels)	Table 13.3
All catch shares (whiting and non-whiting groundfish)	Table 13.4
Whiting (shoreside and at-sea)	Table 13.5
Non-whiting groundfish (catch shares only)	Table 13.6
At-sea Pacific whiting	Table 13.7
Shoreside Pacific whiting	Table 13.8
Non-whiting midwater trawl	Table 13.9
DTS trawl with trawl endorsement	Table 13.10
Non-whiting, non-DTS trawl with trawl endorsement	Table 13.11
Groundfish fixed gear with trawl endorsement	Table 13.12
Groundfish fixed gear with fixed gear endorsement	Table 13.13
Crab	Table 13.14
Shrimp	Table 13.15
Other fisheries	Table 13.16
All catch shares with quota earnings and quota	Table 13.17
Whiting vessels with quota earnings and quota	Table 13.18
Groundfish vessels with quota earnings and quota	Table 13.19

³ An EDC vessel is defined as any vessel that had a limited entry trawl permit on the vessel in the designated year.

⁴ A catch share vessel is any vessel that participated in the West Coast Groundfish Trawl Catch Share Program at any time in the designated year.

Table 13.2: West Coast average variable cost and total cost net revenue for EDC vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) on the West Coast, for all vessels that were required to submit an EDC form (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Revenue	\$390	144	\$447	138	\$725	136	\$683	129	\$859	124	\$832	125	\$712	118
(Variable costs)	(\$235)	144	(\$270)	138	(\$385)	136	(\$405)	129	(\$464)	124	(\$496)	125	(\$419)	118
Variable cost net revenue	\$154	144	\$177	138	\$340	136	\$278	129	\$395	124	\$336	125	\$294	118
(Fixed costs)	(\$124)	144	(\$132)	138	(\$193)	136	(\$233)	129	(\$175)	124	(\$164)	125	(\$174)	118
Total cost net revenue	\$30	144	\$44	138	\$147	136	\$46	129	\$220	124	\$173	125	\$120	118

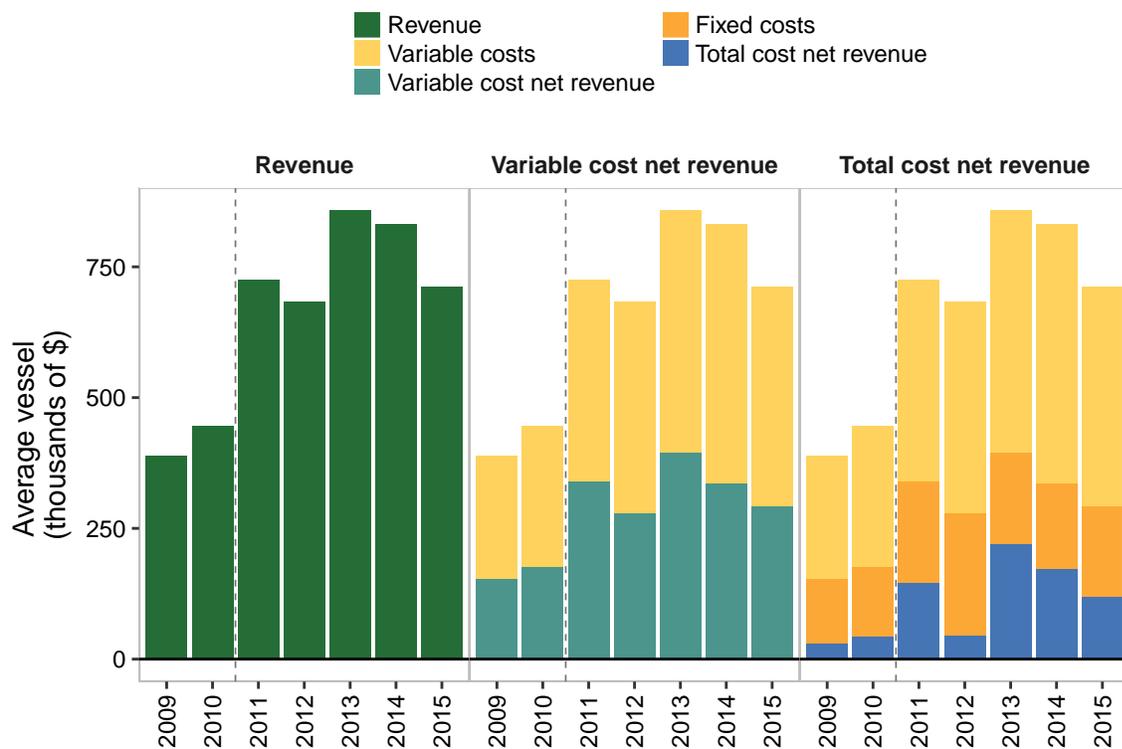


Figure 49: West Coast average variable cost and total cost net revenue for EDC vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast, for EDC vessels. Dashed line represents the beginning of the catch share program.

Table 13.3: West Coast average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) on the West Coast for only vessels that participated in the catch share program (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Revenue	\$404	134	\$466	128	\$806	113	\$749	110	\$899	109	\$908	105	\$783	97
(Variable costs)	(\$242)	134	(\$278)	128	(\$431)	113	(\$444)	110	(\$490)	109	(\$543)	105	(\$461)	97
Variable cost net revenue	\$162	134	\$187	128	\$375	113	\$305	110	\$409	109	\$364	105	\$322	97
(Fixed costs)	(\$131)	134	(\$139)	128	(\$213)	113	(\$242)	110	(\$185)	109	(\$172)	105	(\$189)	97
Total cost net revenue	\$32	134	\$48	128	\$162	113	\$63	110	\$224	109	\$192	105	\$133	97

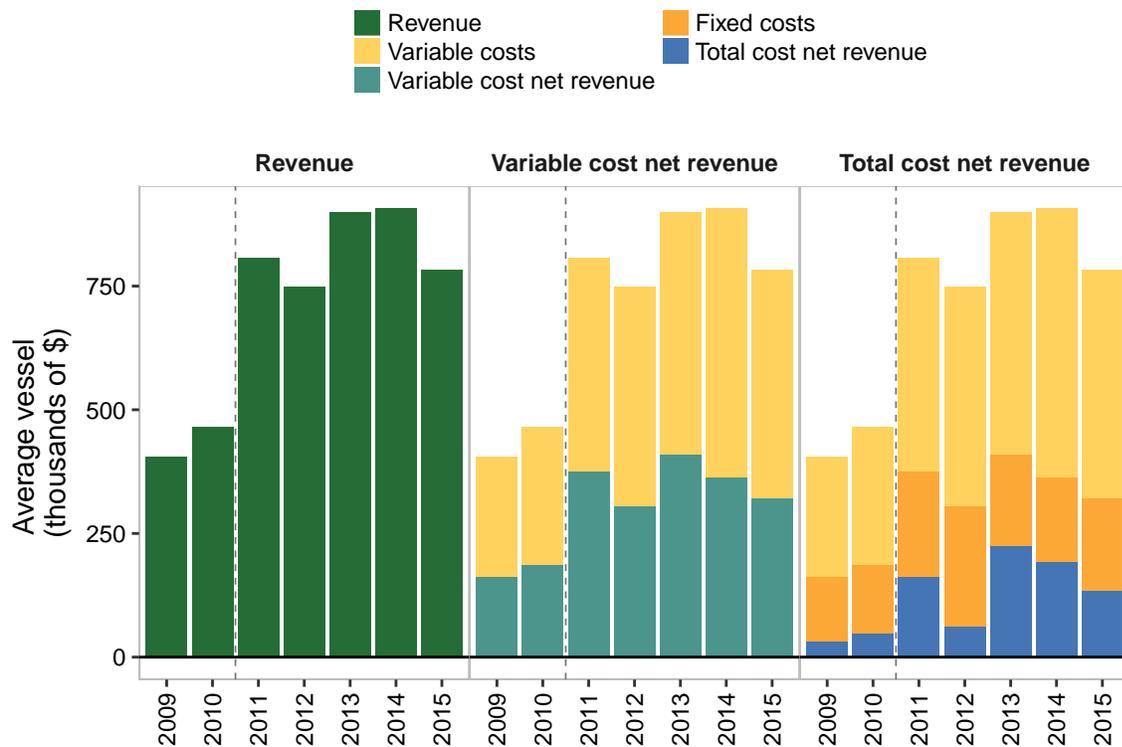


Figure 50: West Coast average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast, only for vessels that participated in the catch share program. Dashed line represents the beginning of the catch share program.

Table 13.4: All catch shares (whiting and non-whiting groundfish) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the catch share (whiting and non-whiting groundfish) fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Revenue	\$300	134	\$347	128	\$587	113	\$530	110	\$605	109	\$629	105	\$486	97
(Variable costs)	(\$184)	134	(\$211)	128	(\$317)	113	(\$322)	110	(\$346)	109	(\$395)	105	(\$305)	97
Variable cost net revenue	\$116	134	\$135	128	\$270	113	\$208	110	\$259	109	\$233	105	\$181	97
(Fixed costs)	(\$104)	134	(\$111)	128	(\$161)	113	(\$179)	110	(\$126)	109	(\$130)	105	(\$132)	97
Total cost net revenue	\$12	134	\$25	128	\$109	113	\$28	110	\$133	109	\$103	105	\$49	97

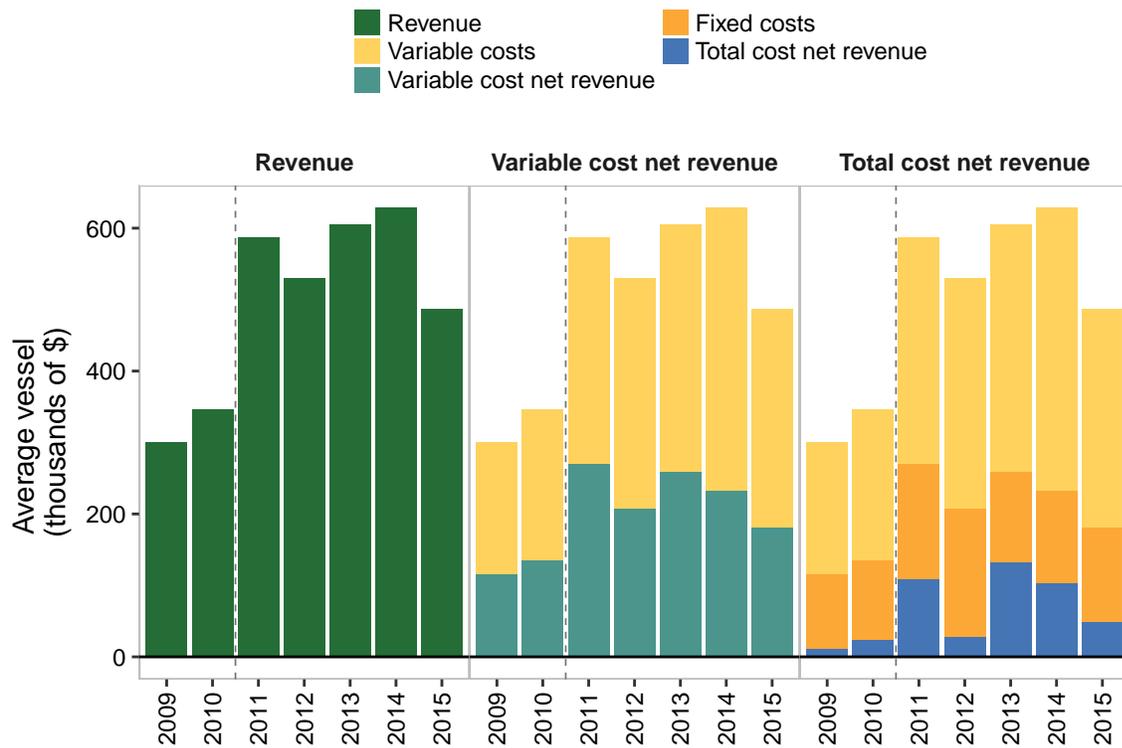


Figure 51: All catch shares (whiting and non-whiting groundfish) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue for all participation in the catch share (whiting and non-whiting groundfish) fisheries. Dashed line represents the beginning of the catch share program.

Table 13.5: Whiting (shoreside and at-sea) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for the whiting fisheries (shoreside and at-sea) (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Revenue	\$234	41	\$450	41	\$1,095	31	\$1,069	28	\$1,286	29	\$1,224	30	\$590	26
(Variable costs)	(\$135)	41	(\$254)	41	(\$543)	31	(\$642)	28	(\$693)	29	(\$763)	30	(\$387)	26
Variable cost net revenue	\$99	41	\$196	41	\$552	31	\$427	28	\$593	29	\$461	30	\$203	26
(Fixed costs)	(\$121)	41	(\$176)	41	(\$342)	31	(\$410)	28	(\$305)	29	(\$296)	30	(\$304)	26
Total cost net revenue	-\$22	41	\$20	41	\$210	31	\$17	28	\$289	29	\$165	30	-\$101	26

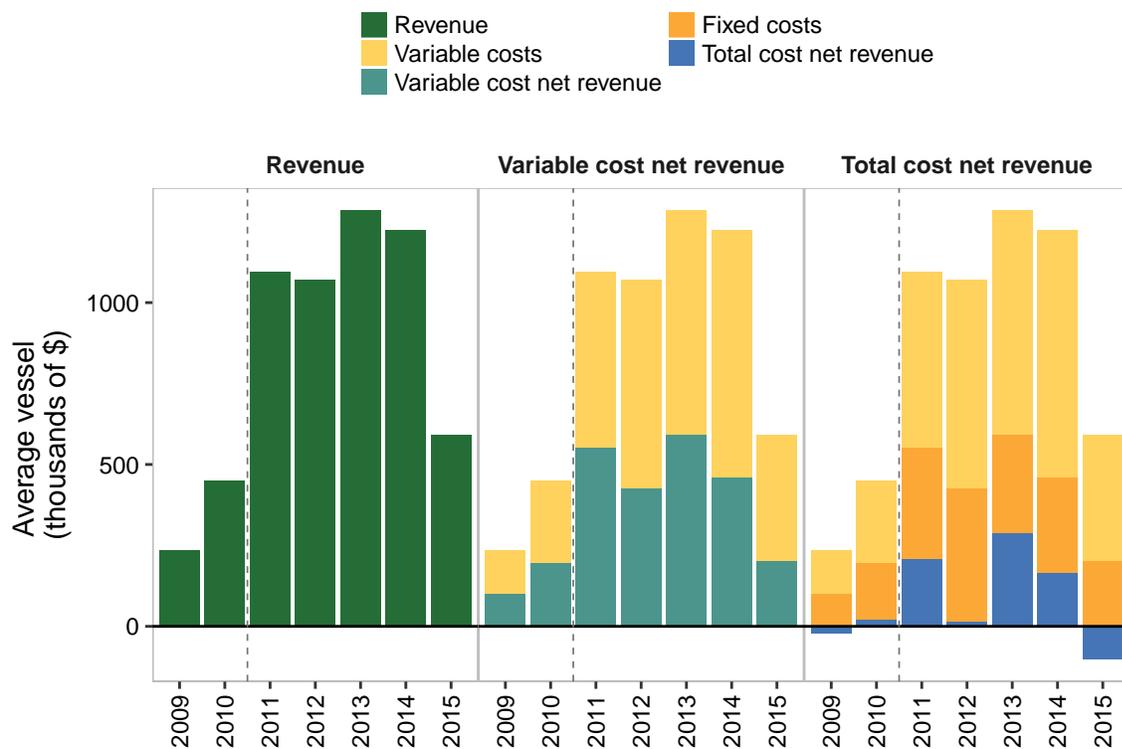


Figure 52: Whiting (shoreside and at-sea) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in whiting fisheries (at-sea and shoreside). Dashed line represents the beginning of the catch share program.

Table 13.6: Groundfish (non-whiting) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in catch share groundfish fisheries (non-whiting) (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$253	121	\$233	111	\$341	95	\$319	89	\$326	88	\$353	83	\$402	79
(Variable costs)	(\$158)	121	(\$150)	111	(\$200)	95	(\$196)	89	(\$200)	88	(\$224)	83	(\$247)	79
Variable cost net revenue	\$94	121	\$83	111	\$141	95	\$123	89	\$125	88	\$128	83	\$155	79
(Fixed costs)	(\$74)	121	(\$63)	111	(\$80)	95	(\$93)	89	(\$56)	88	(\$57)	83	(\$62)	79
Total cost net revenue	\$21	121	\$21	111	\$61	95	\$30	89	\$70	88	\$71	83	\$93	79

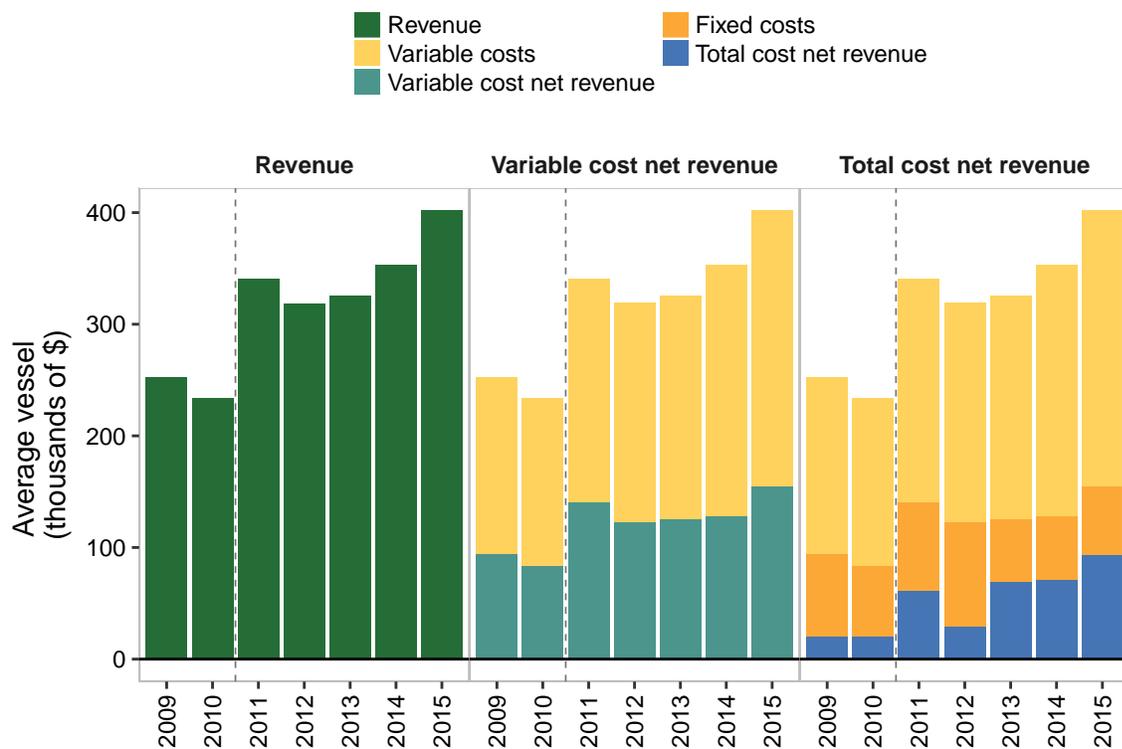


Figure 53: Groundfish (non-whiting) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in catch share groundfish fisheries (non-whiting). Dashed line represents the beginning of the catch share program.

13.2 Net revenue for West Coast catch share fisheries, crab, shrimp, and other fisheries

Table 13.7: At-sea Pacific whiting fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the At-sea Pacific whiting fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Revenue	\$220	19	\$402	21	\$619	18	\$560	16	\$581	18	\$653	19	\$383	14
(Variable costs)	(\$115)	19	(\$200)	21	(\$306)	18	(\$372)	16	(\$342)	18	(\$417)	19	(\$236)	14
Variable cost net revenue	\$105	19	\$201	21	\$313	18	\$188	16	\$239	18	\$236	19	\$147	14
(Fixed costs)	(\$92)	19	(\$88)	21	(\$190)	18	(\$206)	16	(\$117)	18	(\$153)	19	(\$146)	14
Total cost net revenue	\$12	19	\$113	21	\$123	18	-\$18	16	\$122	18	\$83	19	\$1	14

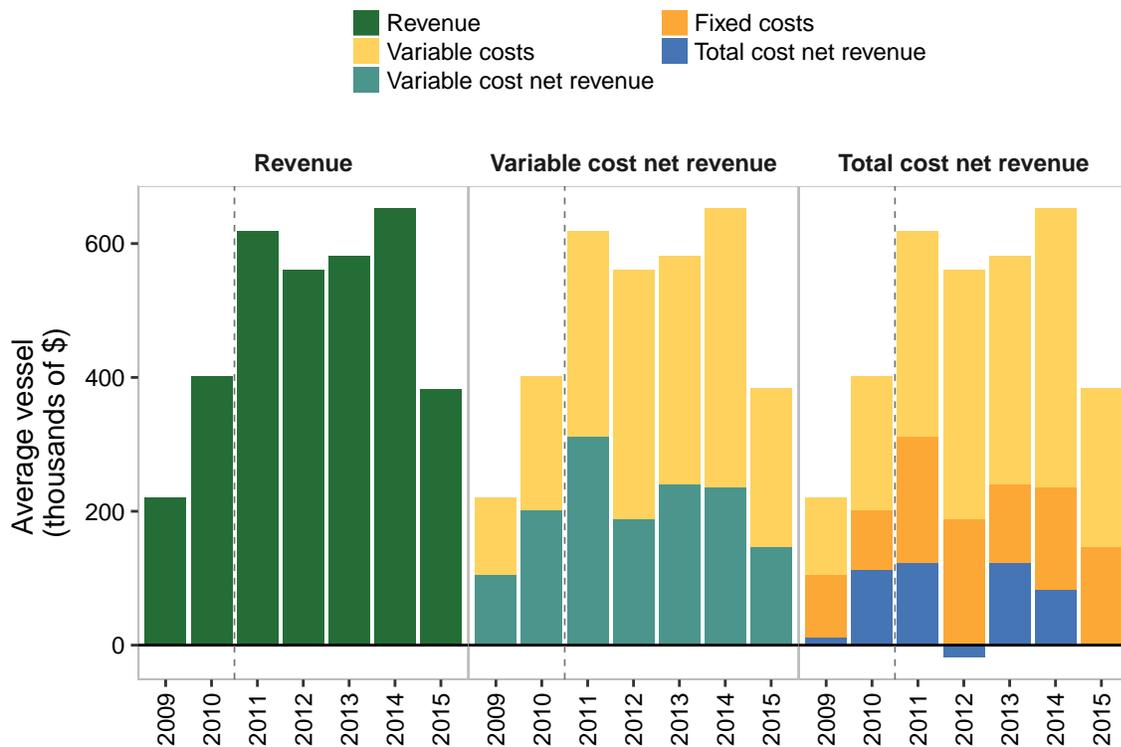


Figure 54: At-sea Pacific whiting fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the at-sea Pacific whiting fishery. Dashed line represents the beginning of the catch share program.

Table 13.8: Shoreside Pacific whiting fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Shoreside Pacific whiting fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Revenue	\$160	34	\$286	35	\$877	26	\$874	24	\$1,118	24	\$973	25	\$454	22
(Variable costs)	(\$98)	34	(\$177)	35	(\$436)	26	(\$501)	24	(\$581)	24	(\$599)	25	(\$307)	22
Variable cost net revenue	\$61	34	\$109	35	\$442	26	\$372	24	\$538	24	\$374	25	\$146	22
(Fixed costs)	(\$95)	34	(\$154)	35	(\$276)	26	(\$341)	24	(\$280)	24	(\$239)	25	(\$267)	22
Total cost net revenue	-\$33	34	-\$44	35	\$166	26	\$32	24	\$257	24	\$135	25	-\$120	22

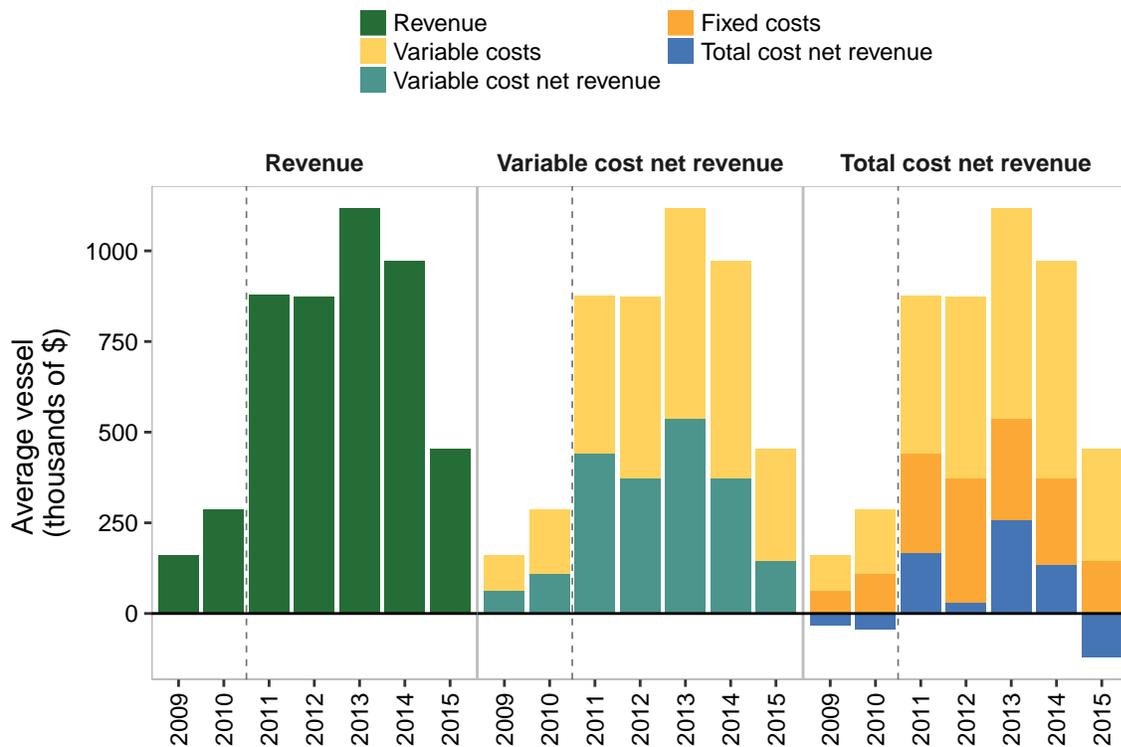


Figure 55: Shoreside Pacific whiting fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the shoreside Pacific whiting fishery. Dashed line represents the beginning of the catch share program.

Table 13.9: Non-whiting midwater trawl fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Non-whiting midwater trawl fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	—	—	—	—	—	—	\$50	6	\$112	6	\$92	10	\$135	13
(Variable costs)	—	—	—	—	—	—	(\$32)	6	(\$65)	6	(\$60)	10	(\$77)	13
Variable cost net revenue	—	—	—	—	—	—	\$18	6	\$47	6	\$32	10	\$58	13
(Fixed costs)	—	—	—	—	—	—	(\$8)	6	(\$15)	6	(\$41)	10	(\$21)	13
Total cost net revenue	—	—	—	—	—	—	\$9	6	\$31	6	-\$9	10	\$38	13

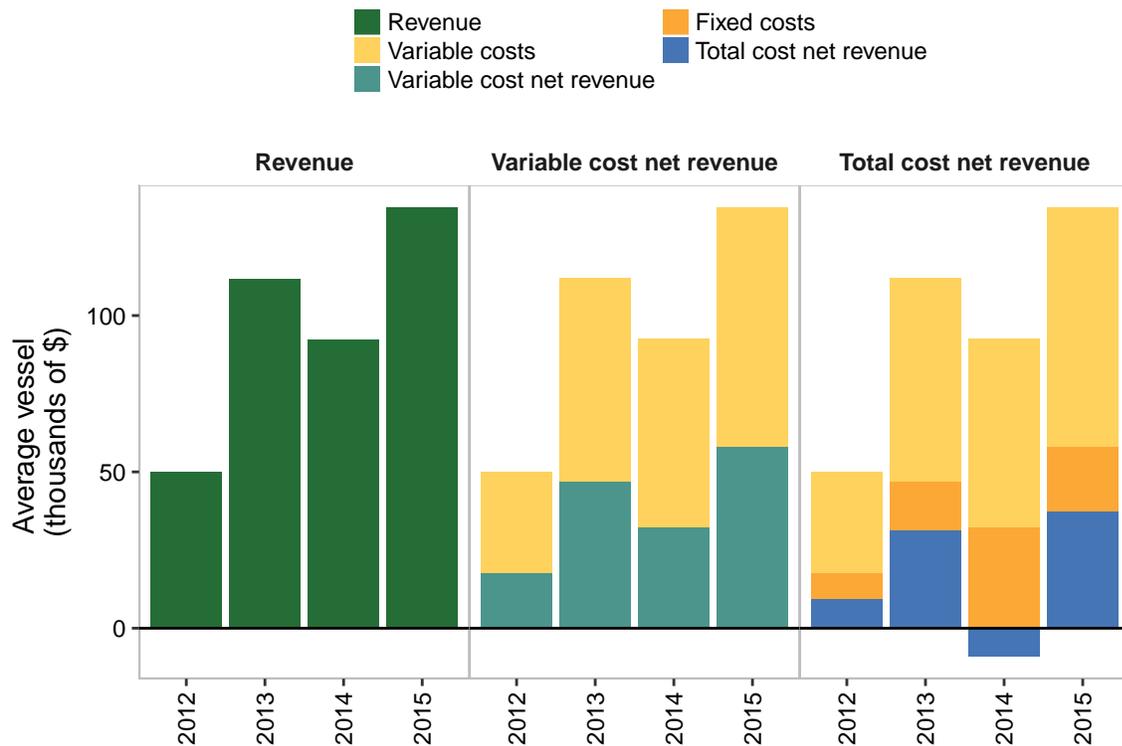


Figure 56: Non-whiting midwater trawl fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the Non-whiting midwater trawl. Vessels did not begin targeting non-whiting groundfish with midwater trawl gear until 2012. Dashed line represents the beginning of the catch share program.

Table 13.10: DTS trawl with trawl endorsement fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the DTS trawl with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$241	108	\$225	98	\$308	64	\$267	58	\$279	60	\$294	51	\$317	51
(Variable costs)	(\$145)	108	(\$144)	98	(\$185)	64	(\$167)	58	(\$174)	60	(\$189)	51	(\$195)	51
Variable cost net revenue	\$96	108	\$82	98	\$123	64	\$100	58	\$105	60	\$106	51	\$123	51
(Fixed costs)	(\$69)	108	(\$60)	98	(\$57)	64	(\$84)	58	(\$50)	60	(\$46)	51	(\$48)	51
Total cost net revenue	\$27	108	\$22	98	\$67	64	\$16	58	\$55	60	\$60	51	\$75	51

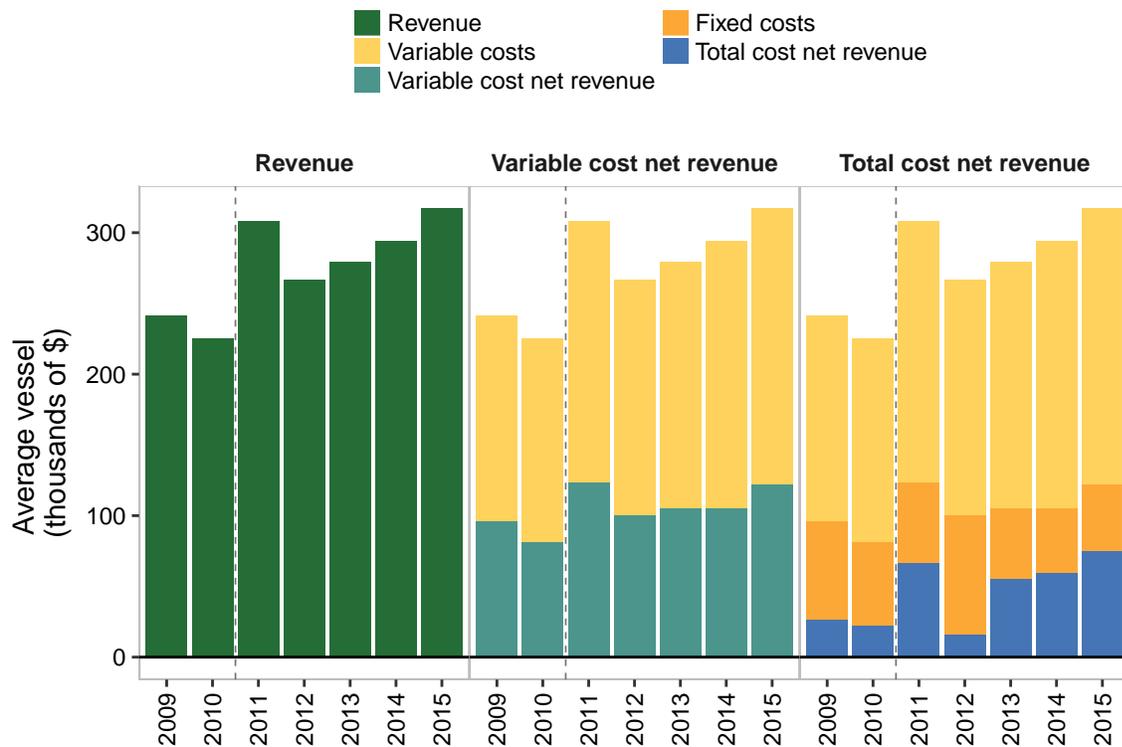


Figure 57: DTS trawl with trawl endorsement fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the DTS trawl with trawl endorsement fishery. Dashed line represents the beginning of the catch share program.

Table 13.11: Non-whiting, non-DTS trawl with trawl endorsement fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Non-whiting, non-DTS trawl with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N												
Revenue	\$48	90	\$40	73	\$100	50	\$151	50	\$163	52	\$164	54	\$188	46
(Variable costs)	(\$37)	90	(\$30)	73	(\$64)	50	(\$94)	50	(\$100)	52	(\$106)	54	(\$117)	46
Variable cost net revenue	\$11	90	\$11	73	\$36	50	\$57	50	\$63	52	\$58	54	\$71	46
(Fixed costs)	(\$16)	90	(\$13)	73	(\$18)	50	(\$33)	50	(\$23)	52	(\$19)	54	(\$23)	46
Total cost net revenue	-\$5	90	-\$3	73	\$18	50	\$24	50	\$40	52	\$39	54	\$48	46

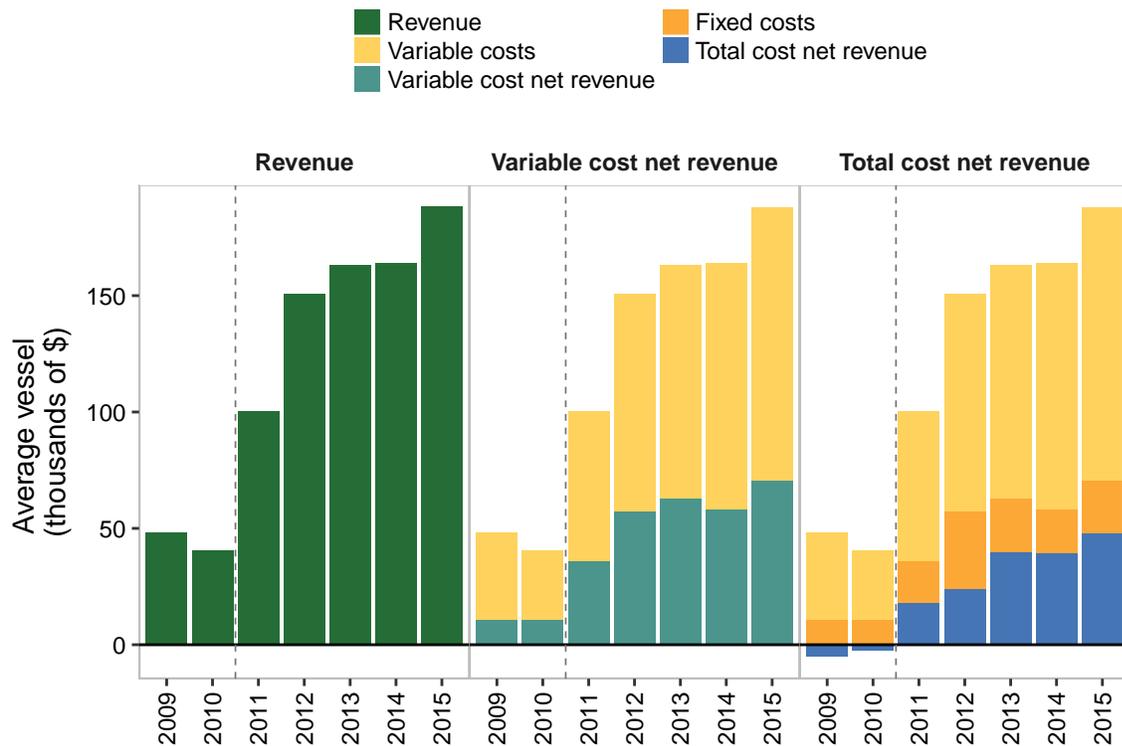


Figure 58: Non-whiting, non-DTS trawl with trawl endorsement fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the non-whiting, non-DTS trawl with trawl endorsement fishery. Dashed line represents the beginning of the catch share program.

Table 13.12: Groundfish fixed gear with trawl endorsement fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Groundfish fixed gear with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$67	3	\$149	6	\$294	26	\$195	26	\$145	19	\$214	21	\$289	18
(Variable costs)	(\$33)	3	(\$70)	6	(\$151)	26	(\$112)	26	(\$84)	19	(\$128)	21	(\$177)	18
Variable cost net revenue	\$34	3	\$79	6	\$143	26	\$82	26	\$61	19	\$86	21	\$112	18
(Fixed costs)	(\$23)	3	(\$21)	6	(\$118)	26	(\$64)	26	(\$32)	19	(\$46)	21	(\$64)	18
Total cost net revenue	\$11	3	\$58	6	\$25	26	\$18	26	\$29	19	\$39	21	\$48	18

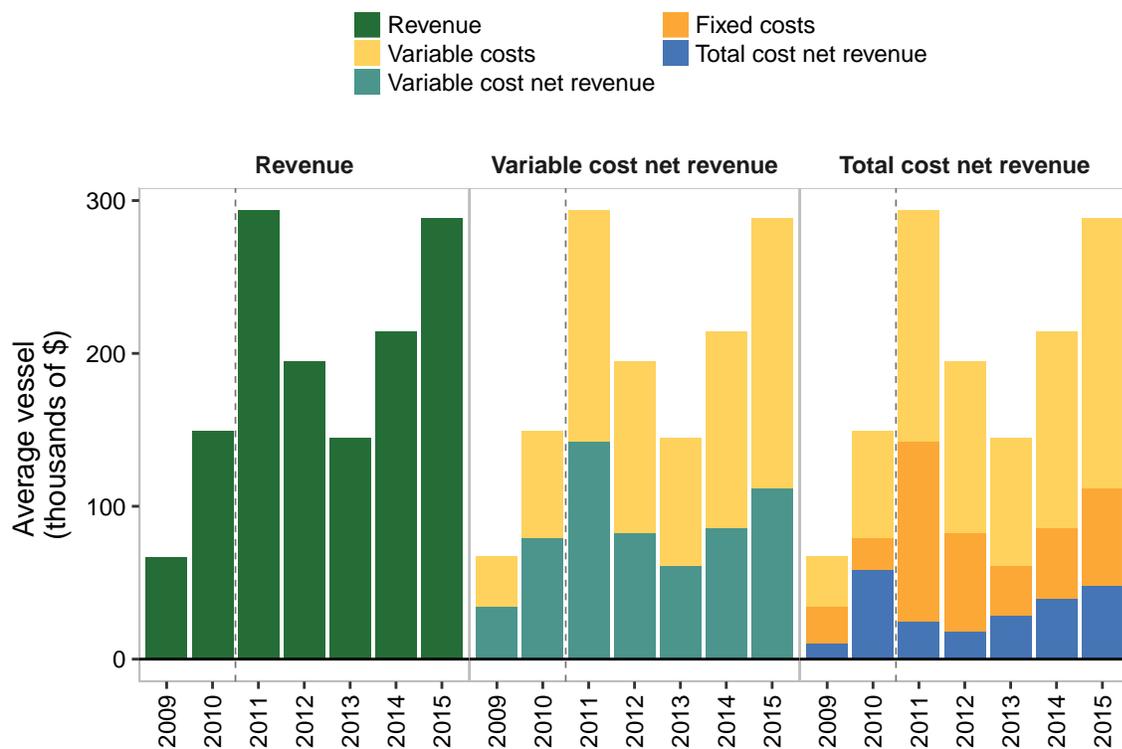


Figure 59: Groundfish fixed gear with trawl endorsement fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the groundfish fixed gear with trawl endorsement fishery.

Table 13.13: Groundfish fixed gear with fixed gear endorsement fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Groundfish fixed gear with fixed gear endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$214	4	\$254	3	\$221	9	\$162	10	\$162	9	\$201	9	\$242	10
(Variable costs)	(\$141)	4	(\$190)	3	(\$93)	9	(\$93)	10	(\$99)	9	(\$111)	9	(\$142)	10
Variable cost net revenue	\$74	4	\$64	3	\$128	9	\$69	10	\$63	9	\$90	9	\$100	10
(Fixed costs)	(\$34)	4	(\$36)	3	(\$38)	9	(\$46)	10	(\$36)	9	(\$36)	9	(\$47)	10
Total cost net revenue	\$40	4	\$29	3	\$90	9	\$23	10	\$26	9	\$54	9	\$53	10

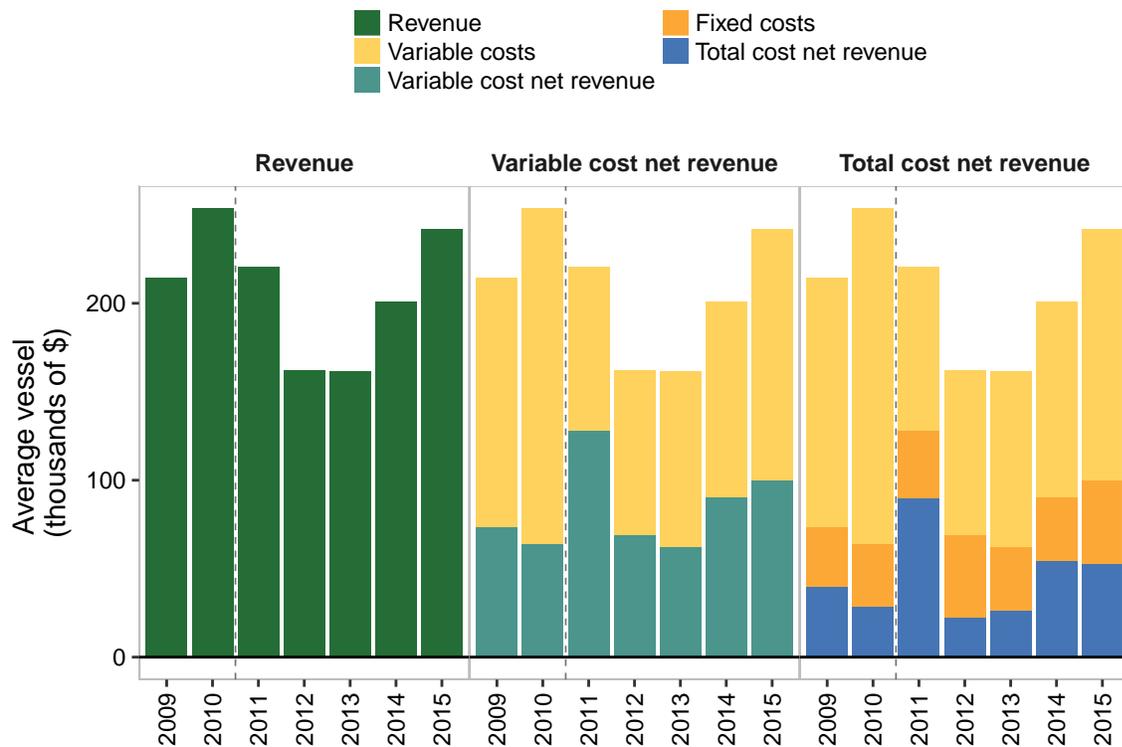


Figure 60: Groundfish fixed gear with trawl endorsement fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the groundfish fixed gear with fixed gear endorsement fishery. Dashed line represents the beginning of the catch share program.

Table 13.14: Crab fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Crab fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$168	62	\$153	62	\$218	68	\$243	61	\$362	67	\$242	61	\$70	52
(Variable costs)	(\$91)	62	(\$87)	62	(\$115)	68	(\$138)	61	(\$171)	67	(\$139)	61	(\$54)	52
Variable cost net revenue	\$77	62	\$66	62	\$103	68	\$105	61	\$191	67	\$103	61	\$15	52
(Fixed costs)	(\$33)	62	(\$29)	62	(\$56)	68	(\$86)	61	(\$67)	67	(\$48)	61	(\$22)	52
Total cost net revenue	\$44	62	\$38	62	\$47	68	\$19	61	\$124	67	\$56	61	-\$7	52

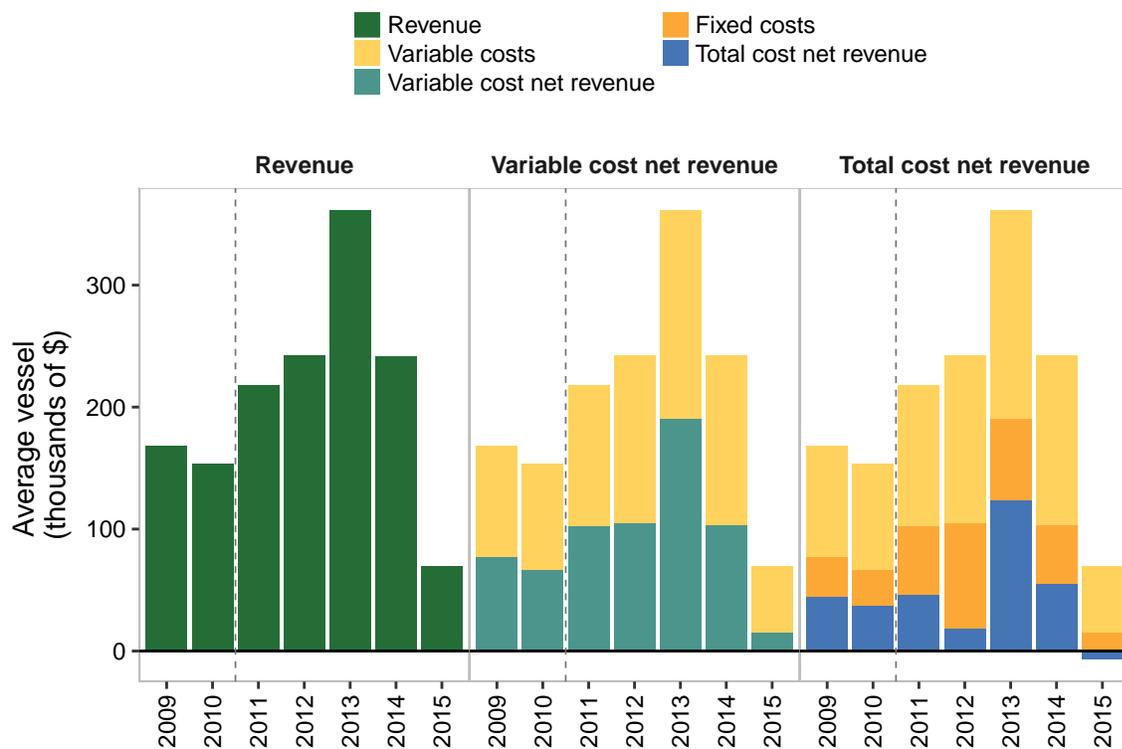


Figure 61: Crab fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the crab fishery. Dashed line represents the beginning of the catch share program.

Table 13.15: Shrimp fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Shrimp fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$111	32	\$155	36	\$341	42	\$321	39	\$370	38	\$501	41	\$638	47
(Variable costs)	(\$64)	32	(\$93)	36	(\$176)	42	(\$175)	39	(\$186)	38	(\$257)	41	(\$317)	47
Variable cost net revenue	\$47	32	\$62	36	\$166	42	\$145	39	\$185	38	\$244	41	\$321	47
(Fixed costs)	(\$42)	32	(\$52)	36	(\$86)	42	(\$103)	39	(\$76)	38	(\$85)	41	(\$126)	47
Total cost net revenue	\$5	32	\$10	36	\$80	42	\$42	39	\$109	38	\$159	41	\$195	47

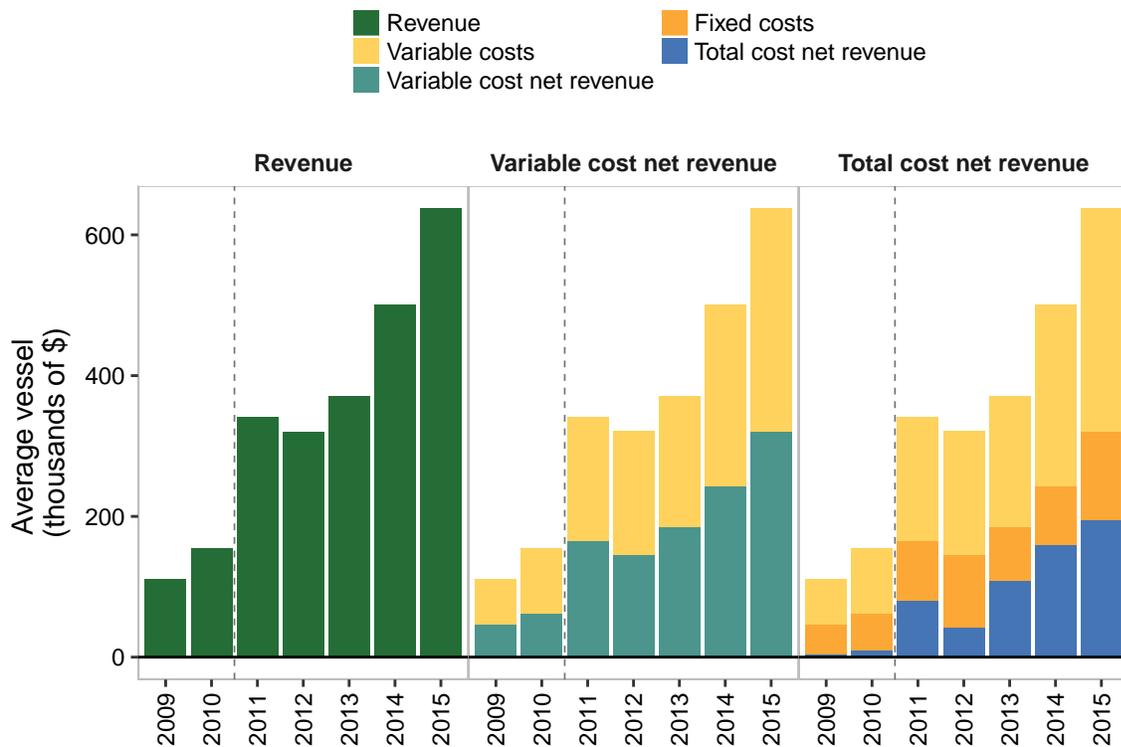


Figure 62: Shrimp fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the shrimp fishery. Dashed line represents the beginning of the catch share program.

Table 13.16: Other fisheries fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Other fisheries fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$37	29	\$45	32	\$44	27	\$33	28	\$38	20	\$49	19	\$46	19
(Variable costs)	(\$32)	29	(\$28)	32	(\$21)	27	(\$23)	28	(\$20)	20	(\$25)	19	(\$34)	19
Variable cost net revenue	\$5	29	\$17	32	\$23	27	\$11	28	\$18	20	\$24	19	\$12	19
(Fixed costs)	(\$17)	29	(\$11)	32	(\$10)	27	(\$19)	28	(\$13)	20	(\$8)	19	(\$10)	19
Total cost net revenue	-\$12	29	\$6	32	\$14	27	-\$9	28	\$5	20	\$16	19	\$3	19

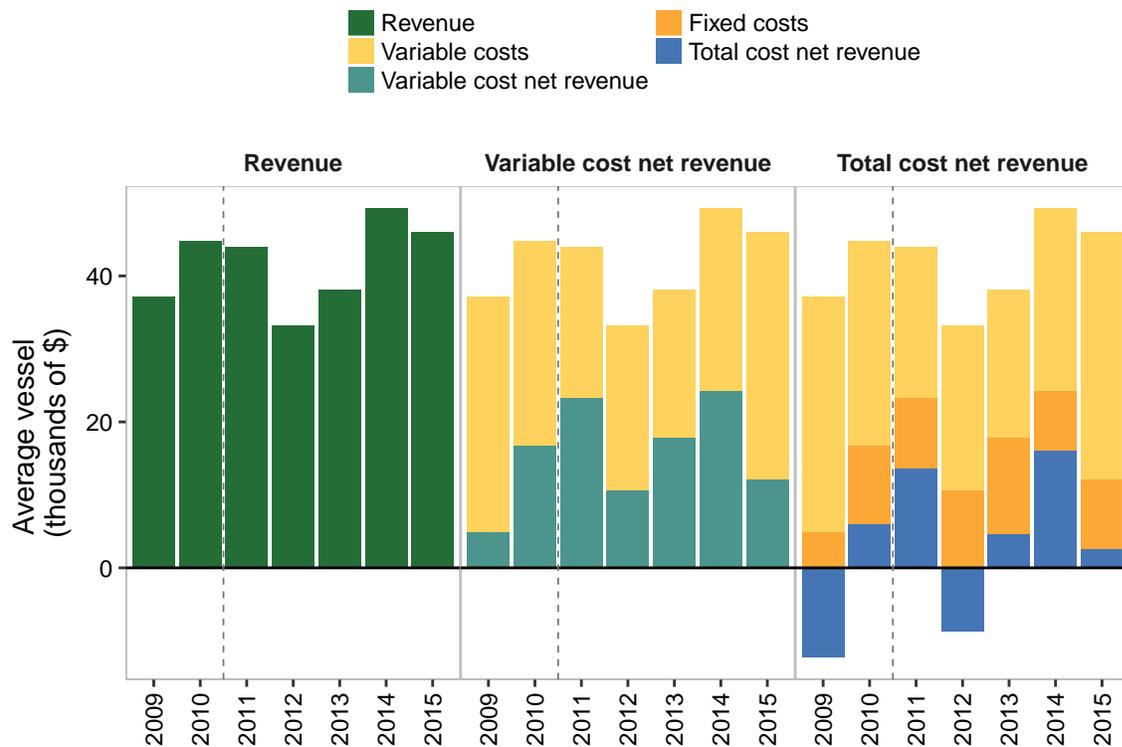


Figure 63: Other fisheries variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in Other fisheries (including salmon, tuna, and halibut). Dashed line represents the beginning of the catch share program.

Net revenue variability for all catch shares participation and by fishery

There is high variability in economic performance among vessels that participate in the catch share program. To display that variability while protecting confidential information, variable cost net revenue is calculated and displayed by groups of three vessels (Figures 64 through 72). To calculate the three-vessel averages, the vessels are ranked from lowest to highest by ex-vessel revenue, aggregated into groups of three and then the average costs and net revenue are calculated for these aggregations of vessels. Total cost net revenue is not shown because the fixed costs for one vessel in a group of three are often greater than 90% of the total fixed costs for all three vessels, breaking the EDC Program “90-10 rule” for confidentiality.

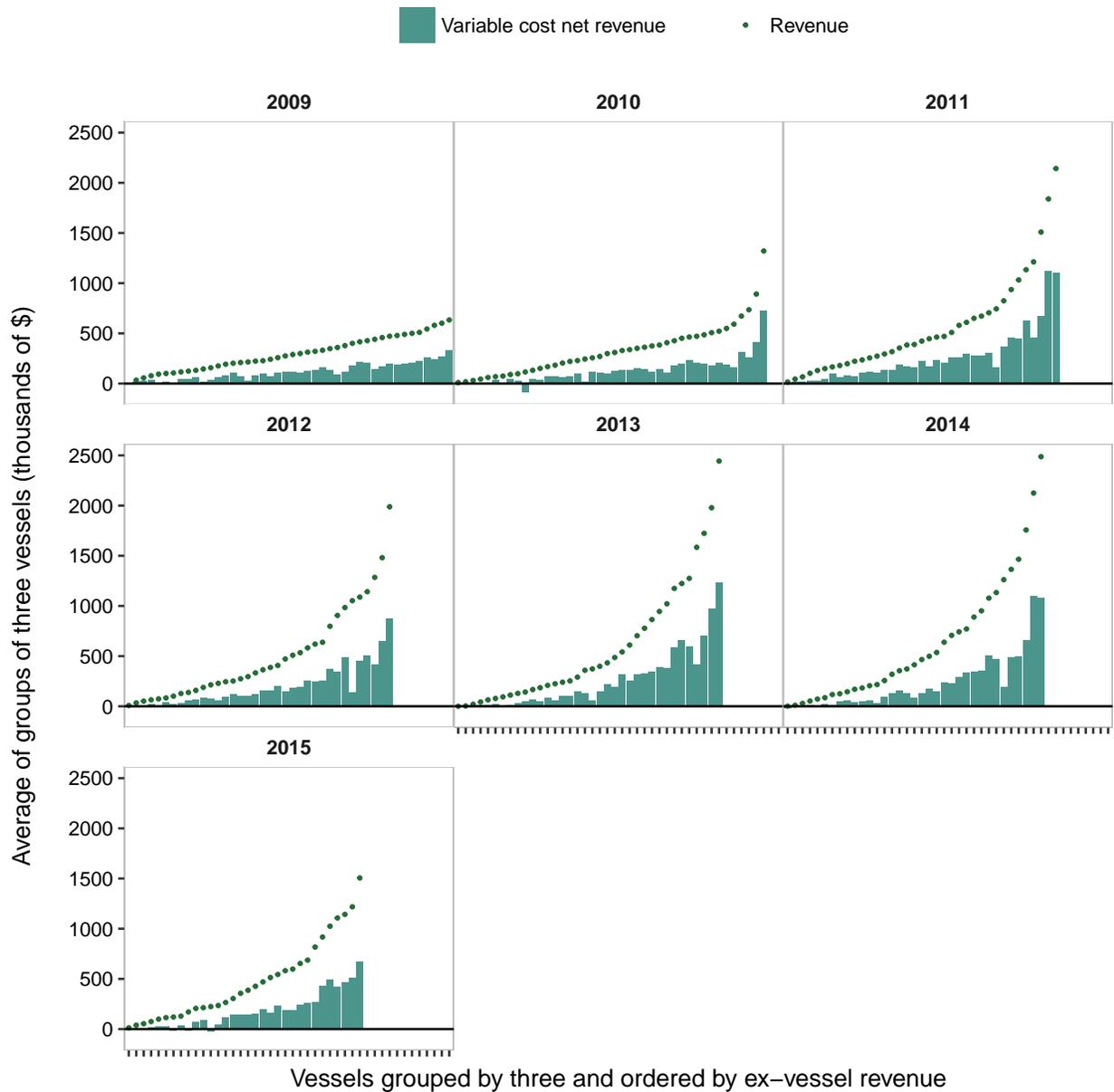


Figure 64: Net revenue in all catch shares fisheries (whiting and non-whiting groundfish) by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in all catch shares fisheries (whiting and non-whiting groundfish). To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.

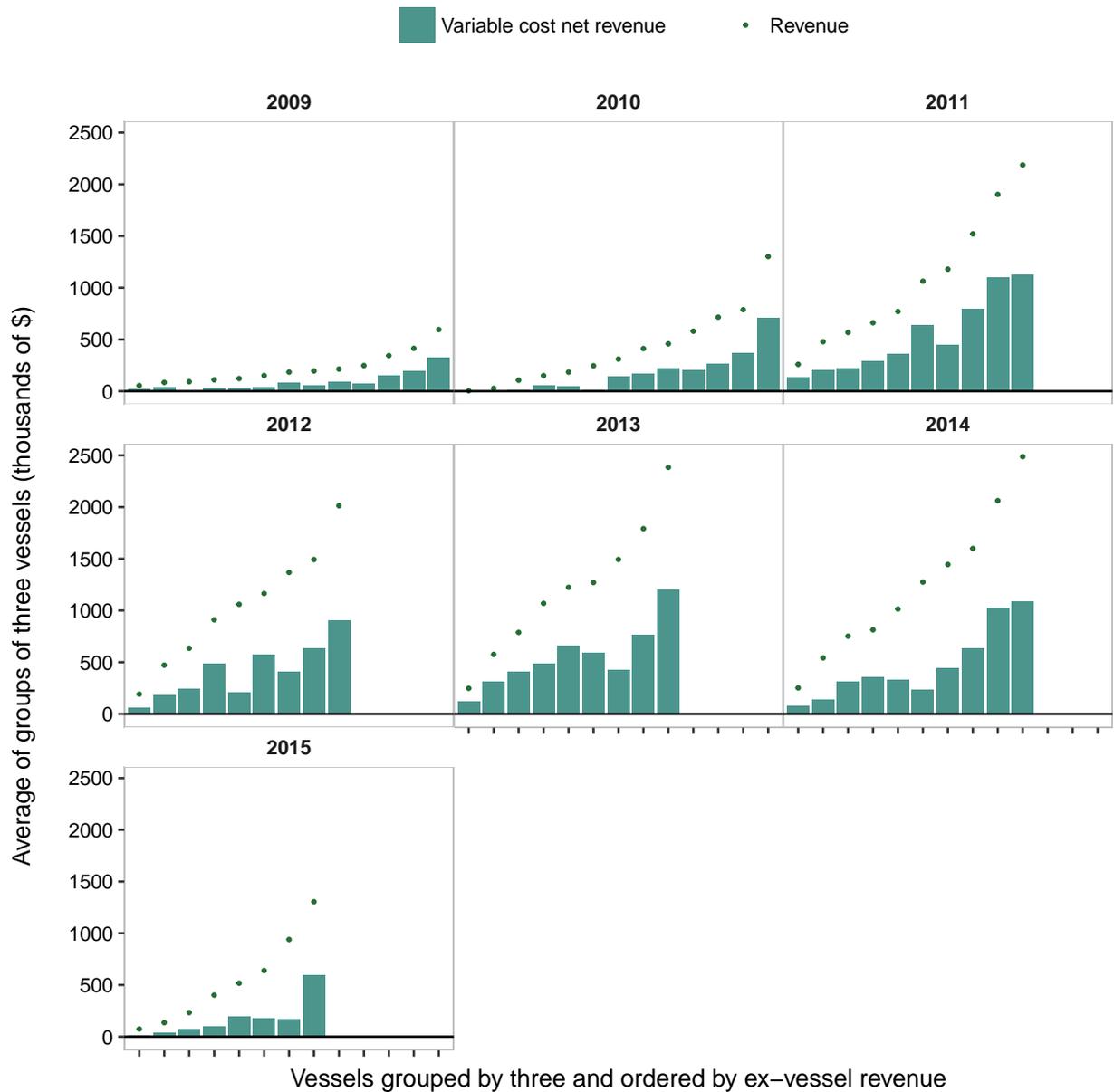


Figure 65: Net revenue in all whiting fisheries (shoreside and at-sea) by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in all catch shares fisheries (whiting and non-whiting groundfish). To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.

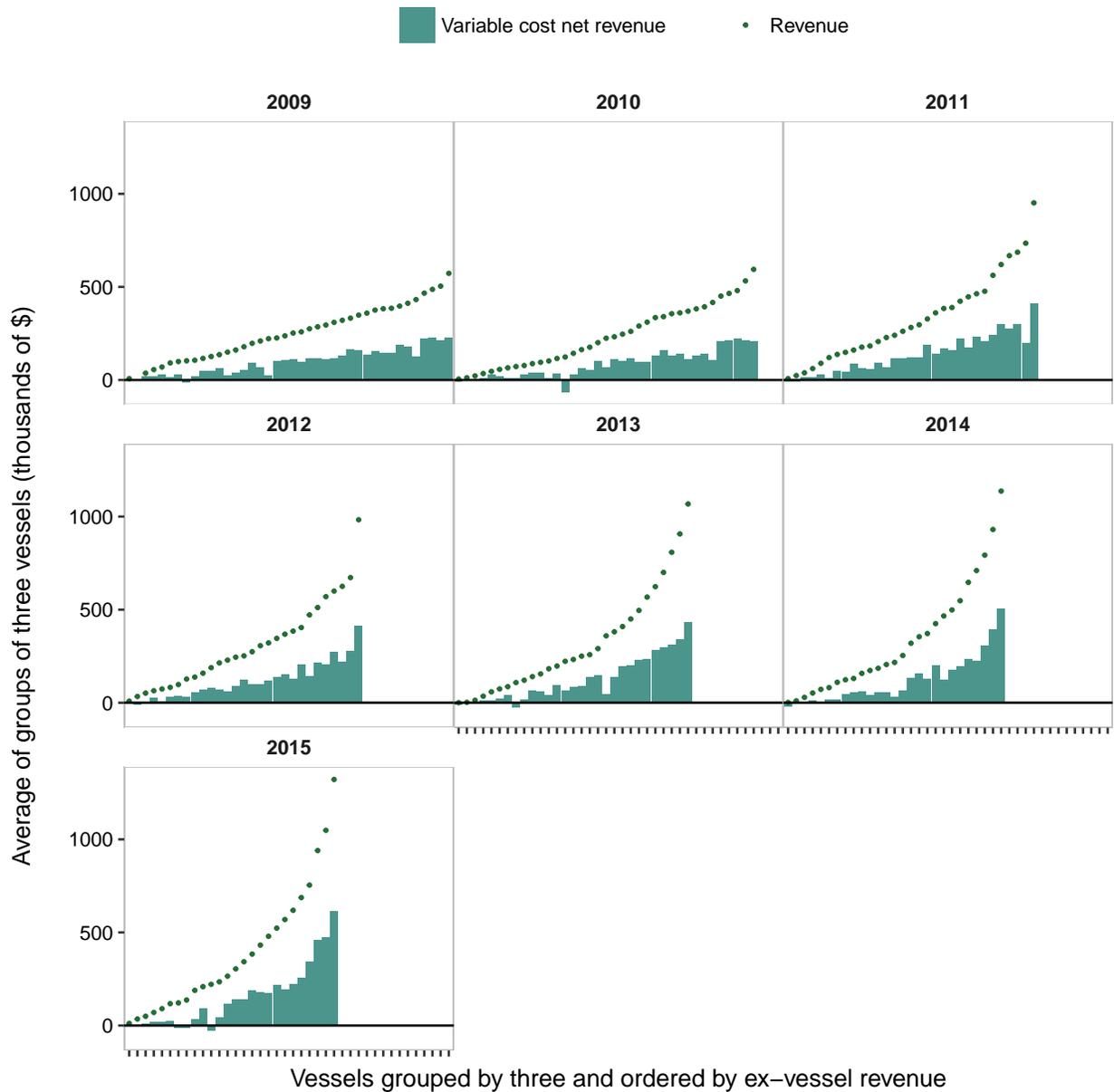


Figure 66: Net revenue in all non-whiting groundfish fisheries (catch shares only) by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in all catch shares fisheries (whiting and non-whiting groundfish). To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.

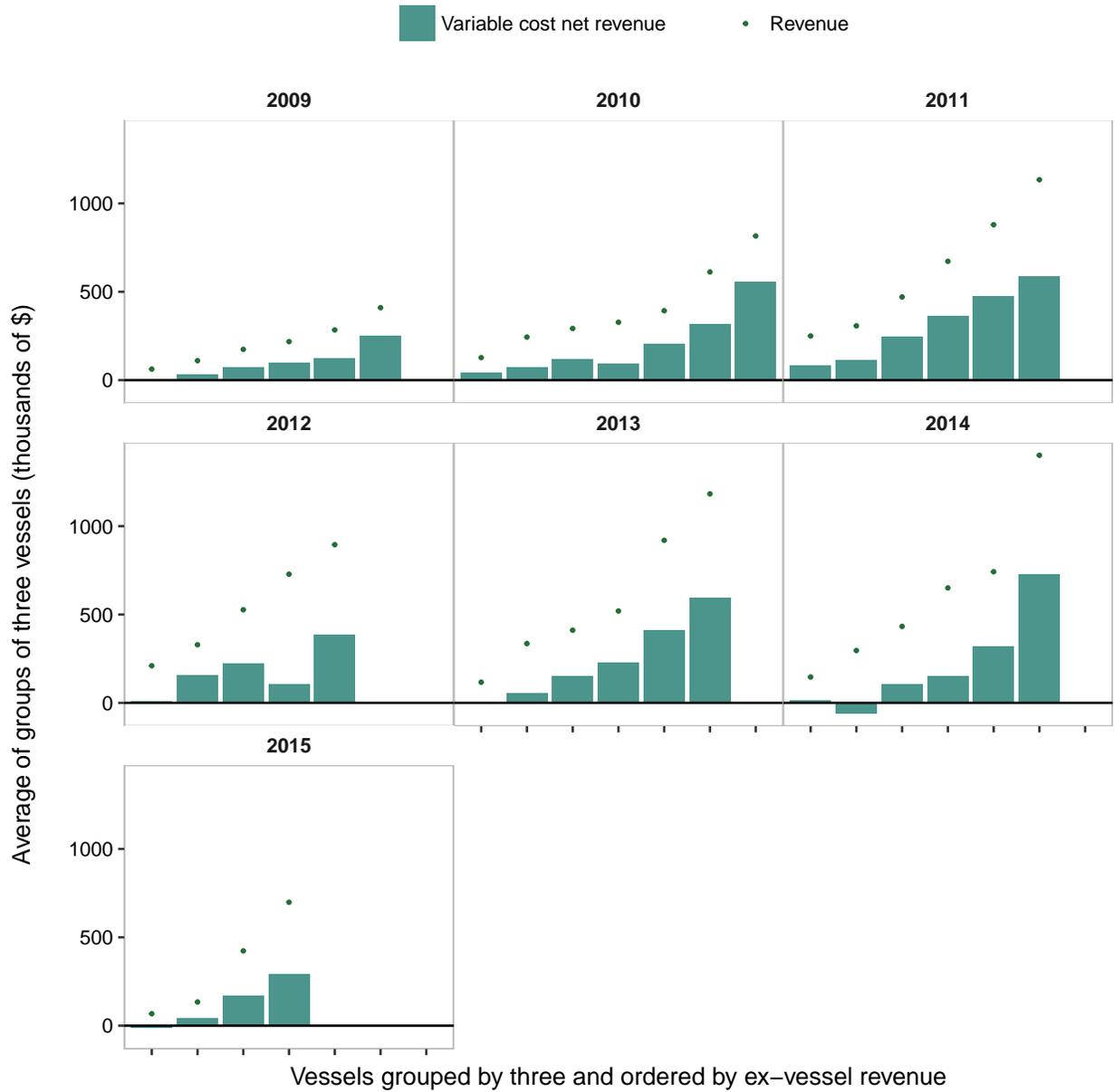


Figure 67: Net revenue in the at-sea Pacific whiting fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the at-sea Pacific whiting fishery. To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.

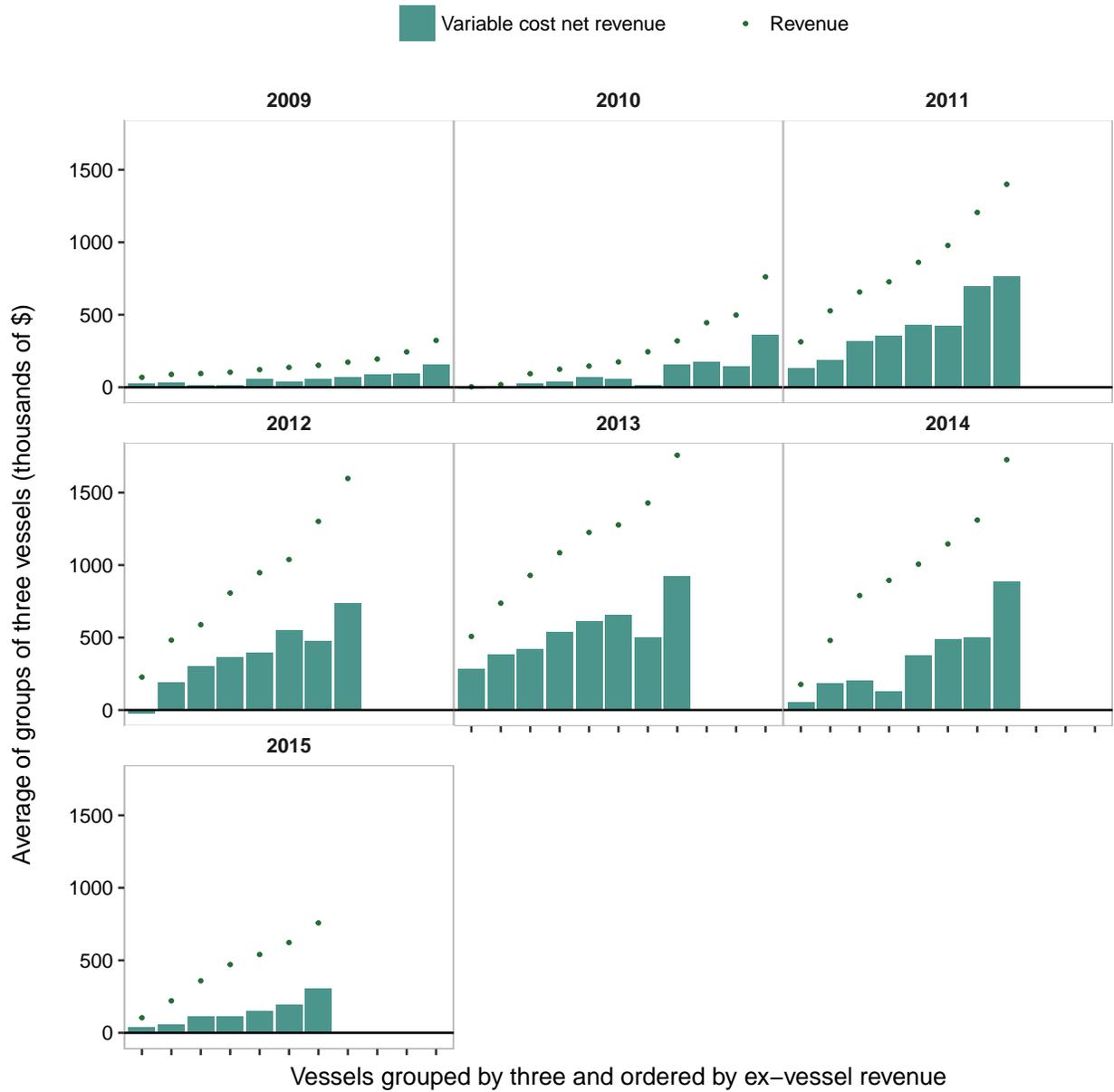


Figure 68: Net revenue in the shoreside Pacific whiting fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the shoreside Pacific whiting fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

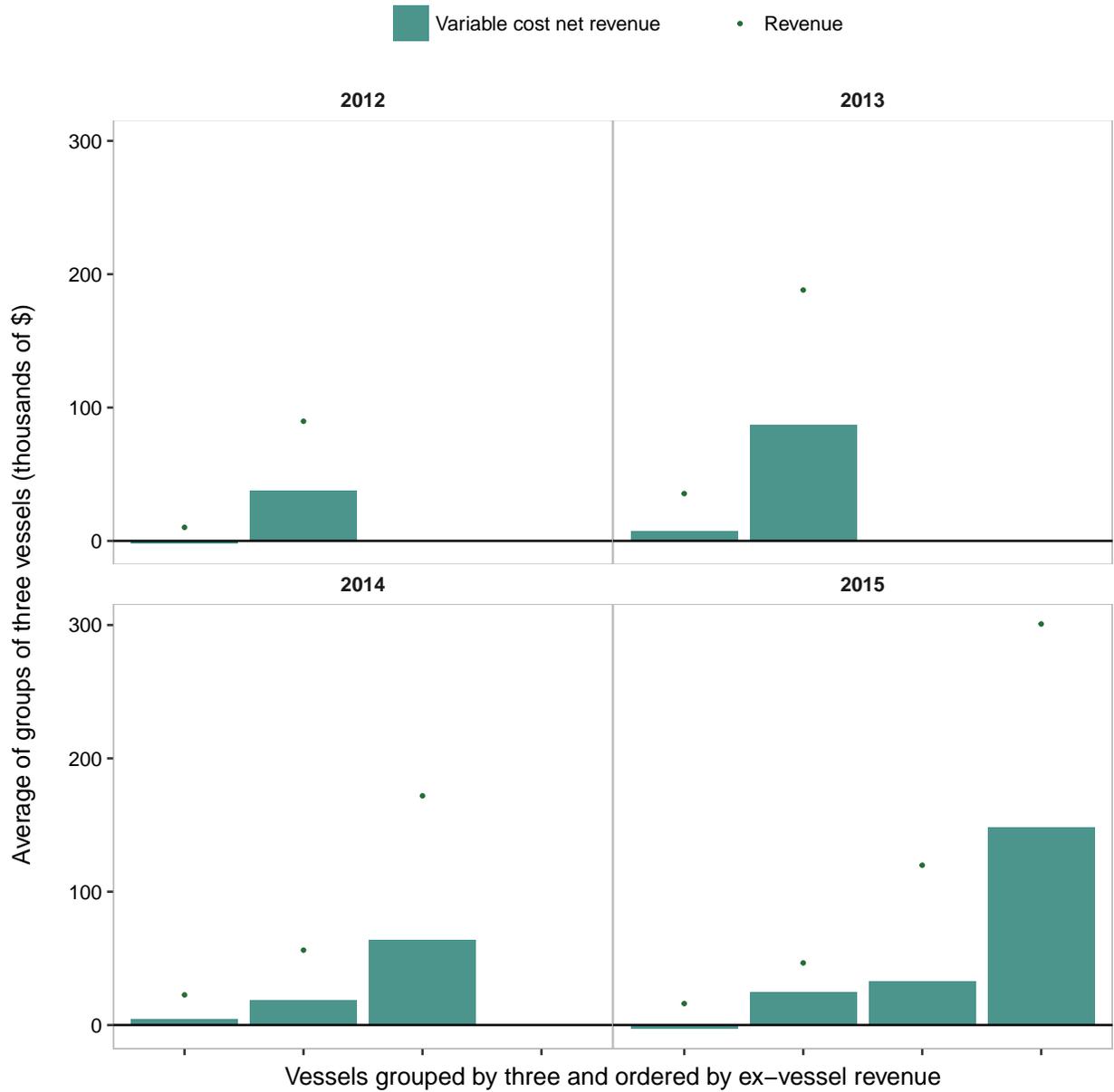


Figure 69: Net revenue in the Non-whiting midwater trawl fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the Non-whiting midwater trawl fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

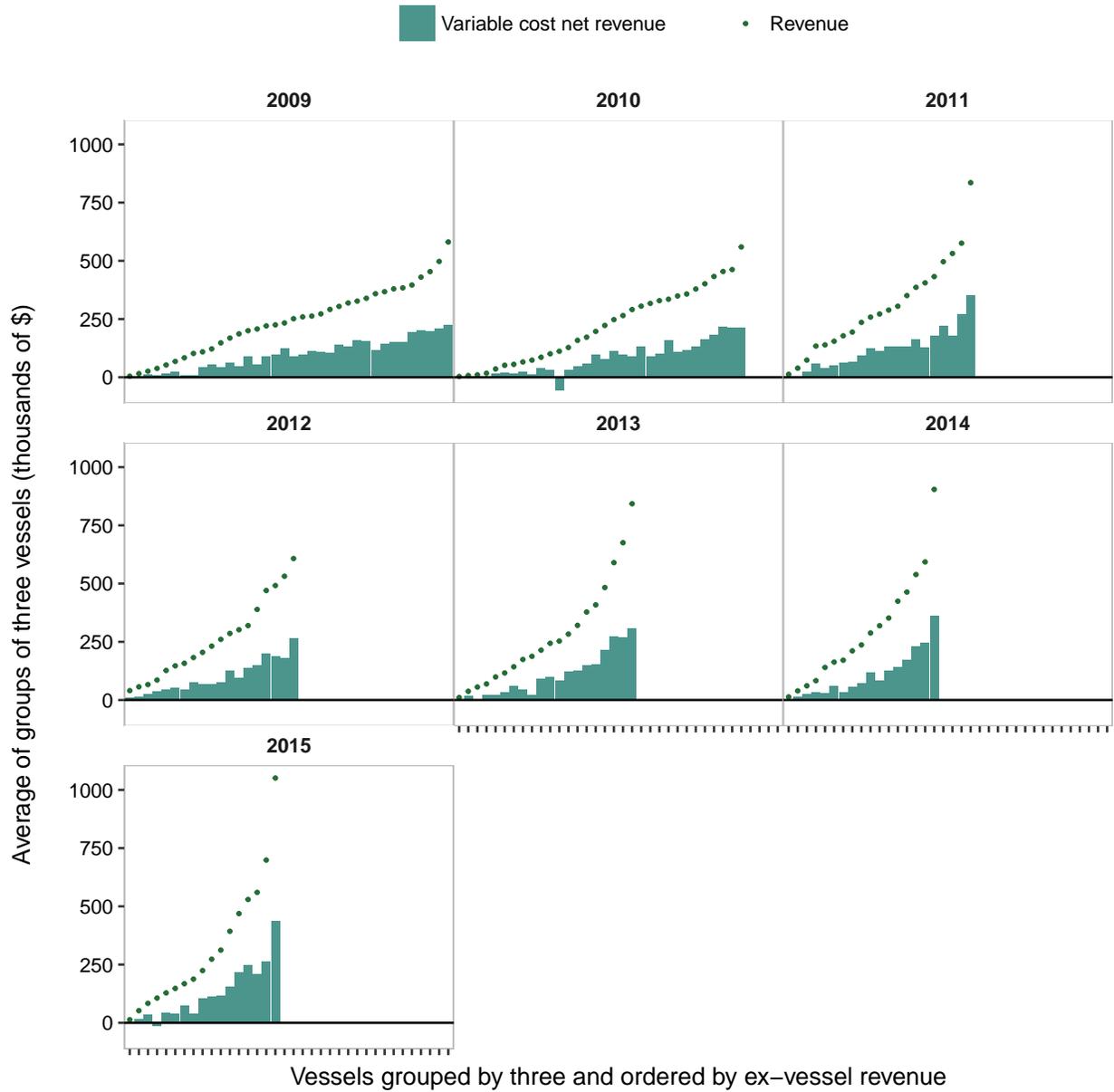


Figure 70: Net revenue in the DTS trawl with trawl endorsement fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the DTS trawl with trawl endorsement fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

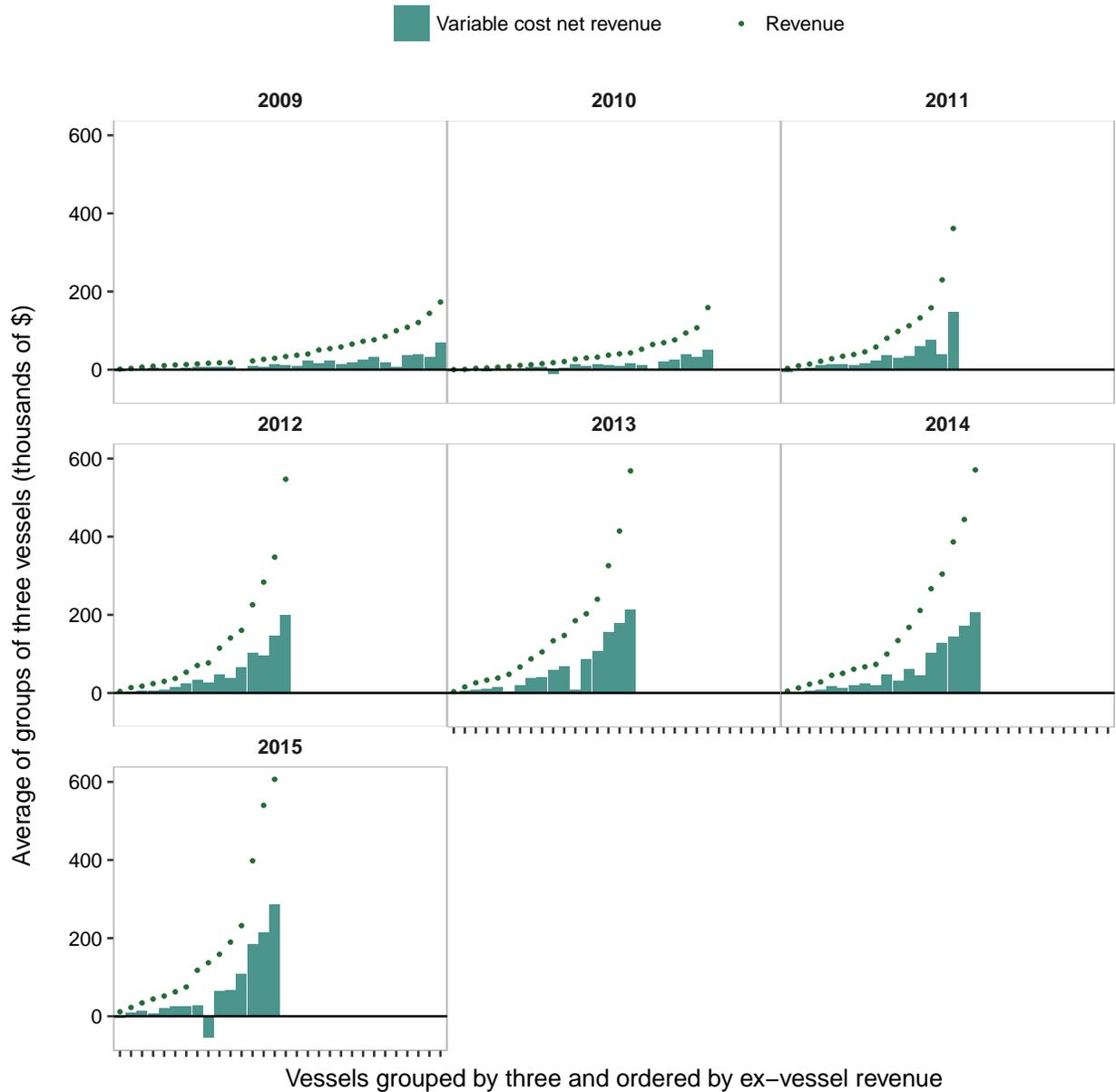


Figure 71: Net revenue in the non-whiting, non-DTS trawl with trawl endorsement fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the non-whiting, non-DTS trawl with trawl endorsement fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

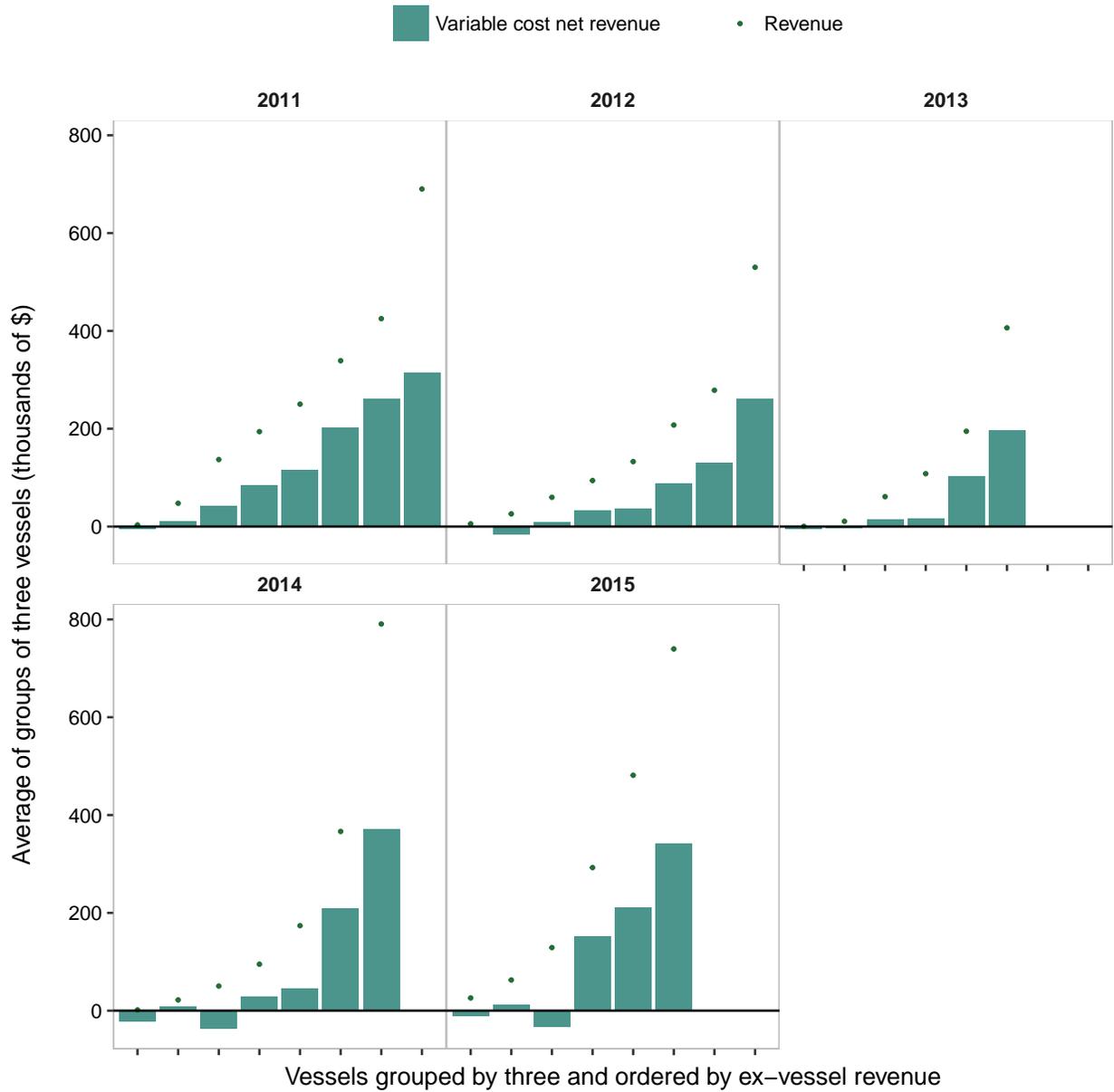


Figure 72: Net revenue in the groundfish fixed gear with trawl endorsement fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the groundfish fixed gear with trawl endorsement fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

13.3 Net revenue including quota costs and earnings

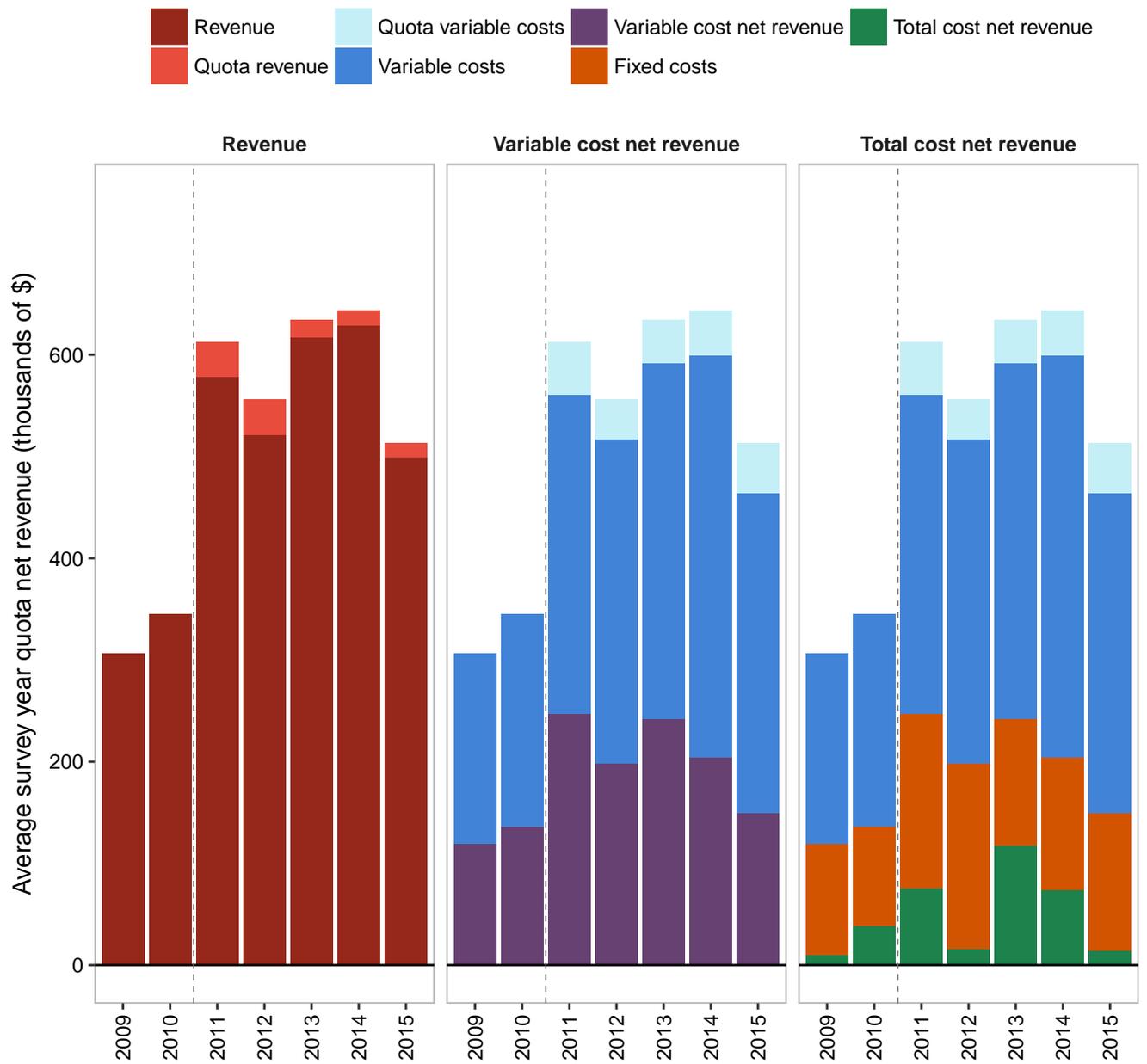
The costs and earnings from quota are an important component of the economic health of the companies that fish in the catch share program. The value of quota is theoretically equal to the profitability of the asset. In theory, a quota owner will fish the quota if the profit they earn from fishing the quota is higher than the price they would receive if they sold the quota. Net revenue including earnings and costs from quota will be less than net revenue without considering quota transactions if quota is purchased from quota share owners not involved with an actively participating vessel.

In the previous sections, we presented net revenue by fishery and calendar year. This was accomplished by using cost disaggregation to allocate variable and fixed costs to each delivery. Unlike the other costs, there is no method for allocating the financial cost of quota to individual deliveries because the source of quota used to cover an individual delivery is not known. Therefore, this section is presented by fiscal year and for all catch share fisheries combined rather than by calendar year by individual fishery. The figures are presented in pairs, the first of each pair depicts the catch share net revenue without including quota revenues or costs and the second pair includes the quota revenues and costs. The pairs are presented for all catch shares, all whiting vessels (includes all catch share activity), and all non-whiting groundfish vessels. The categorization of whiting or non-whiting groundfish vessel is mutually exclusive (if a vessel fished in both the whiting portion of the catch share program or the non-whiting groundfish portion, they are classified as a whiting vessel).

All Catch Shares Net Revenue: Including quota costs and earnings

Table 13.17: All catch share (whiting and non-whiting groundfish) average variable cost and total cost net revenue by survey year with and without quota revenue and quota costs. Average ex-vessel revenue, variable cost net revenue, and total cost net revenue (thousands of \$) for all participation in the catch share (whiting and non-whiting groundfish) fisheries by survey year with and without accounting for quota costs.

	2009		2010		2011		2012		2013		2014		2015	
	With	Without												
Revenue	\$306.0	\$306.0	\$344.9	\$344.9	\$612.1	\$578.0	\$556.5	\$521.6	\$634.1	\$616.6	\$643.4	\$628.9	\$513.0	\$499.5
Variable cost net revenue	\$119.3	\$119.3	\$136.3	\$136.3	\$247.1	\$264.8	\$198.1	\$202.5	\$242.2	\$267.0	\$204.5	\$233.9	\$150.0	\$185.8
Total cost net revenue	\$10.2	\$10.2	\$38.3	\$38.3	\$76.0	\$93.8	\$16.5	\$20.9	\$117.5	\$142.3	\$73.4	\$102.9	\$14.1	\$49.9



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Figure 73: All catch share (whiting and non-whiting groundfish) average net revenue with quota earnings and costs by survey year. This figure displays the average net revenue with quota earnings and costs by survey year. The components shown are revenue, quota revenue, variable costs, variable quota costs, variable cost net revenue, fixed costs, and total cost net revenue for all participation in the (whiting and non-whiting groundfish) fisheries by survey year. There are too few observations to display fixed quota costs (purchase or sale of quota shares).

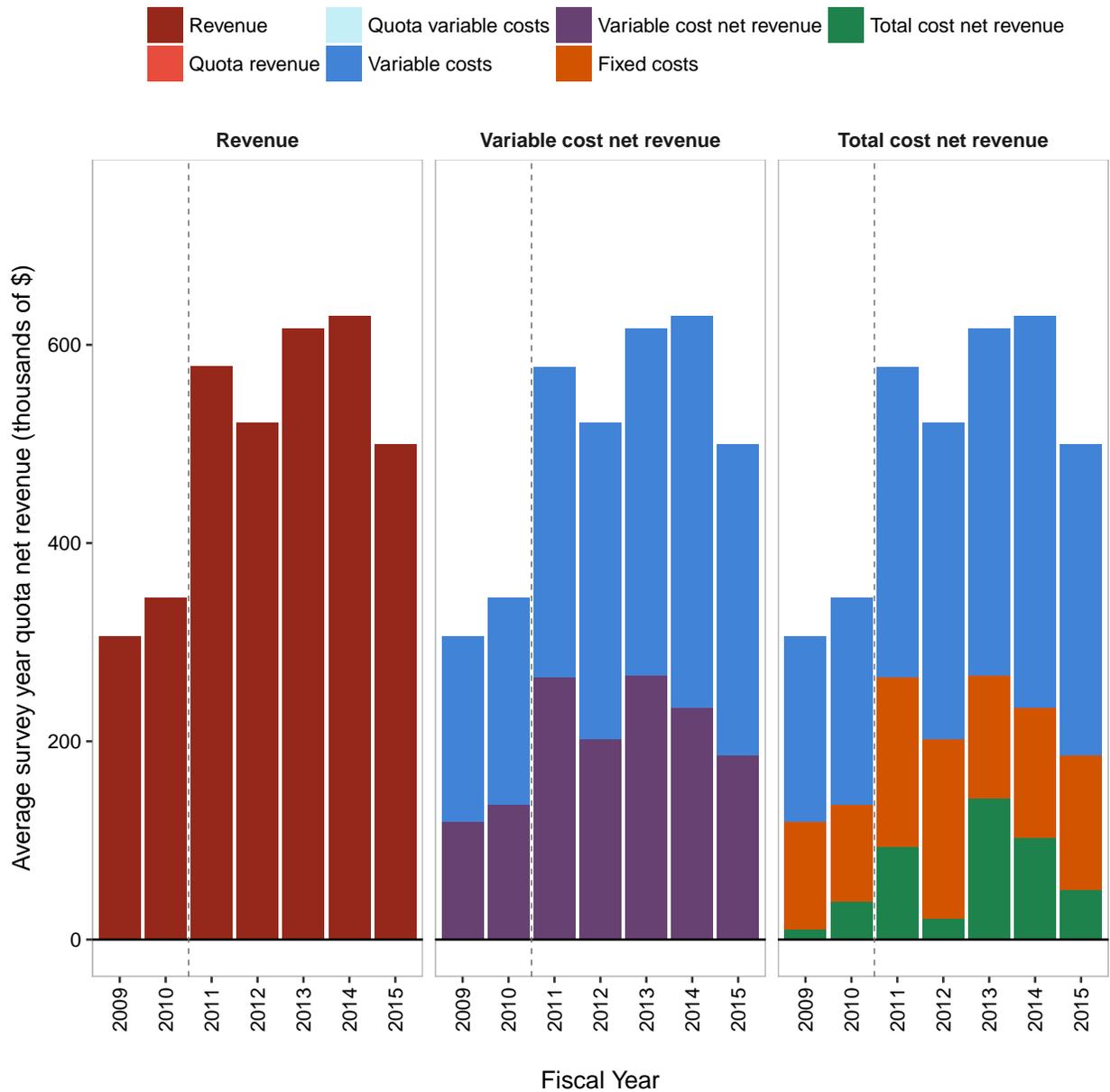


Figure 74: All catch share (whiting and non-whiting groundfish) average net revenue without quota earnings and costs by survey year. Average ex-vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue for all participation in the catch share fisheries (whiting and non-whiting groundfish) by survey year. Dashed line represents the beginning of the catch share program.

Catch Shares Net Revenue for Whiting Vessels: Including quota costs and earnings

Table 13.18: Whiting vessel average net revenue for all catch shares participation with quota earnings and costs by survey year. Average revenue, variable cost net revenue, and total cost net revenue (millions of \$) for all whiting vessels by survey year with and without quota costs.

	2009		2010		2011		2012		2013		2014		2015	
	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without
Revenue	\$0.43	\$0.43	\$0.56	\$0.56	\$1.18	\$1.15	\$1.15	\$1.12	\$1.42	\$1.41	\$1.37	\$1.35	\$0.79	\$0.77
Variable cost net revenue	\$0.19	\$0.19	\$0.24	\$0.24	\$0.53	\$0.57	\$0.42	\$0.44	\$0.60	\$0.66	\$0.47	\$0.51	\$0.25	\$0.28
Total cost net revenue	\$-0.00	\$-0.00	\$0.06	\$0.06	\$0.14	\$0.18	\$-0.02	\$-0.01	\$0.29	\$0.35	\$0.13	\$0.17	\$-0.10	\$-0.07

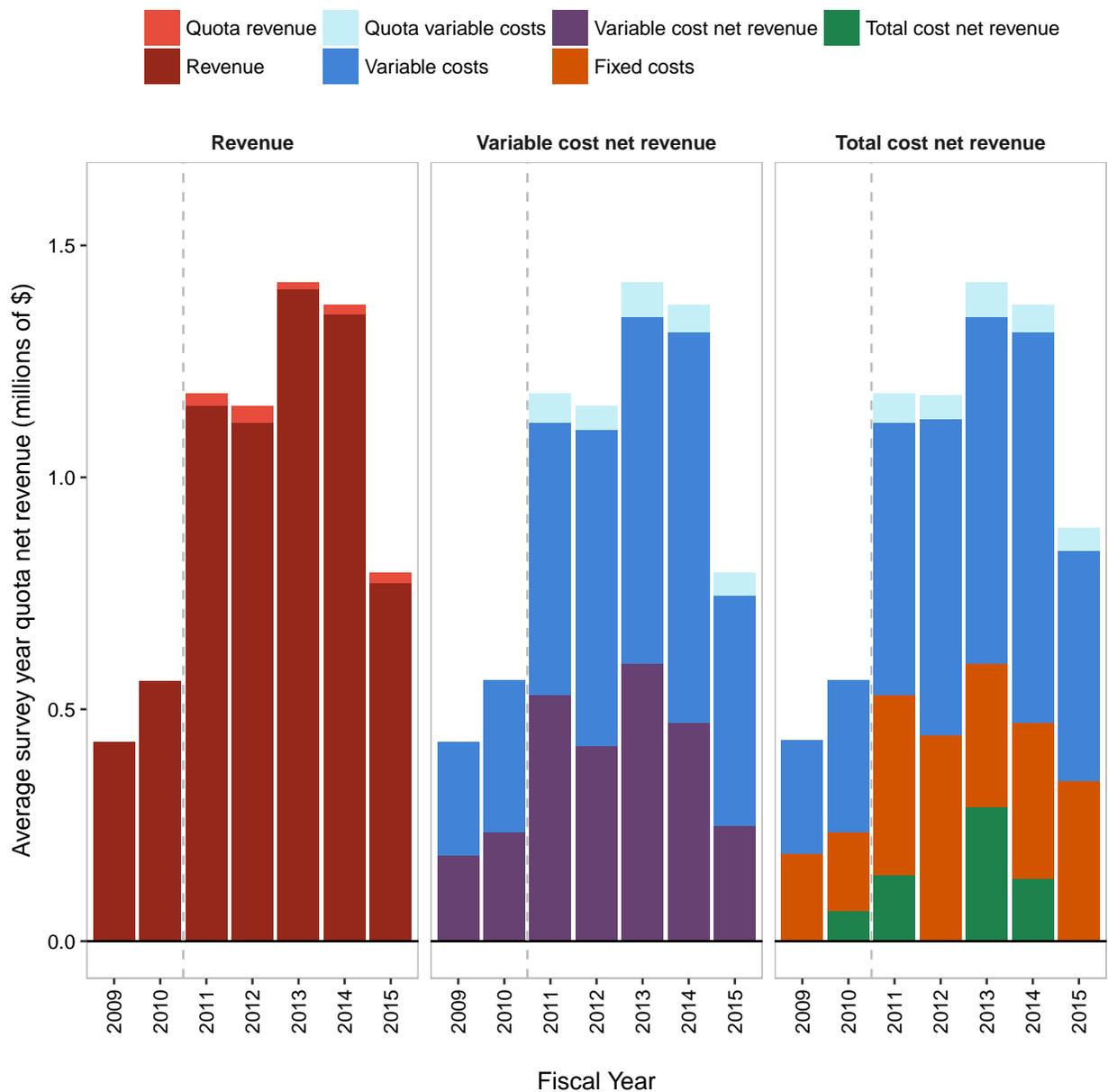


Figure 75: Whiting vessel average net revenue for all catch shares participation with quota earnings and costs by survey year. Average ex-vessel revenue, quota revenue, variable costs, variable quota costs, variable cost net revenue, fixed costs, and total cost net revenue for whiting vessel participation in the catch share fisheries (whiting and non-whiting groundfish) by survey year. There are too few observations to display fixed quota costs (purchase or sale of quota shares). Dashed line represents the beginning of the catch share program.

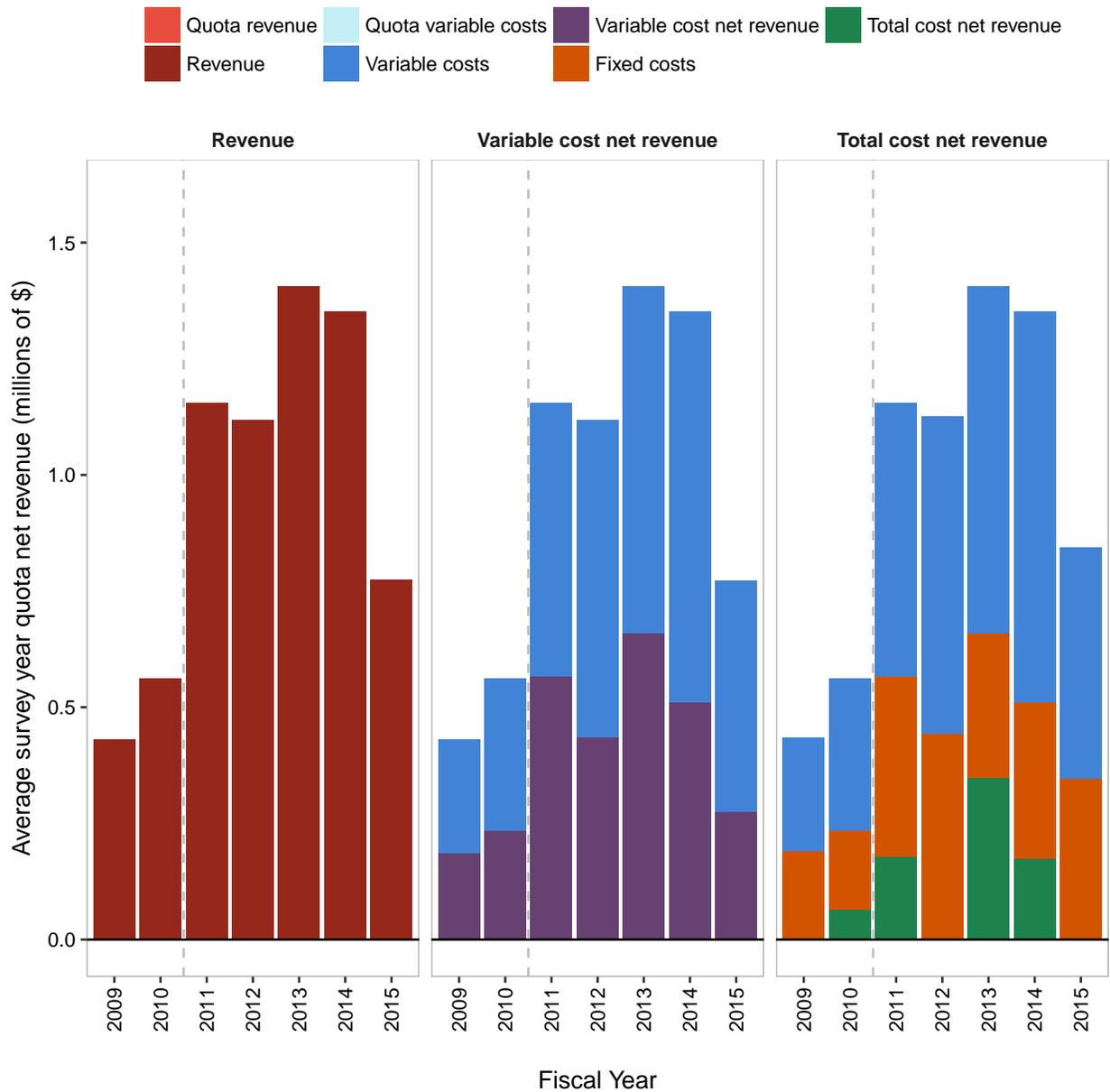


Figure 76: Whiting vessel average net revenue for all catch shares participation without quota earnings and costs by survey year. Average ex-vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue for whiting vessel participation in the catch share fisheries (whiting and non-whiting groundfish) by survey year. Dashed line represents the beginning of the catch share program.

Catch Shares Net Revenue for Non-whiting Groundfish Vessels: Including quota costs and earnings

Table 13.19: Non-whiting groundfish vessel average net revenue for all catch shares participation with quota earnings and costs by survey year. Average revenue, variable cost net revenue, and total cost net revenue (thousands of \$) for non-whiting groundfish vessels by survey year with and without accounting for quota costs.

	2009		2010		2011		2012		2013		2014		2015	
	With	Without												
Revenue	\$251.3	\$251.3	\$243.8	\$243.8	\$390.1	\$353.1	\$352.6	\$317.8	\$345.7	\$326.9	\$356.0	\$343.5	\$413.8	\$403.0
Variable cost net revenue	\$90.0	\$90.0	\$90.3	\$90.3	\$135.8	\$146.8	\$122.3	\$123.0	\$111.5	\$123.2	\$98.8	\$124.5	\$115.3	\$154.2
Total cost net revenue	\$16.4	\$16.4	\$25.8	\$25.8	\$49.9	\$60.9	\$30.2	\$30.9	\$54.6	\$66.2	\$49.1	\$74.7	\$53.2	\$92.1

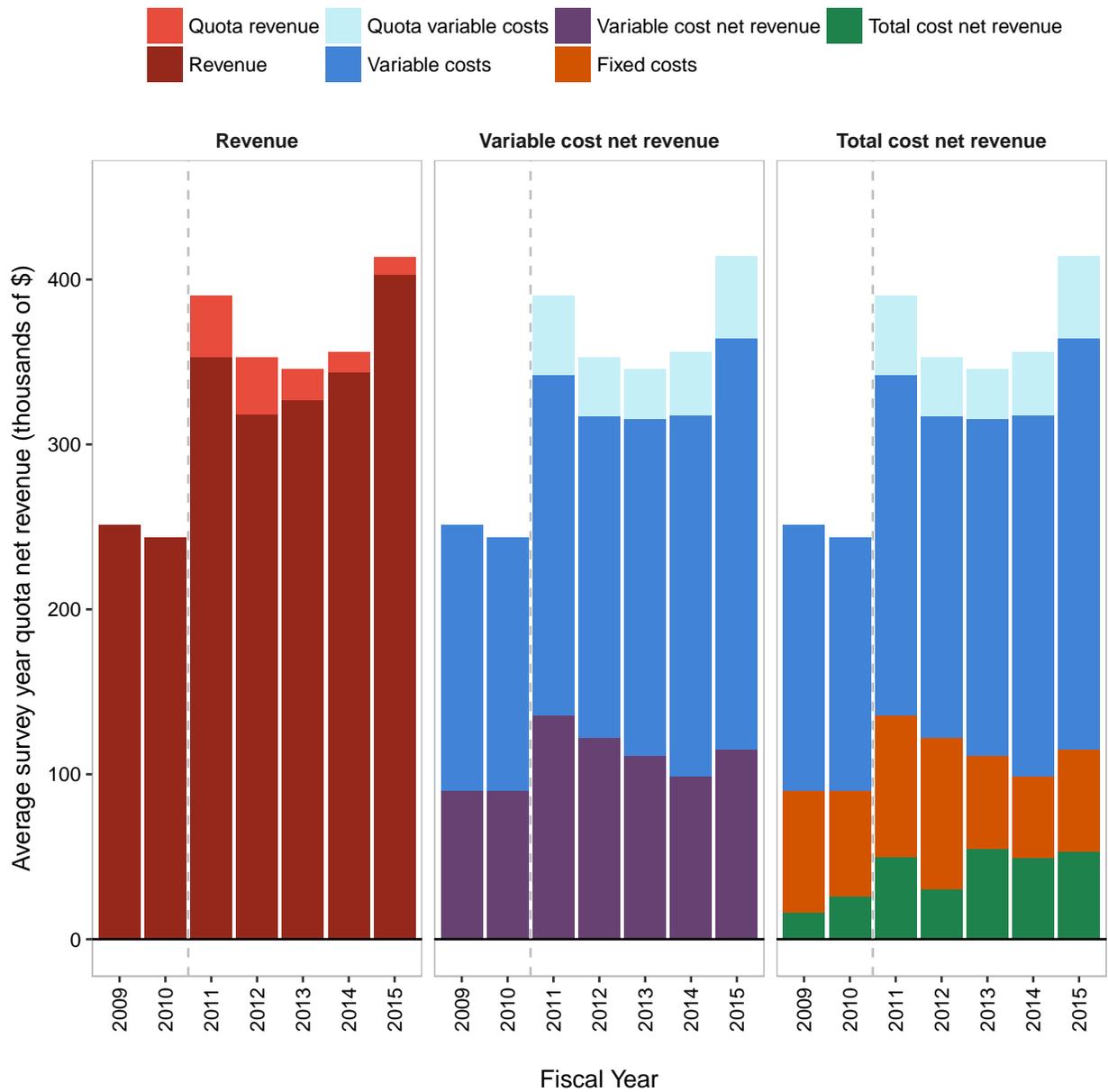


Figure 77: Non-whiting groundfish vessel average net revenue for all catch shares participation with quota earnings and costs by survey year. Average ex-vessel revenue, quota revenue, variable costs, variable quota costs, variable cost net revenue, fixed costs, and total cost net revenue for non-whiting groundfish vessel participation in catch share fisheries (non-whiting groundfish) by survey year. There are too few observations to display fixed quota costs (purchase or sale of quota shares). Dashed line represents the beginning of the catch share program.

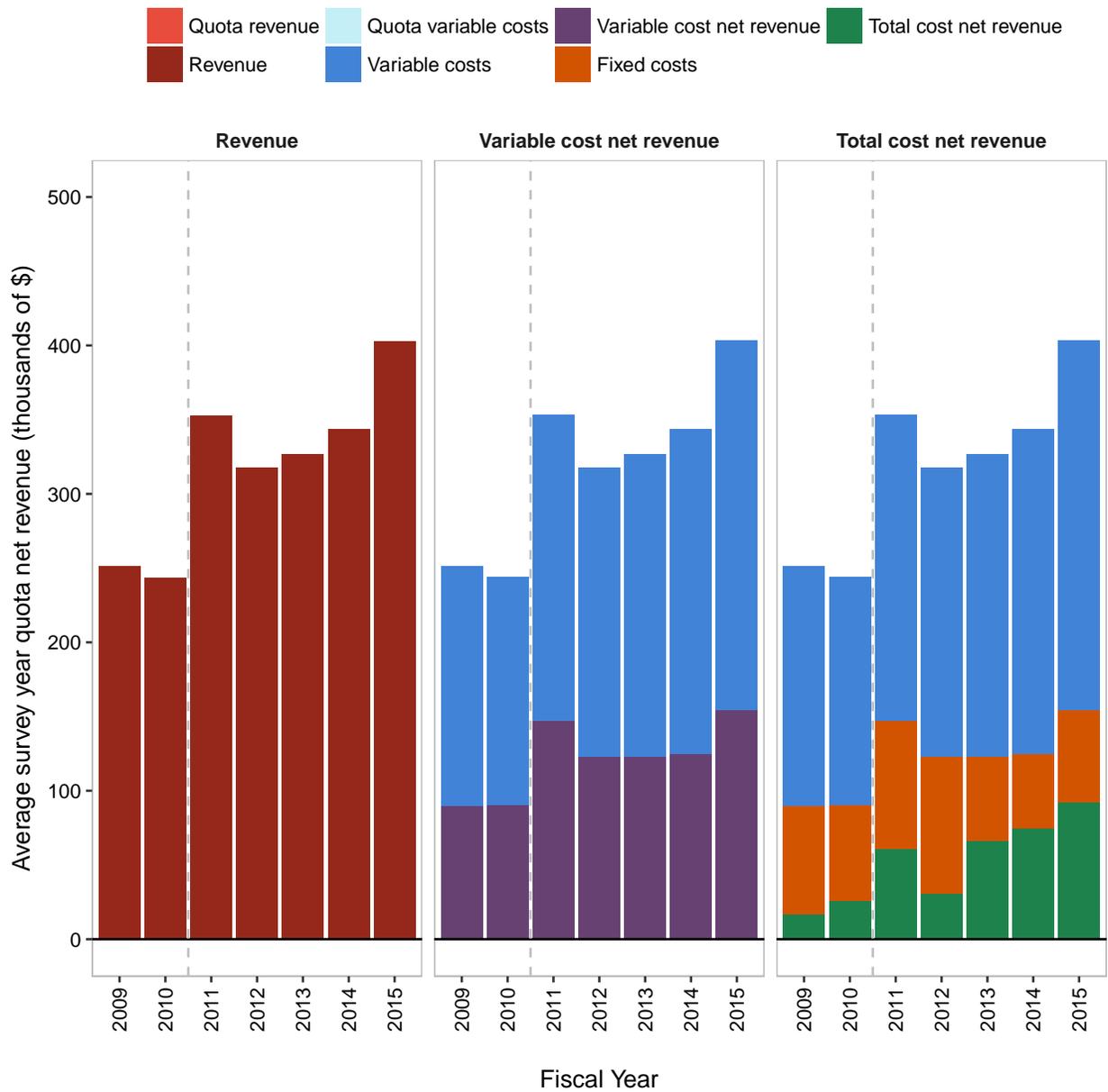


Figure 78: Non-whiting groundfish vessel average net revenue for all catch shares participation without quota earnings and costs by survey year. Average ex-vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue for all non-whiting groundfish vessels by participation in catch share fisheries (non-whiting groundfish) by survey year. Dashed line represents the beginning of the catch share program.

14 Economic Performance: Cost, Revenue, and Net Revenue Rates

As an indication of changes in efficiency and profitability, rates are calculated for revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue by days at sea and per metric ton of fish landed for all West Coast vessels (Table 14.1), delineated by vessel size (Tables 14.2 through 14.4), and home port state (Tables 14.5 through 14.7).

14.1 All West Coast operations

Table 14.1: Mean and median rates for all vessels that fished on the West Coast. Mean and median revenue, costs, and net revenues (\$) per day and per metric ton (mt) landed ($N_{2009} = 132$, $N_{2010} = 129$, $N_{2011} = 132$, $N_{2012} = 128$, $N_{2013} = 124$, $N_{2014} = 125$, $N_{2015} = 117$).

Description	2009		2010		2011		2012		2013		2014		2015	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$5,207	\$4,428	\$5,796	\$4,465	\$8,755	\$7,432	\$8,123	\$6,676	\$9,583	\$8,673	\$8,960	\$8,171	\$7,291	\$7,202
Revenue/mt	\$1,352	\$1,125	\$1,394	\$1,077	\$2,442	\$1,485	\$2,505	\$1,395	\$2,320	\$1,533	\$2,667	\$1,505	\$2,570	\$1,651
Variable costs/day	\$3,042	\$2,555	\$3,423	\$2,739	\$4,728	\$3,923	\$4,875	\$3,963	\$5,236	\$4,604	\$5,432	\$4,737	\$4,468	\$4,430
Variable costs/mt	\$996	\$662	\$869	\$673	\$1,565	\$849	\$1,613	\$878	\$1,983	\$839	\$2,485	\$877	\$1,757	\$908
Variable cost net revenue/day	\$2,166	\$1,721	\$2,372	\$1,551	\$4,026	\$3,192	\$3,249	\$2,420	\$4,347	\$3,709	\$3,528	\$3,105	\$2,822	\$2,933
Variable cost net revenue/mt	\$356	\$371	\$524	\$388	\$878	\$595	\$892	\$544	\$337	\$634	\$181	\$614	\$813	\$694
Fixed costs/day	\$1,749	\$971	\$1,555	\$947	\$6,806	\$1,482	\$4,111	\$1,723	\$2,077	\$1,281	\$2,200	\$1,054	\$2,266	\$1,149
Fixed costs/mt	\$445	\$250	\$364	\$228	\$4,964	\$295	\$1,909	\$351	\$780	\$242	\$3,544	\$211	\$609	\$284
Total cost net revenue/day	\$417	\$477	\$818	\$576	-\$2,780	\$1,486	-\$863	\$763	\$2,270	\$1,908	\$1,328	\$1,850	\$557	\$1,478
Total cost net revenue/mt	-\$89	\$103	\$161	\$104	-\$4,087	\$229	-\$1,017	\$136	-\$444	\$347	-\$3,362	\$344	\$204	\$311

14.2 All West Coast operations by vessel length

Table 14.2: Small vessel mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 44$, $N_{2010} = 44$, $N_{2012} = 49$, $N_{2013} = 47$, $N_{2014} = 47$, $N_{2015} = 42$).

Description	2009		2010		2011		2012		2013		2014		2015	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$3,292	\$2,842	\$3,395	\$3,243	\$5,526	\$4,608	\$4,574	\$3,522	\$5,593	\$4,712	\$4,732	\$4,642	\$4,603	\$4,222
Revenue/mt	\$2,168	\$1,629	\$2,389	\$1,820	\$3,850	\$4,080	\$3,980	\$4,303	\$3,769	\$3,216	\$4,382	\$3,159	\$4,397	\$2,774
Variable costs/day	\$1,836	\$1,612	\$1,875	\$1,720	\$3,108	\$2,910	\$2,714	\$2,562	\$2,938	\$2,483	\$3,058	\$2,970	\$2,864	\$2,658
Variable costs/mt	\$1,175	\$904	\$1,317	\$990	\$2,850	\$1,718	\$2,645	\$2,245	\$3,895	\$1,613	\$5,102	\$2,023	\$3,087	\$2,124
Variable cost net revenue/day	\$1,457	\$1,054	\$1,519	\$1,291	\$2,418	\$2,169	\$1,860	\$1,511	\$2,654	\$1,978	\$1,674	\$1,713	\$1,739	\$1,291
Variable cost net revenue/mt	\$993	\$617	\$1,072	\$728	\$1,000	\$1,199	\$1,335	\$798	-\$125	\$1,114	-\$720	\$925	\$1,310	\$926
Fixed costs/day	\$721	\$592	\$668	\$587	\$13,321	\$1,073	\$3,792	\$958	\$1,112	\$838	\$1,577	\$575	\$936	\$658
Fixed costs/mt	\$607	\$354	\$533	\$363	\$12,617	\$609	\$3,997	\$805	\$1,476	\$486	\$8,556	\$439	\$954	\$726
Total cost net revenue/day	\$735	\$352	\$851	\$584	-\$10,904	\$1,025	-\$1,932	\$582	\$1,542	\$1,269	\$97	\$1,166	\$803	\$744
Total cost net revenue/mt	\$386	\$304	\$540	\$350	-\$11,616	\$508	-\$2,662	\$390	-\$1,601	\$638	-\$9,276	\$587	\$355	\$483

Table 14.3: Medium vessel mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 54$, $N_{2010} = 52$, $N_{2012} = 55$, $N_{2013} = 53$, $N_{2014} = 53$, $N_{2015} = 50$).

Description	2009		2010		2011		2012		2013		2014		2015	
	Mean	Median												
Revenue/day	\$4,473	\$4,153	\$4,546	\$4,148	\$7,508	\$7,285	\$7,162	\$6,699	\$8,429	\$8,561	\$8,236	\$8,502	\$8,328	\$9,011
Revenue/mt	\$1,217	\$1,143	\$1,272	\$1,062	\$2,139	\$1,412	\$2,251	\$1,383	\$2,160	\$1,509	\$2,517	\$1,505	\$2,323	\$1,666
Variable costs/day	\$2,753	\$2,497	\$3,078	\$2,716	\$4,268	\$4,091	\$4,402	\$3,962	\$4,713	\$4,440	\$4,862	\$4,779	\$4,875	\$4,698
Variable costs/mt	\$833	\$708	\$938	\$674	\$1,168	\$813	\$1,381	\$871	\$1,209	\$801	\$1,398	\$867	\$1,416	\$927
Variable cost net revenue/day	\$1,720	\$1,548	\$1,469	\$1,229	\$3,241	\$3,170	\$2,759	\$2,377	\$3,716	\$3,468	\$3,374	\$3,151	\$3,453	\$3,874
Variable cost net revenue/mt	\$383	\$354	\$334	\$407	\$971	\$586	\$869	\$556	\$951	\$655	\$1,119	\$617	\$908	\$739
Fixed costs/day	\$1,335	\$994	\$1,317	\$989	\$2,015	\$1,375	\$2,978	\$1,605	\$1,763	\$1,151	\$1,827	\$1,094	\$1,686	\$1,258
Fixed costs/mt	\$400	\$270	\$390	\$266	\$560	\$275	\$951	\$359	\$519	\$242	\$788	\$211	\$600	\$283
Total cost net revenue/day	\$385	\$424	\$152	\$545	\$1,226	\$1,490	-\$218	\$802	\$1,952	\$1,898	\$1,548	\$2,206	\$1,768	\$2,187
Total cost net revenue/mt	-\$17	\$105	-\$56	\$104	\$411	\$315	-\$82	\$209	\$432	\$406	\$331	\$419	\$307	\$462

Table 14.4: Large vessel mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 37$, $N_{2010} = 38$, $N_{2012} = 32$, $N_{2013} = 32$, $N_{2014} = 32$, $N_{2015} = 32$).

Description	2009		2010		2011		2012		2013		2014		2015	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$8,551	\$7,059	\$10,073	\$8,365	\$15,046	\$15,925	\$14,522	\$13,928	\$16,660	\$15,861	\$15,885	\$14,481	\$9,327	\$9,068
Revenue/mt	\$432	\$233	\$399	\$217	\$1,008	\$269	\$715	\$315	\$513	\$269	\$471	\$233	\$718	\$193
Variable costs/day	\$4,928	\$4,798	\$5,610	\$5,295	\$7,664	\$7,372	\$8,595	\$7,860	\$9,091	\$7,800	\$9,562	\$8,365	\$5,887	\$6,123
Variable costs/mt	\$917	\$125	\$260	\$133	\$384	\$137	\$416	\$189	\$298	\$140	\$282	\$162	\$511	\$146
Variable cost net revenue/day	\$3,624	\$2,861	\$4,463	\$3,102	\$7,382	\$7,229	\$5,928	\$6,131	\$7,569	\$6,782	\$6,323	\$6,094	\$3,440	\$3,418
Variable cost net revenue/mt	-\$484	\$90	\$140	\$95	\$623	\$143	\$299	\$143	\$215	\$144	\$189	\$101	\$207	\$84
Fixed costs/day	\$3,524	\$2,022	\$2,839	\$1,956	\$4,215	\$3,471	\$7,380	\$2,968	\$3,804	\$2,985	\$3,636	\$2,278	\$4,723	\$1,440
Fixed costs/mt	\$254	\$78	\$128	\$66	\$303	\$86	\$377	\$111	\$123	\$52	\$121	\$42	\$195	\$53
Total cost net revenue/day	\$99	\$749	\$1,624	\$889	\$3,167	\$3,546	-\$1,452	\$1,858	\$3,764	\$3,460	\$2,688	\$3,510	-\$1,283	\$1,850
Total cost net revenue/mt	-\$738	\$38	\$11	\$36	\$321	\$75	-\$78	\$50	\$91	\$78	\$68	\$72	\$12	\$35

14.3 All West Coast operations by vessel home port state

Table 14.5: Washington mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 16$, $N_{2010} = 17$, $N_{2012} = 15$, $N_{2013} = 15$, $N_{2014} = 15$, $N_{2015} = 18$, $N_{2015} = 17$).

Description	2009		2010		2011		2012		2013		2014		2015	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$6,638	\$6,631	\$8,548	\$6,479	\$13,062	\$11,024	\$13,545	\$12,914	\$14,991	\$13,121	\$14,494	\$9,475	\$7,986	\$7,950
Revenue/mt	\$487	\$386	\$564	\$180	\$2,101	\$448	\$1,865	\$458	\$1,484	\$323	\$2,136	\$319	\$2,369	\$517
Variable costs/day	\$3,815	\$4,521	\$4,560	\$3,871	\$6,511	\$5,922	\$7,078	\$6,599	\$7,137	\$6,858	\$7,624	\$6,335	\$4,396	\$4,334
Variable costs/mt	\$308	\$227	\$356	\$109	\$974	\$238	\$954	\$228	\$608	\$180	\$2,066	\$194	\$1,413	\$274
Variable cost net revenue/day	\$2,823	\$2,209	\$3,988	\$2,608	\$6,551	\$6,354	\$6,467	\$5,894	\$7,854	\$6,673	\$6,870	\$3,832	\$3,590	\$3,690
Variable cost net revenue/mt	\$179	\$140	\$208	\$93	\$1,128	\$156	\$911	\$230	\$876	\$194	\$70	\$115	\$956	\$243
Fixed costs/day	\$2,242	\$1,655	\$2,105	\$1,359	\$3,814	\$1,989	\$4,819	\$2,623	\$3,114	\$2,438	\$3,703	\$1,471	\$1,828	\$1,110
Fixed costs/mt	\$159	\$93	\$172	\$45	\$406	\$193	\$471	\$174	\$398	\$59	\$781	\$88	\$617	\$93
Total cost net revenue/day	\$581	\$611	\$1,883	\$1,020	\$2,736	\$3,464	\$1,648	\$1,570	\$4,740	\$3,407	\$3,167	\$2,948	\$1,762	\$1,288
Total cost net revenue/mt	\$20	\$26	\$35	\$56	\$722	\$80	\$439	\$56	\$478	\$136	-\$711	\$81	\$339	\$76

Table 14.6: Oregon mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 75$, $N_{2010} = 74$, $N_{2012} = 76$, $N_{2013} = 72$, $N_{2014} = 73$, $N_{2015} = 79$).

Description	2009		2010		2011		2012		2013		2014		2015	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$5,525	\$4,725	\$5,866	\$4,617	\$8,723	\$7,513	\$8,010	\$6,485	\$9,959	\$9,111	\$9,062	\$8,961	\$7,712	\$7,454
Revenue/mt	\$1,120	\$1,022	\$1,111	\$959	\$2,182	\$1,351	\$2,137	\$1,232	\$1,992	\$1,399	\$2,289	\$1,330	\$2,382	\$1,638
Variable costs/day	\$3,130	\$2,566	\$3,583	\$2,828	\$4,593	\$3,781	\$4,985	\$3,974	\$5,498	\$4,815	\$5,659	\$4,782	\$4,664	\$4,589
Variable costs/mt	\$699	\$526	\$757	\$578	\$1,091	\$782	\$1,350	\$773	\$1,066	\$755	\$1,328	\$749	\$1,540	\$885
Variable cost net revenue/day	\$2,395	\$1,850	\$2,284	\$1,682	\$4,130	\$3,327	\$3,025	\$2,360	\$4,461	\$3,956	\$3,403	\$3,441	\$3,048	\$3,066
Variable cost net revenue/mt	\$421	\$363	\$354	\$338	\$1,090	\$547	\$786	\$491	\$926	\$611	\$960	\$608	\$843	\$694
Fixed costs/day	\$2,001	\$1,002	\$1,746	\$1,077	\$2,346	\$1,566	\$4,200	\$1,730	\$2,317	\$1,393	\$1,840	\$1,094	\$4,951	\$1,274
Fixed costs/mt	\$314	\$220	\$332	\$223	\$672	\$242	\$1,773	\$276	\$426	\$180	\$582	\$164	\$612	\$299
Total cost net revenue/day	\$394	\$687	\$538	\$513	\$1,785	\$1,374	-\$1,175	\$761	\$2,144	\$2,210	\$1,562	\$1,964	-\$1,903	\$1,806
Total cost net revenue/mt	\$107	\$134	\$22	\$111	\$418	\$232	-\$986	\$125	\$501	\$393	\$379	\$386	\$231	\$362

Table 14.7: California mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 43, N_{2010} = 43, N_{2012} = 43, N_{2013} = 41, N_{2014} = 39, N_{2015} = 28$).

Description	2009		2010		2011		2012		2013		2014		2015	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$4,250	\$3,420	\$4,799	\$4,222	\$7,162	\$6,691	\$6,607	\$5,985	\$6,329	\$5,683	\$6,463	\$6,387	\$5,717	\$5,206
Revenue/mt	\$1,945	\$1,411	\$2,067	\$1,373	\$2,796	\$1,735	\$3,235	\$2,224	\$3,027	\$2,393	\$3,538	\$2,198	\$2,682	\$1,735
Variable costs/day	\$2,627	\$2,594	\$2,814	\$2,583	\$4,166	\$3,593	\$3,941	\$3,323	\$3,829	\$3,474	\$4,034	\$3,719	\$4,009	\$3,909
Variable costs/mt	\$1,676	\$877	\$1,174	\$882	\$2,365	\$1,029	\$2,200	\$1,215	\$3,933	\$1,293	\$2,683	\$1,382	\$2,172	\$1,242
Variable cost net revenue/day	\$1,622	\$1,461	\$1,985	\$1,392	\$2,996	\$2,616	\$2,667	\$2,311	\$2,500	\$2,600	\$2,430	\$2,566	\$1,708	\$1,840
Variable cost net revenue/mt	\$270	\$546	\$894	\$545	\$431	\$769	\$1,034	\$769	-\$906	\$869	\$855	\$771	\$510	\$706
Fixed costs/day	\$1,084	\$915	\$1,032	\$814	\$15,217	\$1,300	\$3,444	\$1,592	\$1,543	\$924	\$2,193	\$868	\$1,111	\$932
Fixed costs/mt	\$720	\$448	\$443	\$310	\$13,545	\$471	\$2,440	\$773	\$1,214	\$443	\$9,822	\$347	\$610	\$345
Total cost net revenue/day	\$538	\$249	\$953	\$491	-\$12,222	\$1,286	-\$777	\$723	\$957	\$1,243	\$237	\$1,527	\$597	\$1,092
Total cost net revenue/mt	-\$451	\$82	\$451	\$205	-\$13,114	\$431	-\$1,405	\$252	-\$2,120	\$409	-\$8,967	\$460	-\$100	\$376

Cost Disaggregation

In order to conduct economic analyses of specific fisheries it is important to have costs broken out by fishery. However, vessels participating in multiple fisheries incur costs that are aggregated across fisheries. These are called joint costs in the economics and accounting literature. They may include fixed costs (e.g., a new engine), or variable costs (e.g., fuel). The former are joined by the nature of the costs, while the latter are joined due to observational limitations. It is difficult to assign fixed costs to a particular fishery because the level of the cost does not vary with vessel participation (at least over the short run).

Some variable costs can be tracked by fishery, but would be costly to do so. For example, although a vessel could theoretically set up a system to track fuel expenditures by fishery, doing so is rare among the EDC catcher vessels. Moreover, some types of fuel use are inherently (by their nature) difficult to allocate, even if they are tracked. An example is a vessel that fishes both on the West Coast and in Alaska. It is not obvious what proportion of the fuel consumed while steaming between the fisheries should be allocated to the West Coast.

There are four methods available for cost disaggregation: 1) disaggregation by weight of shoreside landings and at-sea deliveries; 2) disaggregation by value of shoreside landings and at-sea deliveries; 3) disaggregation by days at sea; and, 4) disaggregation by a combination of the other three methods by cost category (“mixed method”). The body of this report uses the “mixed method” for all cost disaggregation.

Use of these methods requires data from various sources. The total weight and ex-vessel revenue from shoreside landings are obtained from fish ticket data. The total weight of at-sea deliveries is obtained from A-SHOP data, and the ex-vessel revenue from at-sea deliveries is obtained from EDC data. The days at sea are also obtained from EDC data. Landings and days at sea are allocated to specific fisheries using the methods described in Section 3: Vessel Participation on the West Coast and in Alaska.

Alaska landings and revenues obtained from EDC data were appended to the information extracted from the West Coast fish ticket data. This was only done for operators who also operated the vessel on the West Coast. If a vessel only participated in Alaska fisheries, the data were excluded from the analyses. If a vessel fished in Alaska, but the operator of the vessel was different from the operator on the West Coast, the Alaska portion was also excluded.

If the vessel was operated by more than one company during the fiscal year, the range of dates that are used to pull the fish ticket records is adjusted. There are two cases when this would occur: the vessel was leased to a different operator, or the vessel was sold mid-year to another company. In cases where the vessel was sold mid-year, information from the Permit Office must be obtained to determine when the vessel was transferred to a new company. Although both the Coast Guard and the Permit Office track vessel ownership information, we use

the Permit Office data as the authoritative source for this information. When the vessel transfers ownership, a new record is made in the Permit Office database and so the dates of operation of the multiple companies can be determined and used as the range of dates for pulling the fish ticket records. Occasionally, the paperwork for vessel sales lags with the change in operation, additional information provided by the participant on the form or other communications is used to adjust the fiscal year used to calculate total revenue to best correspond with the information provided on the form. If the vessel was leased by the owner of the vessel, then the lease dates provided on the EDC form are combined with the fiscal year data to pull the fish ticket records.

Once the total revenues from shoreside landings is calculated, it is then added to the other revenue categories provided on the forms to generate the total revenue. Landings of species associated with zero revenue were excluded entirely from the cost disaggregation analyses.

Listed below are the variables used to disaggregate each cost category for the "mixed" method:

- Costs were disaggregated using ex-vessel revenue for the following cost categories:
 - Capitalized expenditures
 - Crew wages
 - Captain wages
 - Travel
 - Fishery association dues
 - Fees
 - Vessel and on-board equipment.
- Costs were disaggregated using at-sea deliveries and shoreside landings weight for the following cost categories:
 - Bait (only aggregated to non-trawl fisheries)
 - Offload fees
 - Trucking expenses
 - Fishing gear.
- Costs were disaggregated using days at sea for the following cost categories:
 - Food
 - Fuel
 - Ice
 - Insurance
 - Other supplies
 - Communications
 - Lease of the vessel
 - Moorage.

To understand the potential implications of the assumptions associated with the four methods of cost disaggregation, the output of the different methods were examined by looking at the effect on average total cost net revenue on the West Coast. Total cost net revenue by cost disaggregation type are presented in Tables A.1 (cost disaggregation using ex-vessel revenue), Table A.2 (cost disaggregation using at-sea deliveries and shoreside landings), Table A.3 (cost disaggregation using days at sea) and A.4 (cost disaggregation using "mixed method").

Using landings and delivery weight resulted in allocating the largest variable and fixed costs to the West Coast than any other method and therefore, the lowest total cost net revenue. The days at sea method resulted in the highest total cost net revenue. Although the different methods resulted in different allocations of costs, Figure 79 shows that there were no major differences between the methods.

Table A.1: Net revenue using ex-vessel revenue for cost disaggregation. Total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the West Coast groundfish trawl catch share program using ex-vessel revenue to disaggregate costs from other fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Revenue	\$311	123	\$362	122	\$587	112	\$530	110	\$605	109	\$629	105	\$486	97
(Variable costs)	(\$179)	123	(\$203)	122	(\$291)	112	(\$312)	110	(\$337)	109	(\$366)	105	(\$276)	97
Variable cost net revenue	\$132	123	\$159	122	\$295	112	\$218	110	\$268	109	\$263	105	\$210	97
(Fixed costs)	(\$110)	123	(\$110)	122	(\$155)	112	(\$182)	110	(\$135)	109	(\$141)	105	(\$135)	97
Total cost net revenue	\$22	123	\$49	122	\$140	112	\$37	110	\$133	109	\$122	105	\$75	97

Table A.2: Net revenue using at-sea deliveries and shoreside landings for cost disaggregation. Total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the West Coast groundfish trawl catch share program using at-sea deliveries and shoreside landings to disaggregate costs from other fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Revenue	\$311	123	\$362	122	\$587	112	\$530	110	\$605	109	\$629	105	\$486	97
(Variable costs)	(\$200)	123	(\$220)	122	(\$309)	112	(\$328)	110	(\$366)	109	(\$386)	105	(\$284)	97
Variable cost net revenue	\$112	123	\$141	122	\$278	112	\$202	110	\$239	109	\$242	105	\$202	97
(Fixed costs)	(\$137)	123	(\$132)	122	(\$184)	112	(\$204)	110	(\$162)	109	(\$162)	105	(\$146)	97
Total cost net revenue	-\$25	123	\$10	122	\$94	112	-\$2	110	\$77	109	\$80	105	\$55	97

Table A.3: Net revenue using days at sea for cost disaggregation. Total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the West Coast groundfish trawl catch share program using days at sea to disaggregate costs from other fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Revenue	\$311	123	\$362	122	\$587	112	\$530	110	\$605	109	\$629	105	\$486	97
(Variable costs)	(\$180)	123	(\$200)	122	(\$285)	112	(\$305)	110	(\$349)	109	(\$362)	105	(\$266)	97
Variable cost net revenue	\$131	123	\$161	122	\$302	112	\$225	110	\$256	109	\$266	105	\$219	97
(Fixed costs)	(\$107)	123	(\$111)	122	(\$148)	112	(\$181)	110	(\$134)	109	(\$140)	105	(\$136)	97
Total cost net revenue	\$24	123	\$50	122	\$154	112	\$44	110	\$121	109	\$127	105	\$84	97

Table A.4: Net revenue using the mixed method for cost disaggregation. Total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the West Coast groundfish trawl catch share program using the mixed method to disaggregate costs from other fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N										
Revenue	\$311	123	\$362	122	\$587	112	\$530	110	\$605	109	\$629	105	\$486	97
(Variable costs)	(\$182)	123	(\$205)	122	(\$292)	112	(\$311)	110	(\$343)	109	(\$367)	105	(\$275)	97
Variable cost net revenue	\$129	123	\$157	122	\$294	112	\$219	110	\$262	109	\$261	105	\$210	97
(Fixed costs)	(\$116)	123	(\$117)	122	(\$165)	112	(\$188)	110	(\$139)	109	(\$141)	105	(\$136)	97
Total cost net revenue	\$13	123	\$40	122	\$130	112	\$31	110	\$123	109	\$120	105	\$75	97

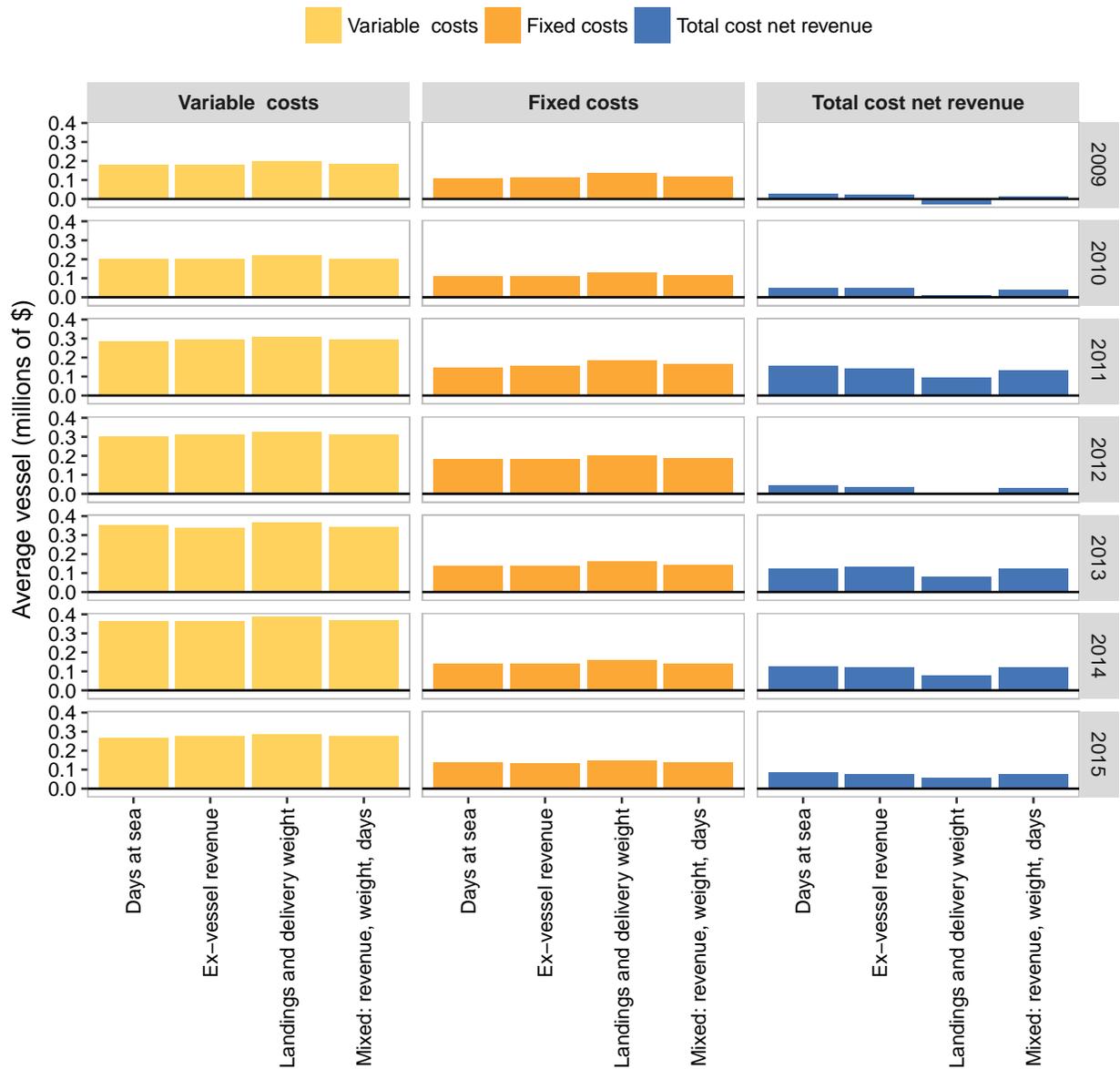


Figure 79: Sensitivity analysis for cost disaggregation methods. Sensitivity analysis of cost disaggregation methods on total cost net revenue for vessel operations in the catch share program (whiting and non-whiting groundfish). The three methods are disaggregation by landings and delivery weight, days at sea, ex-vessel revenue, and “mixed” where costs are disaggregated by one of the three methods depending on the type of cost.