

Economic Data Collection Program

Catcher Vessel Report

Draft Report for PFMC Review

Do Not Cite

Northwest Fisheries Science Center<sup>1</sup>

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# Summary

This report summarizes information collected from the West Coast groundfish trawl catcher vessel fleet as a part of the Economic Data Collection (EDC) program, which was enacted to monitor the economic effects of the 2011 transition of the West Coast groundfish trawl fishery to a catch share program. The catch share program consists of cooperative programs for the at-sea mothership and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet. Annual EDC submissions are required from all fishery participants. This catcher vessel report (and its companion reports covering the other sectors) is the first in what is expected to be an annual series of reports. EDC economists expect to expand and refine the methods used in each new annual publication.

The report covers the years 2009 to 2011. It contains information about annual participation by catcher vessels in the West Coast and Alaska groundfish trawl fisheries, as well as the vessel physical characteristics, fuel use, speed, and crew size and share systems. Fish landings and the ports of delivery are summarized. The report also contains variable and fixed cost information, revenues, and calculated net revenue from West Coast harvest. Finally, a breakdown of costs, revenue, net revenue per day at sea, and per metric ton of harvest provide basic metrics for the economic performance of the catcher vessel fleet.



# 1 Introduction

## 1.1 Background

In January 2011, the West Coast groundfish trawl fishery transitioned to a catch share program. The catch share program consists of an individual fishing quota (IFQ) program for the shorebased trawl fleet, and cooperative programs for the at-sea mothership and catcher-processor fleets. The Economic Data Collection (EDC) program<sup>1</sup> was enacted as part of these new regulations to monitor the economic effects of the catch share program. Annual economic data submissions are required from all fishery participants: catcher vessels, motherships, catcher-processors, and first receivers and shorebased processors §50 CFR 660.114. Baseline, pre-catch share data, was submitted in 2011 for the 2009 and 2010 operating years. Data for the first year the fishery operated under catch share program (2011), was submitted in 2012.

This draft report summarizes the 2009-11 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 and earnings surveys were available for 64% of the shoreside catcher vessels with limited entry groundfish permits with trawl endorsements (trawl fleet) (2003-2004 collection<sup>2</sup>) and 57% of the fleet for the 2007-2008 collection<sup>3</sup>. Moreover, no cost and earnings data were available for catcher vessels that delivered to motherships.

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

- Economic Data Collection Program, Administration and Operations Report, Draft Report for the SSC Economic Subcommittee Review (March 2013)
- Economic Data Collection Program, Mothership Report, Draft Report for the SSC Economic Subcommittee Review (March 2013)

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<sup>1</sup>Additional information on the EDC Program, including the EDC data collection forms can be found at [www.nwfsc.noaa.gov/edc](http://www.nwfsc.noaa.gov/edc)

<sup>2</sup>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.

<sup>3</sup>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

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

The Administration and Operations Report describes the EDC Program administration and fielding of the surveys, the EDC forms, data QA/QC and data processing, and safeguarding confidential information. The other EDC reports provide basic data summaries for the catcher-processor, mothership, and first receiver and shorebased processor forms.

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

## 1.2 Purpose of the report

This report, like the other three EDC data summary reports, 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, the data summary reports provide information about the performance of the catch share program. This includes information that can be used to monitor whether and to what degree the goals of the program are being met. It is expected that additional modeling and analysis will be included in each subsequent year, which will provide more detailed information about the performance of the program. These reports will serve as the basis for the 5-year review of the catch share program that is mandated in the MSA, as well as the NMFS National Catch Shares Performance Indicators. Currently, with just a single year of catch share EDC data, it may be difficult to draw firm conclusions about the performance of the program. In addition, the catch share program may have a transitional period in the first few year as participants learn about the system and develop new business strategies.

Third, the reports either provide or serve as the basis for economic models that will be used as part of the Pacific Fishery Management Council's (PFMC) biennial specification process for groundfish management. These models include the IO-PAC<sup>4</sup> model, as well as estimates of

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<sup>4</sup>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.

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.

### **1.3 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 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 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 for their operation of that vessel is submitted.

A calendar year is used to determine which vessels meet the criteria. For example, in 2012, data were collected from all owners, lessees, and charters of a catcher vessel registered to a limited entry trawl permit during 2011. The forms are fielded on this schedule in order to allow participants the time necessary to complete their taxes, which may contain some information that is required on the EDC forms. 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.

### **1.4 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 whiting to motherships at-sea (at-sea whiting fishery), catcher vessels that deliver whiting to shorebased facilities (shorebased whiting fishery), and catcher vessels that delivery non-whiting groundfish

to shorebased facilities (non-whiting groundfish fishery). Additionally, the non-whiting groundfish fishery can be further classified into two additional fisheries, characterized by the composition of target species groups. These fisheries are the DTS fishery which includes dover sole, thornyheads, and sablefish and the near-shore fishery (includes all non-whiting, non-DTS species groups). 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. Often times, 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.

## 1.5 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 vessel 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 as 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 clearly states whether the count of individuals represents entities or vessels.

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 100 vessels that had expenses on ice, the mean expense in 2011 was \$5,870. Therefore to calculate the average expense for ice for the entire fleet, one would need to multiply the mean by 100 and then divide by the total number of vessels (134).

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.

One last guideline when interpreting the aggregated data are 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. Currently data are presented for survey year, and therefore data assigned to a survey year may not overlap completely with the calendar year. Information obtained from outside of the EDC Program are adjusted to match the fiscal year provided on each form. For the three years of data collected from catcher vessels, 88% of entities used a fiscal year that is the same as the calendar year.

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 Draft Report. Additionally, "—" is used to denote fields where the question was not asked on the form during the survey year.

## 2 Survey Response Rates

For the 2011 Catcher Vessel EDC forms, 96.0% of all required forms are complete<sup>1</sup>. This is an increase from the 2009 and 2010 collection, when 88.1% and 92.0% were complete, respectively. Over the three years of the data collection, there has been no entity<sup>2</sup> that was unable to renew a limited entry groundfish permit due to a missing or incomplete EDC. 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 2.2 shows that in 2011, the complete EDCs represented 97.0% of all landings value associated with EDC vessels.

**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	
	N	%	N	%	N	%
Complete	148	88.1%	150	92.0%	166	96.0%
Incomplete	6	3.6%	1	0.6%	2	1.2%
Not received	14	8.3%	12	7.4%	5	2.9%

To further emphasize the response rate, the percentage of complete forms out of all forms required by total revenue associated with vessel forms was calculated 2.2. This was only possible because all vessels with at-sea deliveries completed the required EDC forms.

<sup>1</sup>For explanation of the term complete, please refer to the Administration and Operations Draft Report section regarding regulations for complete EDC forms

<sup>2</sup>An "entity" is defined as a unique combination of an owner or lessee and vessel, whereas as a "vessel" refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

**Table 2.2: Form response rates as a function of total revenue.** The total ex-vessel revenue on the West Coast associated with vessels that were required to submit an EDC form, by form status. If two forms were required for one vessel and one was submitted for one entity, and the other was incomplete, the shoreside landings revenue was attributed to both forms and is therefore counted twice in the table (% = percent of total ex-vessel revenue associated with EDC vessels in survey year. An entity is defined as a unique combination of an owner or lessee and vessel, whereas as a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.).

Form status	2009		2010		2011	
	Total	%	Total	%	Total	%
Complete	\$56,771,023	92.5%	\$60,700,423	96.2%	\$95,352,292	97.0%
Incomplete	\$ 1,277,271	2.1%	\$ 315,666	0.5%	\$ 492,319	0.5%
Not received	\$ 3,297,533	5.4%	\$ 2,071,895	3.3%	\$ 2,463,935	2.5%

For most of the forms, there is a one-to-one relationship between a vessel and the vessel owner, in which case there is no lessee 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 entities will operate the vessel (Table 2.3).

**Table 2.3: Information about forms, entities, and vessels.** Number of required forms, number of entities that harvested fish, number of vessels that harvested fish by location, number of vessels that were leased, number of lease contracts, number of vessels that were fished by more than one entity, and number of 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 as vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Activity	2009	2010	2011
	N	N	N
Number of required forms	168	163	173
Number of entities that harvested fish	133	130	143
Number of vessels that harvested fish on the West Coast or Alaska	132	129	138
Number of vessels that harvested fish on the West Coast	130	126	132
Number of vessels that harvested fish in Alaska	31	31	35
Number of vessels that were leased	11	8	9
Number of lease contracts	12	9	9
Number of vessels that were fished by more than one entity. An entity is defined as a unique combination of an owner or lessee and vessel, whereas as vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.	***	***	5
Number of vessels sold	***	5	8



### 3 Vessel Participation on the West Coast and in Alaska

The EDC form asks participants to provide the total number of days spent fishing by fishery on the West Coast and in Alaska. Participants are instructed to count partial days as full days when recording days at sea on the forms. The West Coast fisheries categories on the EDC form are whiting with trawl gear, non-whiting groundfish with trawl gear, groundfish with fixed gear, shrimp, crab, halibut (both Pacific and California), salmon, tuna, and other. The days spent fishing in all Alaskan fisheries is also requested. Additionally, participants provide the total number of days spent chartering or doing research. Most vessels that participate in the catch share fisheries are also involved in other fishing activities.

Although these data provide most of the information necessary for examining vessel participation, several of the fisheries are further disaggregated 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 whiting fishery is disaggregated into at-sea Pacific whiting and shoreside Pacific whiting; and non-whiting groundfish with trawl gear is further disaggregated into dover-thornyhead-sablefish (DTS) with trawl gear and non-whiting, non-DTS groundfish with trawl gear, commonly referred to as the trawl near-shore fishery.

The disaggregation of reported days at sea into subfisheries uses ex-vessel revenue to classify at-sea deliveries or shoreside landings by the subfisheries. Fish ticket data are compiled from the start date of the vessel's fiscal year through one full year. These data are then used to designate each unique delivery to a fishery. 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 days associated with that trip are designated as "Pacific whiting fishery".

All revenue associated with at-sea deliveries were associated with the at-sea Pacific whiting fishery.

DTS revenue was identified using the landings of the species dover sole, thornyheads, and sablefish. Blackgill rockfish were also included because it is also a deep-water species, which is commonly caught in combination with the other three species. In almost all cases in 2009-2011,

the daily deliveries where blackgill rockfish had the highest revenue, sablefish yielded the next highest revenue.

In order to separate the trawl groundfish catch share days from the fixed gear groundfish days, landings with a gear identification of fixed gear were split by the type of limited entry permit attached to the vessel, either a trawl endorsed or gear endorsed permit.

Landings weight was explored as an alternative to using revenue to classify deliveries by fishery. We compared the results of using the highest revenue method versus the highest landings weight method for designating the fishery. 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.

In 2009 through 2011, relatively few entities<sup>1</sup> participated in the halibut, salmon, tuna, and other fisheries. Therefore these fisheries were grouped together into an “Other” category. Additionally, groundfish that was caught without a limited entry groundfish permit with a trawl endorsement was also included in the “Other” category. This includes all groundfish caught with fixed gear—with or without a fixed gear endorsed limited entry groundfish permit—or trawl gear without a limited entry groundfish permit. The number of entities that participated in each of these fisheries ranged from zero, for salmon in 2009, to seventeen, for tuna in 2009. Most of these participants’ information cannot be shown due to confidentiality restrictions.

Once each delivery is assigned to a particular fishery, using revenue, annual landings by fishery is calculated for each vessel. The days at sea reported on the forms by participants are then apportioned to a fishery according to the proportion of total landings (or deliveries) in each fishery.

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<sup>1</sup>An entity is defined as a unique combination of an owner or lessee and vessel, whereas as a “vessel” refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

**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).

Activity	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
At-sea Pacific whiting	20.5	20	26.8	20	30.6	18
Shoreside Pacific whiting	31.5	35	38.1	35	51.7	26
DTS trawl with trawl endorsement	57.3	102	52.8	93	46.8	65
Non-whiting, non-DTS trawl with trawl endorsement	16.3	75	13.9	61	16.4	46
Groundfish fixed gear with trawl endorsement	17.1	5	52.4	7	32.1	26
Crab	39.3	56	37.9	57	37.3	66
Shrimp	29.7	31	36.3	36	43.3	41
Alaska	102.4	31	111.8	31	129.6	35
Other	14.3	29	24.5	27	16.3	29
Chartering or research	30.0	10	31.8	11	40.5	13

**Table 3.2: Total days at sea.** Total days at sea for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses).

Activity	2009		2010		2011	
	Total	N	Total	N	Total	N
At-sea Pacific whiting	410.0	20	536.0	20	550.0	18
Shoreside Pacific whiting	1,103.6	35	1,335.0	35	1,343.0	26
DTS trawl with trawl endorsement	5,842.6	102	4,914.6	93	3,045.1	65
Non-whiting, non-DTS trawl with trawl endorsement	1,224.7	75	848.2	61	755.9	46
Groundfish fixed gear with trawl endorsement	85.7	5	366.9	7	834.7	26
Crab	2,198.7	56	2,159.0	57	2,462.6	66
Shrimp	919.5	31	1,307.9	36	1,777.0	41
Alaska	3,173.0	31	3,465.0	31	4,537.0	35
Other	415.4	29	660.2	27	471.3	29
Chartering or research	300.0	10	350.0	11	526.0	13

### 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 show the number of one way trips taken by vessels.

**Table 3.3: Trips to Alaska.** Count of vessels by number of one-way trips between the West Coast and Alaska. (N = number of EDC vessels, % = percent of all vessels in the survey year).

Number of one-way trips	2009		2010		2011	
	N	%	N	%	N	%
1	***	***	5	15.2%	3	9.4%
2	23	76.7%	20	60.6%	25	78.1%
3	***	***	***	***	***	***
4	5	16.7%	6	18.2%	***	***

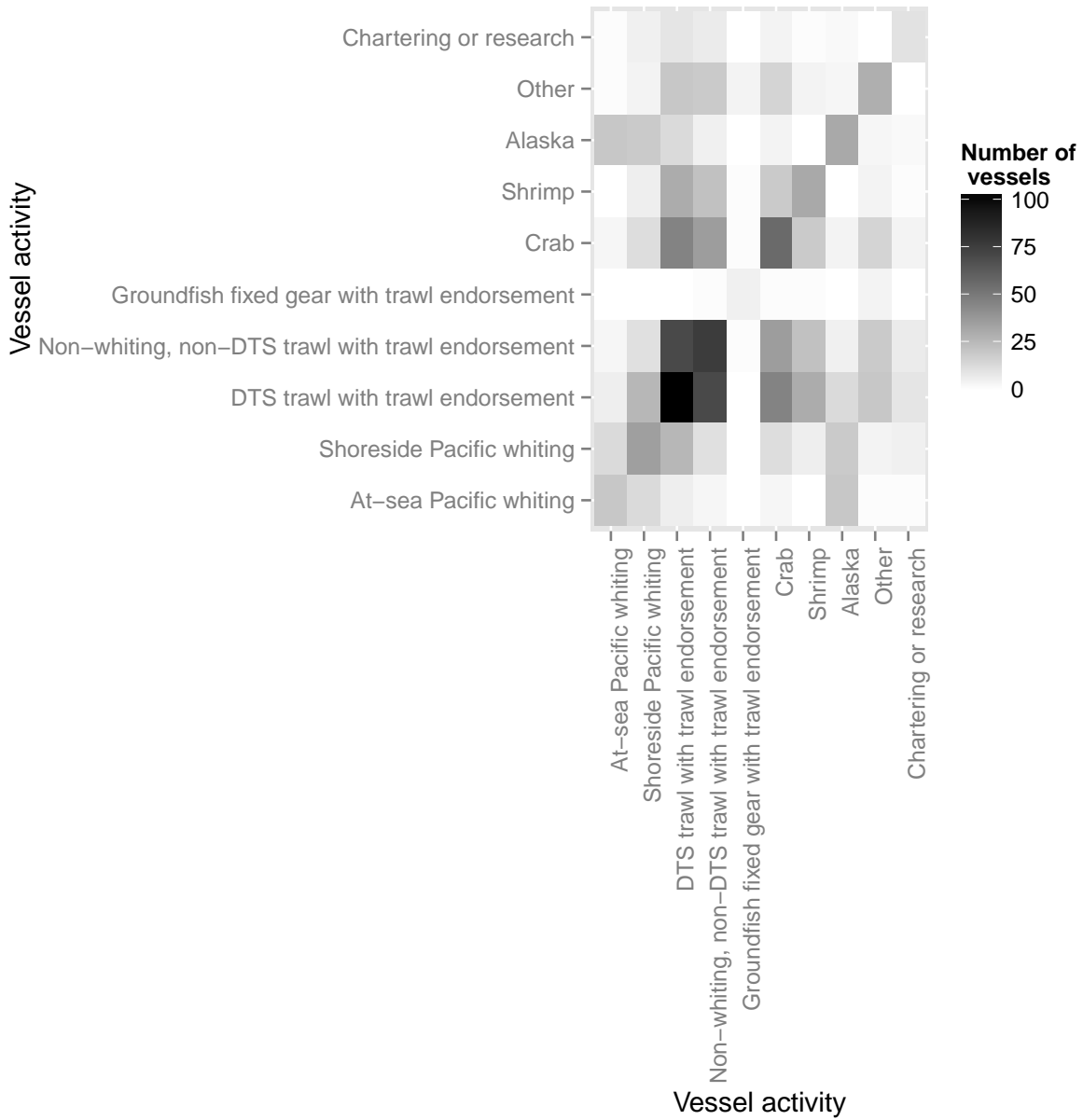
### 3.2 Vessel participation in multiple fisheries

A key characteristic of vessels on the West Coast is participation in multiple fisheries. In 2010, only 5.4% of all entities<sup>2</sup> participated in one fishery. Participation in multiple fisheries maintains employment throughout different seasonal fisheries. Diversification of participation could also protect communities from variability in the abundance of target species. Figures 3.1, 3.2, and 3.3 provide additional insight into the portfolio of fisheries in which the EDC vessels participate.

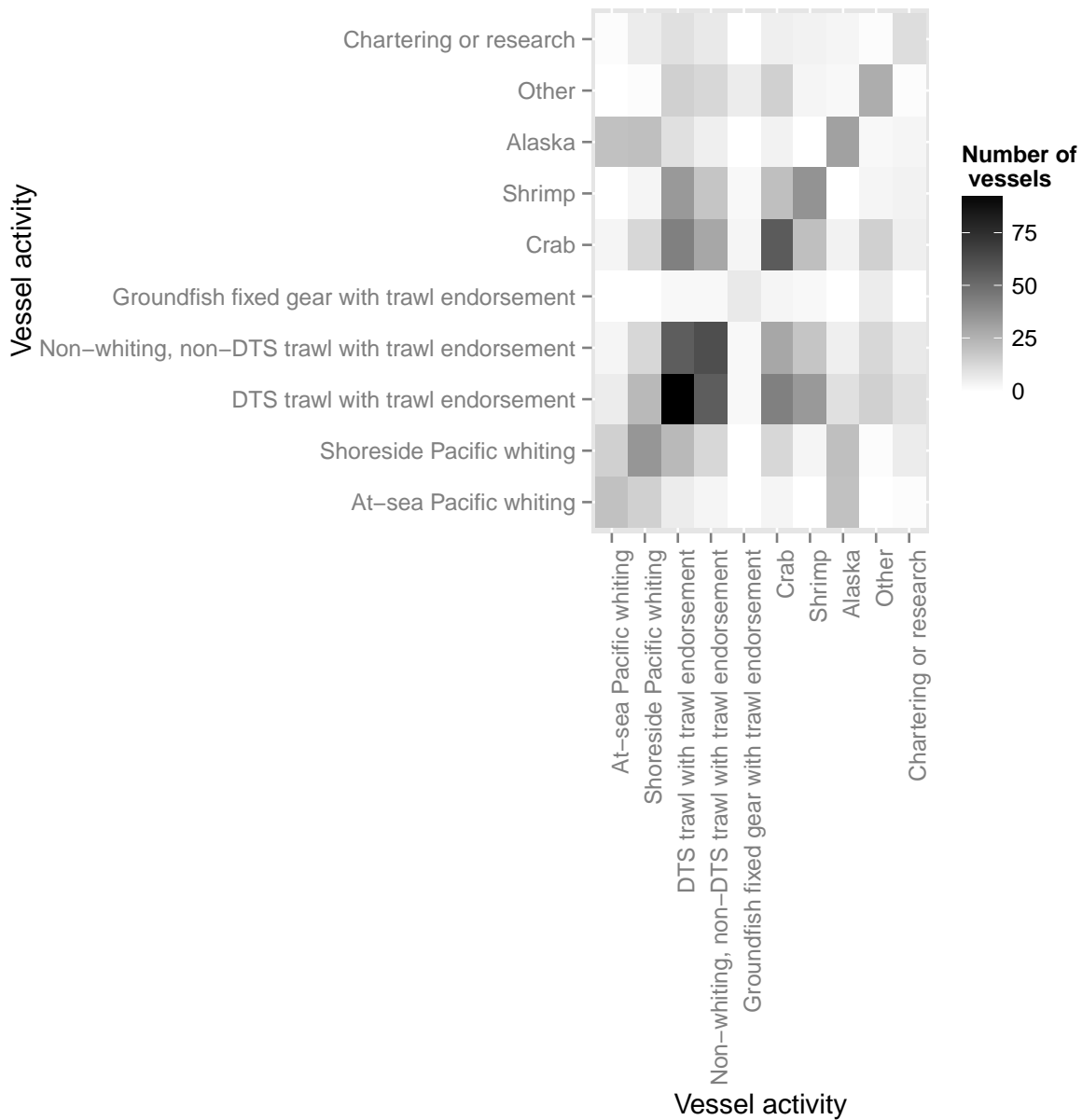
<sup>2</sup>An entity is defined as a unique combination of an owner or lessee and vessel, whereas as a "vessel" refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

**Table 3.4: 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 as 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	
	N	%	N	%	N	%
1	9	6.8%	7	5.4%	22	15.3%
2	34	25.6%	45	34.6%	51	35.4%
3	54	40.6%	43	33.1%	46	31.9%
4	27	20.3%	25	19.2%	19	13.2%
5	6	4.5%	7	5.4%	5	3.5%
6	3	2.3%	3	2.3%	***	***

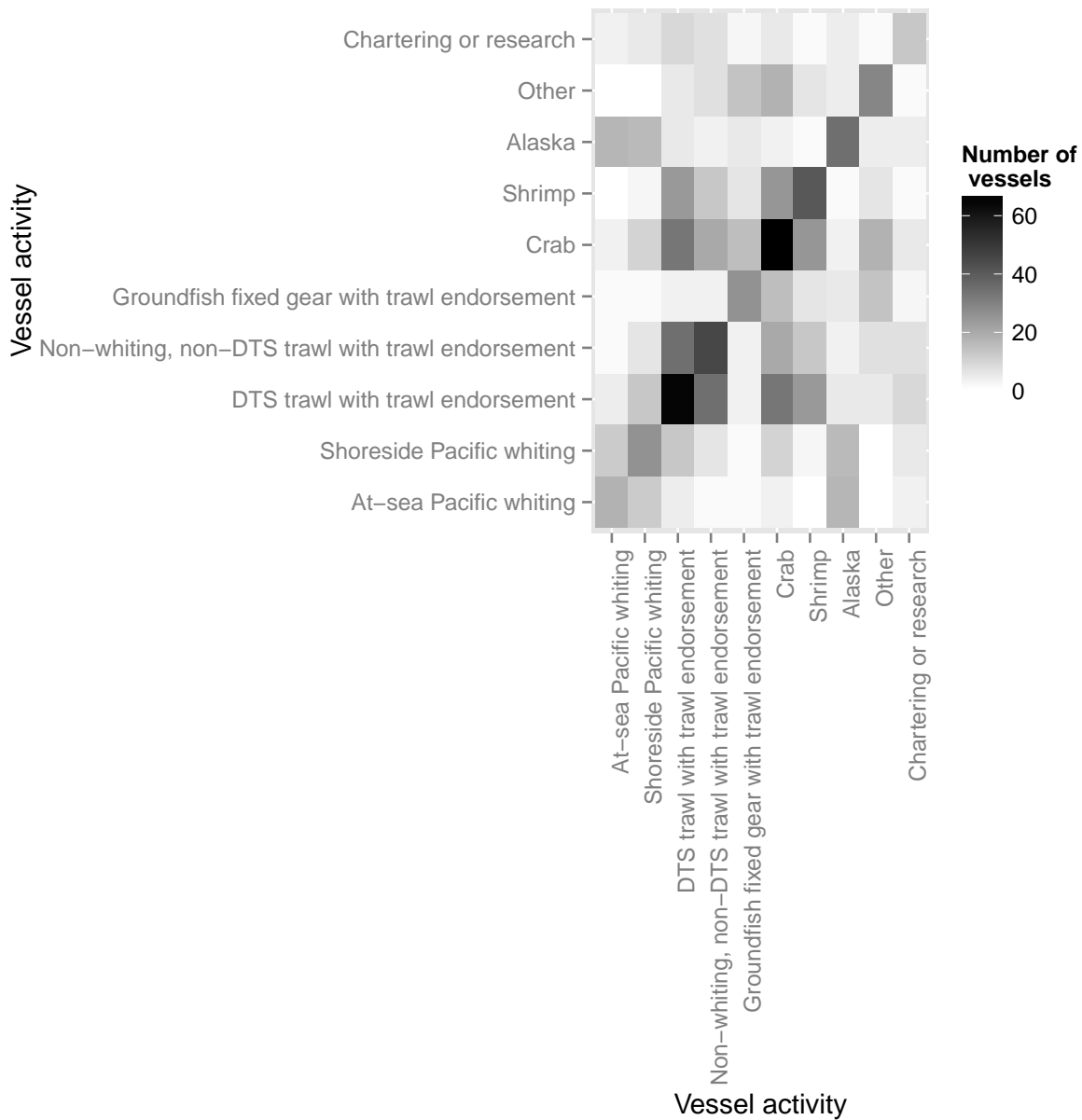


**Figure 3.1: Participation in multiple fisheries - 2009.** Frequency of participation in multiple fisheries during 2009 fiscal year.



**Figure 3.2: Participation in multiple fisheries - 2010.** Frequency of participation in multiple fisheries during 2010 fiscal year.





**Figure 3.3: Participation in multiple fisheries - 2011.** Frequency of participation in multiple fisheries during 2011 fiscal year.

## 4 Home Port

The vessel home port is an important component of understanding the complexity and diversity of the West Coast fleet. This information will be particularly 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. Table 4.1 shows the number of entities by home port. There are many measures of home port, including the home port listed on Coast Guard registrations and the port where the vessel made the most landings. In this table, the home port provided by participants on the EDC form is summarized here. Home ports provided on the EDC forms are mapped to the IO-PAC port groupings<sup>1</sup>. 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 the Puget Sound region.

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 4.11 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.

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<sup>1</sup>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 4.1: Vessel home port.** Number of entities by home port reported on 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 as 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	
	N	%	N	%	N	%
Alaska	***	***	***	***	3	2.1%
Astoria	20	13.9%	20	13.9%	26	18.2%
Brookings	7	4.9%	7	4.9%	8	5.6%
Coos Bay	20	13.9%	19	13.2%	19	13.3%
Crescent City	7	4.9%	7	4.9%	7	4.9%
Eureka	9	6.2%	9	6.2%	9	6.3%
Fort Bragg	7	4.9%	7	4.9%	7	4.9%
Monterey	3	2.1%	***	***	***	***
Morro Bay	6	4.2%	4	2.8%	6	4.2%
Newport	23	16.0%	23	16.0%	25	17.5%
Puget Sound	25	17.4%	28	19.4%	17	11.9%
San Francisco	6	4.2%	8	5.6%	7	4.9%
South and central WA coast	4	2.8%	4	2.8%	4	2.8%
Tillamook	6	4.2%	6	4.2%	4	2.8%

**Table 4.2: At-sea Pacific whiting fishery days at sea by home port.** Average number of days vessels fished in the At-sea Pacific whiting fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Alaska	***	***	***	***	0	0
Astoria	***	***	***	***	***	***
Brookings	***	***	***	***	0	0
Newport	17	9	25	9	28	9
Puget Sound	28	7	32	7	35	7
San Francisco	***	***	***	***	***	***

**Table 4.3: Shoreside Pacific whiting fishery days at sea by home port.** Average number of days vessels fished in the Shoreside Pacific whiting fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Alaska	***	***	***	***	0	0
Astoria	50	3	61	3	45	3
Brookings	***	***	***	***	***	***
Coos Bay	22	4	***	***	***	***
Crescent City	***	***	***	***	0	0
Eureka	***	***	***	***	0	0
Newport	25	14	33	14	49	15
Puget Sound	30	7	40	9	58	4
South and central WA coast	***	***	***	***	***	***
Tillamook	***	***	***	***	0	0

**Table 4.4: DTS trawl with trawl endorsement fishery days at sea by home port.** Average number of days vessels fished in the DTS trawl with trawl endorsement fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Astoria	73	18	74	17	62	16
Brookings	54	7	57	7	46	6
Coos Bay	43	17	43	16	52	9
Crescent City	50	7	42	6	22	3
Eureka	60	9	55	8	48	7
Fort Bragg	59	7	53	7	37	6
Monterey	***	***	***	***	***	***
Morro Bay	***	***	***	***	***	***
Newport	44	18	39	16	16	9
Puget Sound	73	5	44	4	43	3
San Francisco	***	***	***	***	***	***
South and central WA coast	96	4	96	3	***	***
Tillamook	72	4	42	5	***	***

**Table 4.5: Non-whiting, non-DTS trawl with trawl endorsement fishery days at sea by home port.** Average number of days vessels fished in the Non-whiting, non-DTS trawl with trawl endorsement fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Alaska	0	0	***	***	0	0
Astoria	18	15	15	12	22	14
Brookings	1	3	4	4	***	***
Coos Bay	17	12	15	11	15	7
Crescent City	2	5	2	5	***	***
Eureka	6	8	4	4	10	4
Fort Bragg	9	6	7	4	11	4
Monterey	***	***	***	***	0	0
Morro Bay	***	***	***	***	0	0
Newport	14	7	8	6	8	5
Puget Sound	5	5	12	4	***	***
San Francisco	29	5	23	5	26	4
South and central WA coast	22	3	***	***	***	***
Tillamook	***	***	***	***	***	***

**Table 4.6: Groundfish fixed gear with trawl endorsement fishery days at sea by home port.** Average number of days vessels fished in the Groundfish fixed gear with trawl endorsement fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Alaska	0	0	0	0	***	***
Astoria	0	0	0	0	41	5
Brookings	0	0	0	0	***	***
Coos Bay	0	0	***	***	***	***
Fort Bragg	0	0	0	0	***	***
Morro Bay	21	4	82	3	35	6
Newport	0	0	0	0	31	3
Puget Sound	0	0	0	0	34	4
San Francisco	0	0	***	***	***	***
Tillamook	***	***	***	***	***	***



**Table 4.7: Crab fishery days at sea by home port.** Average number of days vessels fished in the Crab fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Astoria	59	6	52	5	43	9
Brookings	25	5	14	5	14	6
Coos Bay	34	10	34	9	33	11
Crescent City	41	5	34	6	34	7
Eureka	64	7	64	7	60	6
Fort Bragg	27	3	36	4	49	4
Monterey	***	***	0	0	0	0
Morro Bay	***	***	***	***	47	3
Newport	30	10	28	10	36	11
Puget Sound	***	***	***	***	***	***
San Francisco	26	3	38	4	42	4
South and central WA coast	***	***	48	3	26	3
Tillamook	***	***	***	***	***	***

**Table 4.8: Shrimp fishery days at sea by home port.** Average number of days vessels fished in the Shrimp fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Astoria	45	3	46	5	52	7
Brookings	***	***	31	4	52	4
Coos Bay	35	10	36	13	41	12
Crescent City	30	4	50	4	42	6
Eureka	28	4	26	4	28	4
Morro Bay	***	***	0	0	0	0
Newport	9	5	***	***	42	6
Puget Sound	***	***	***	***	0	0
South and central WA coast	0	0	***	***	0	0
Tillamook	***	***	***	***	***	***

**Table 4.9: Other fisheries days at sea by home port.** Average number of days vessels fished in the Other fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Alaska	0	0	0	0	***	***
Astoria	24	5	34	4	12	5
Brookings	***	***	0	0	***	***
Coos Bay	2	5	7	4	12	6
Crescent City	0	0	***	***	0	0
Eureka	***	***	***	***	0	0
Fort Bragg	***	***	***	***	***	***
Monterey	***	***	***	***	0	0
Morro Bay	10	4	30	3	11	3
Newport	27	4	28	4	27	3
Puget Sound	0	0	0	0	***	***
San Francisco	27	3	42	4	15	4
South and central WA coast	***	***	***	***	0	0
Tillamook	***	***	***	***	***	***

**Table 4.10: Alaska fishery days at sea by home port.** Average number of days vessels fished in the Alaska fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Alaska	***	***	***	***	***	***
Astoria	***	***	***	***	***	***
Brookings	***	***	***	***	***	***
Coos Bay	***	***	***	***	***	***
Newport	108	13	120	13	112	13
Puget Sound	106	11	127	11	145	14
San Francisco	***	***	***	***	***	***
Tillamook	***	***	***	***	***	***

**Table 4.11: Chartering or research days at sea by home port.** Average number of days vessels fished in the Chartering or research fishery on the West Coast by home port reported on EDC form. (N = number of EDC vessels with non-zero, non-NA responses).

Home port	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Alaska	0	0	0	0	***	***
Astoria	***	***	***	***	***	***
Brookings	***	***	***	***	***	***
Coos Bay	21	4	***	***	***	***
Fort Bragg	0	0	0	0	***	***
Newport	36	4	36	4	49	4
Puget Sound	0	0	***	***	36	3
Tillamook	0	0	***	***	0	0

## 5 Vessel Physical Characteristics

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

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

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. The mean market value of the EDC vessels in all years was over \$1 million, however the median was only \$500,000 in 2011. The mean is driven by several very large market values provided by participants. Similarly, the mean replacement value of the EDC vessels was over \$2 million and the median was \$1,300,000 in 2011.

**Table 5.1: Average vessel characteristics.** Average market value, replacement value, horsepower, fuel capacity and length (N = number of EDC vessels with non-zero, non-NA responses).

Vessel characteristic	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Market value (\$)	1,067,907	123	1,145,910	121	1,175,649	138
Replacement value (\$)	1,976,306	121	2,030,050	120	2,229,211	135
Vessel length (feet)	73	140	73	143	72	153
Vessel fuel capacity (gallons)	12,440	139	12,153	142	12,142	154
Horsepower of main engines	650	140	636	143	635	151

The participants provide information about whether the vessel was hauled out. Each year about

half 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.

**Table 5.2: Haul outs.** Number of EDC vessels (N) that hauled the vessel during their fiscal year (% percent of vessels in survey year).

Haul out	2009		2010		2011	
	N	%	N	%	N	%
YES	85	64.4%	65	50.4%	87	62.6%
NO	47	35.6%	64	49.6%	52	37.4%

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

Processed at-sea	2009		2010		2011	
	N	%	N	%	N	%
YES	6	4.5%	7	5.4%	15	10.8%
NO	126	95.5%	122	94.6%	121	87.1%
No response	0	0.0%	0	0.0%	3	2.2%

## 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

**Table 5.4: Average horsepower.** Average horsepower of EDC vessels that did not fish on the West Coast or Alaska, fished on the West Coast and Alaska, fished only in Alaska, and fished only on the West Coast. In 2009 and 2010 there was no question specifically for Alaska (N = number of entities with non-zero, non-NA responses).

Characteristic	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Fished on the West Coast and Alaska	1,037	40	1,014	42	1,016	38
Fished only on the West Coast	464	92	464	88	462	100
Fished only in Alaska	***	***	0	0	1,060	3
Did not fish	797	17	640	20	765	20

**Table 5.5: Average replacement value.** Average replacement value (\$) of vessels that did not fish on the West Coast or Alaska, fished on the West Coast and Alaska, fished only in Alaska, and fished only on the West Coast. 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 (N = number of entities with non-zero, non-NA responses. An entity is defined as a unique combination of an owner or lessee and vessel, whereas as vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel).

Activity	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Fished on the West Coast and Alaska	\$3,738,333	39	\$3,851,585	41	\$4,011,806	36
Fished only on the West Coast	\$1,077,293	82	\$1,096,138	80	\$1,375,713	89
Fished only in Alaska	***	***	\$0	0	\$6,833,333	3
Did not fish	***	***	***	***	\$2,215,333	15

**Table 5.6: Average market value** Average market value (\$) of vessels that did not fish on the West Coast or Alaska, fished on the West Coast and Alaska, fished only in Alaska, and fished only on the West Coast. 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 replacement value of the vessel (N = number of entities with non-zero, non-NA responses. An entity is defined as a unique combination of an owner or lessee and vessel, whereas as vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel).

Activity	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Fished on the West Coast and Alaska	\$2,299,167	39	\$2,479,939	41	\$2,436,959	37
Fished only on the West Coast	\$455,477	84	\$473,489	81	\$564,468	90
Fished only in Alaska	***	***	\$0	0	\$5,340,000	3
Did not fish	***	***	***	***	\$1,146,406	16

**Table 5.7: Average vessel fuel capacity** Average vessel fuel capacity (gallons) of vessels that did not fish on the West Coast or Alaska, fished on the West Coast and Alaska, fished only in Alaska, and fished only on the West Coast. In 2009 and 2010 there was no question specifically for Alaska (N = number of entities with non-zero, non-NA responses. An entity is defined as a unique combination of an owner or lessee and vessel, whereas as vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel).

Activity	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Fished on the West Coast and Alaska	22,847	40	22,889	42	21,043	38
Fished only on the West Coast	6,895	92	7,284	88	7,542	100
Fished only in Alaska	***	***	0	0	39,005	3
Did not fish	19,404	16	12,807	19	15,876	20



**Table 5.8: Average vessel length.** Average length (feet) of vessels that did not fish on the West Coast or Alaska, fished on the West Coast and Alaska, fished only in Alaska, and fished only on the West Coast. In 2009 and 2010 there was no question specifically for Alaska (N = number of entities with non-zero, non-NA responses. An entity is defined as a unique combination of an owner or lessee and vessel, whereas as vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel).

Activity	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Fished on the West Coast and Alaska	86	40	86	42	86	38
Fished only on the West Coast	66	92	67	88	66	100
Fished only in Alaska	***	***	0	0	103	3
Did not fish	80	17	72	20	73	23

# 6 Vessel Fuel Use, Speed, and Crew Size

Participants are asked to estimate the average daily fuel use while fishing. On average, more fuel is used per day in the Pacific whiting fishery than any other fishery.

## 6.1 Fuel use

### 6.1.1 Average fuel use per day by fishery

**Table 6.1: Average daily fuel use.** Average daily fuel use (gallons per day) by fishery (N = number of EDC vessels with non-zero, non-NA responses).

Activity	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Pacific whiting	800.9	40	805.5	40	822.9	34
Groundfish trawl gear	298.6	105	304.4	99	322.8	81
Groundfish fixed gear	155.6	8	143.3	9	141.5	26
Crab	173.6	56	178.0	56	170.0	65
Halibut	271.4	7	206.3	6	141.1	7
Salmon	***	***	38.8	4	70.0	5
Shrimp	240.9	36	229.4	36	218.9	43
Tuna	128.9	15	120.1	14	77.9	8
Steaming between West Coast and Alaska	895.5	31	860.5	33	809.8	32

## 6.1.2 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 size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	918	31	921	31	920	28
Medium vessel (> 60 ft, <= 80 ft)	399	9	407	9	396	5
Small vessel (< 60 ft)	0	0	0	0	***	***

**Table 6.3: Groundfish trawl gear fishery fuel use.** Average fuel use (gallons per day) of vessels that fished in the groundfish trawl gear fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	522	21	516	20	543	16
Medium vessel (> 60 ft, <= 80 ft)	288	48	289	49	286	45
Small vessel (< 60 ft)	182	36	189	30	230	20

**Table 6.4: Groundfish fixed gear fishery fuel use.** Average fuel use (gallons per day) of vessels that fished in the groundfish fixed gear fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	***	***	***	***	***	***
Medium vessel (> 60 ft, <= 80 ft)	***	***	***	***	200	7
Small vessel (< 60 ft)	91	6	84	7	116	18

**Table 6.5: Crab fishery fuel use.** Average fuel use (gallons per day) of vessels that fished in the crab fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	342	6	350	6	303	7
Medium vessel (> 60 ft, <= 80 ft)	235	20	239	21	224	26
Small vessel (< 60 ft)	99	30	99	29	97	32

**Table 6.6: Halibut fishery fuel use.** Average fuel use (gallons per day) of vessels that fished in the halibut fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	***	***	0	0	0	0
Medium vessel (> 60 ft, <= 80 ft)	***	***	363	3	258	3
Small vessel (< 60 ft)	100	4	50	3	54	4

**Table 6.7: Salmon fishery fuel use.** Average fuel use (gallons per day) of vessels that fished in the salmon fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Small vessel (< 60 ft)	***	***	39	4	70	5

**Table 6.8: Shrimp fishery fuel use.** Average fuel use (gallons per day) of vessels that fished in the shrimp fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	350	4	340	5	285	5
Medium vessel (> 60 ft, <= 80 ft)	263	21	239	21	239	25
Small vessel (< 60 ft)	160	11	153	10	156	13

**Table 6.9: Tuna fishery fuel use.** Average fuel use (gallons per day) of vessels that fished in the tuna fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Medium vessel (> 60 ft, <= 80 ft)	251	3	***	***	***	***
Small vessel (< 60 ft)	98	12	98	12	75	7

**Table 6.10: 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 size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	939	28	917	29	921	26
Medium vessel (> 60 ft, <= 80 ft)	488	3	450	4	321	4
Small vessel (< 60 ft)	0	0	0	0	***	***

### 6.1.3 Average total fuel use

**Table 6.11: Average total fuel use.** Average total fuel use (gallons) per entity (gallons). (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 as 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	
	Mean	N	Mean	N	Mean	N
Total diesel use on West Coast	25,531	129	27,768	126	24,401	133
Other fuel use on West Coast	336	7	280	6	***	***

## 6.2 Speed while fishing or steaming

Participants are also asked to provide the average speed of the vessel while fishing. This value was only required for trawl fisheries, and therefore no speed is provided for halibut, crab, or groundfish with fixed gear.

### 6.2.1 Average speed by fishery

**Table 6.12: Average speed by fishery.** Average speed (knots) by fishery (N = number of EDC vessels with non-zero, non-NA responses).

Fishery	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Groundfish trawl gear	2.6	105	2.6	99	2.8	79
Pacific whiting	3.1	40	3.1	40	3.3	34
Salmon	***	***	2.5	4	2.5	5
Shrimp	2.0	36	1.9	36	2.7	42
Steaming between West Coast and Alaska	9.0	31	9.0	32	8.9	32
Tuna	5.0	15	5.2	15	5.5	9

## 6.2.2 Average speed by fishery and vessel length class

**Table 6.13: Groundfish trawl gear fishery fishing speed.** Average speed (knots) of vessels that fished in the groundfish trawl gear fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	3	21	3	20	3	16
Medium vessel (> 60 ft, <= 80 ft)	2	48	2	49	3	43
Small vessel (< 60 ft)	3	36	3	30	3	20



**Table 6.14: Pacific whiting fishery fishing speed.** Average speed (knots) of vessels that fished in the Pacific whiting fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	3	31	3	31	3	28
Medium vessel (> 60 ft, <= 80 ft)	3	9	3	9	4	5
Small vessel (< 60 ft)	0	0	0	0	***	***

**Table 6.15: Salmon fishery fishing speed.** Average speed (knots) of vessels that fished in the salmon fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Small vessel (< 60 ft)	***	***	2	4	3	5

**Table 6.16: Shrimp fishery fishing speed.** Average speed (knots) of vessels that fished in the shrimp fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	2	4	2	5	2	5
Medium vessel (> 60 ft, <= 80 ft)	2	21	2	21	3	25
Small vessel (< 60 ft)	2	11	2	10	2	12

**Table 6.17: Steaming between West Coast and Alaska fishery fishing speed.** Average speed (knots) of vessels that steamed between West Coast and Alaska by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	9	28	9	28	9	26
Medium vessel (> 60 ft, <= 80 ft)	9	3	9	4	8	4
Small vessel (< 60 ft)	0	0	0	0	***	***

**Table 6.18: Tuna fishery fishing speed.** Average speed (knots) of vessels that fished in the tuna fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	0	0	0	0	***	***
Medium vessel (> 60 ft, <= 80 ft)	6	3	6	3	***	***
Small vessel (< 60 ft)	5	12	5	12	5	7

## 6.3 Crew size

The EDC forms collect crew size by fishery. The values provided in Table 6.19 exclude the captain. These data provide information about the total number of jobs or positions on vessels; they do not reflect the total number of individuals who served as crewmembers. The EDC Program is currently exploring the state commercial fish license systems to determine whether it would be feasible to collect the license numbers on the EDC forms.

### 6.3.1 Average crew size by fishery

**Table 6.19: Average crew size.** Average crew size (excluding captain) by activity (N = number of EDC vessels with non-zero, non-NA responses).

Activity	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Crab	2.8	56	2.9	57	2.9	65
Groundfish fixed gear	1.9	8	2.0	8	2.6	26
Groundfish trawl gear	2.0	105	2.0	98	2.1	80
Halibut	1.8	7	1.6	6	1.9	7
Pacific whiting	2.6	41	2.6	41	2.7	34
Salmon	***	***	1.7	3	1.8	4
Shrimp	2.0	37	2.0	37	2.0	43
Steaming between West Coast and Alaska	2.9	31	2.9	33	3.1	31
Tuna	1.5	15	1.6	14	1.5	7

### 6.3.2 Average crew size by fishery and vessel length class

**Table 6.20: Crab fishery crew size.** Average crew size (not including captain) on vessels that fished in the crab fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	3.6	6	3.3	6	3.5	7
Medium vessel (> 60 ft, <= 80 ft)	3.4	21	3.4	22	3.3	25
Small vessel (< 60 ft)	2.3	29	2.4	29	2.4	33

**Table 6.21: Groundfish fixed gear fishery crew size.** Average crew size (not including captain) on vessels that fished in the groundfish fixed gear fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	***	***	***	***	***	***
Medium vessel (> 60 ft, <= 80 ft)	***	***	***	***	3.6	7
Small vessel (< 60 ft)	1.3	6	1.5	6	2.1	18

**Table 6.22: Groundfish trawl gear fishery crew size.** Average crew size (not including captain) on vessels that fished in the groundfish trawl gear fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	2.3	21	2.3	20	2.4	16
Medium vessel (> 60 ft, <= 80 ft)	2.1	49	2.1	50	2.1	44
Small vessel (< 60 ft)	1.8	35	1.8	28	1.8	20

**Table 6.23: Halibut fishery crew size.** Average crew size (not including captain) on vessels that fished in the halibut fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	***	***	0	0	0	0
Medium vessel (> 60 ft, <= 80 ft)	***	***	1.7	3	2.2	3
Small vessel (< 60 ft)	1.6	4	1.5	3	1.6	4

**Table 6.24: 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 size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	2.7	31	2.7	31	2.9	27
Medium vessel (> 60 ft, <= 80 ft)	2.2	10	2.2	10	2.2	6
Small vessel (< 60 ft)	0	0	0	0	***	***

**Table 6.25: Salmon fishery crew size.** Average crew size (not including captain) on vessels that fished in the salmon fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	0	0	0	0	***	***
Small vessel (< 60 ft)	***	***	1.7	3	1.7	3

**Table 6.26: Shrimp fishery crew size.** Average crew size (not including captain) on vessels that fished in the shrimp fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	2.1	4	2.1	5	2.0	5
Medium vessel (> 60 ft, <= 80 ft)	2.0	22	2.0	22	2.1	25
Small vessel (< 60 ft)	1.8	11	1.7	10	1.9	13

**Table 6.27: 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 size 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	
	Mean	N	Mean	N	Mean	N
Large vessel (> 80 ft)	2.9	28	2.9	29	3.0	25
Medium vessel (> 60 ft, <= 80 ft)	3.0	3	3.0	4	3.2	4
Small vessel (< 60 ft)	0	0	0	0	***	***

**Table 6.28: Tuna fishery crew size.** Average crew size (not including captain) on vessels that fished in the tuna fishery on the West Coast by size 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	
	Mean	N	Mean	N	Mean	N
Medium vessel (> 60 ft, <= 80 ft)	1.8	4	1.7	3	***	***
Small vessel (< 60 ft)	1.5	11	1.6	11	1.4	6



## 7 At-Sea Deliveries and Shoreside Landings

Vessels in the catch share fishery participate in both shorebased and at-sea fisheries. 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 can be obtained from other sources.

Landings and deliveries information are primarily obtained from state fish ticket data provided through PacFIN, and the At-Sea Hake Observer Program database 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. Landings increased in both the shoreside and at-sea fisheries between 2010 and 2011 (Table 7.1).

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

Location of delivery	2009		2010		2011	
	Total	N	Total	N	Total	N
Alaska	94,821	31	103,625	31	135,282	34
At-sea	30,927	20	33,965	20	47,728	18
Shoreside	77,926	124	91,980	121	122,873	126

### 7.1 At-sea deliveries

The at-sea fisheries on the West Coast target Pacific whiting. There is very little bycatch in this fishery (Table 7.2).

**Table 7.2:** 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	
	Total	N	Total	N	Total	N
Arrowtooth flounder	1	20	3	19	7	18
Coastal pelagics	***	***	0	13	9	10
Crab	0	0	0	0	***	***
Dover sole	0	0	1	11	0	7
English sole	0	0	***	***	***	***
Lingcod	1	14	0	7	0	8
Other shellfish	0	5	0	11	***	***
Other species	***	***	10	19	23	18
Pacific cod	***	***	0	0	***	***
Pacific halibut	0	14	1	12	0	6
Pacific herring	0	12	***	***	***	***
Pacific whiting	30,667	20	33,756	20	47,462	18
Rex sole	0	0	2	11	2	9
Rockfish	201	20	114	20	92	18
Sablefish	0	6	5	14	2	14
Salmon	1	19	2	19	4	18
Sharks, skates and rays	9	20	51	20	106	18
Shrimp	0	3	0	3	0	4
Squid	8	20	21	20	19	18
Thornyheads	0	0	0	9	1	8

## 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, and thornyheads. Between 2009 and 2011, there were 12 species grouped into the

other groundfish species category. By weight, the most common were sand sole, starry flounder, and rock sole.

**Table 7.3:** Total shoreside landings (metric tons) by species group of groundfish (N = number of EDC vessels)

Species group	2009		2010		2011	
	Total	N	Total	N	Total	N
Arrowtooth flounder	3,542	91	2,971	91	2,284	83
Dover sole	10,883	107	9,947	104	7,583	90
English sole	238	103	148	97	109	70
Lingcod	100	113	71	101	256	86
Pacific cod	66	43	88	43	263	42
Pacific whiting	45,074	38	59,663	43	87,996	62
Petrals sole	1,545	107	720	100	801	73
Rex sole	515	109	405	104	360	81
Rockfish	988	121	1,138	113	1,458	103
Sablefish	3,084	118	2,702	110	2,792	108
Sanddab	278	53	152	39	144	31
Sharks, skates and rays	1,284	111	1,305	106	1,325	91
Thornyheads	2,348	109	2,397	108	1,658	93
Other species	71	56	100	54	100	58

In all three years, shrimp and crab were the highest volume non-groundfish species caught by EDC vessels. Shrimp catch by these vessels increased 151% between 2009 and 2011 and 72% between 2010 and 2011. This change can be partly attributed to increases in shrimp prices and partly due to more flexibility provided by the catch share program.

**Table 7.4:** Total shoreside landings (metric tons) by species group of non-groundfish (N = number of EDC vessels)

Species group	2009		2010		2011	
	Total	N	Total	N	Total	N
California halibut	43	7	54	8	48	5
Coastal pelagics	3	32	4	26	24	30
Crab	2,356	71	2,255	70	2,605	87
Echinoderms	0	9	0	5	***	***
Pacific halibut	2	17	***	***	11	22
Pacific herring	***	***	16	12	1	11
Salmon	2	30	14	34	32	32
Shrimp	5,095	33	7,448	40	12,808	42
Squid	153	62	116	48	23	43
Sturgeon	0	3	***	***	0	0
Tuna	102	17	133	14	59	9
Other shellfish	2	29	2	29	1	32
Other species	120	88	131	85	108	82

### 7.3 Shoreside landings by state

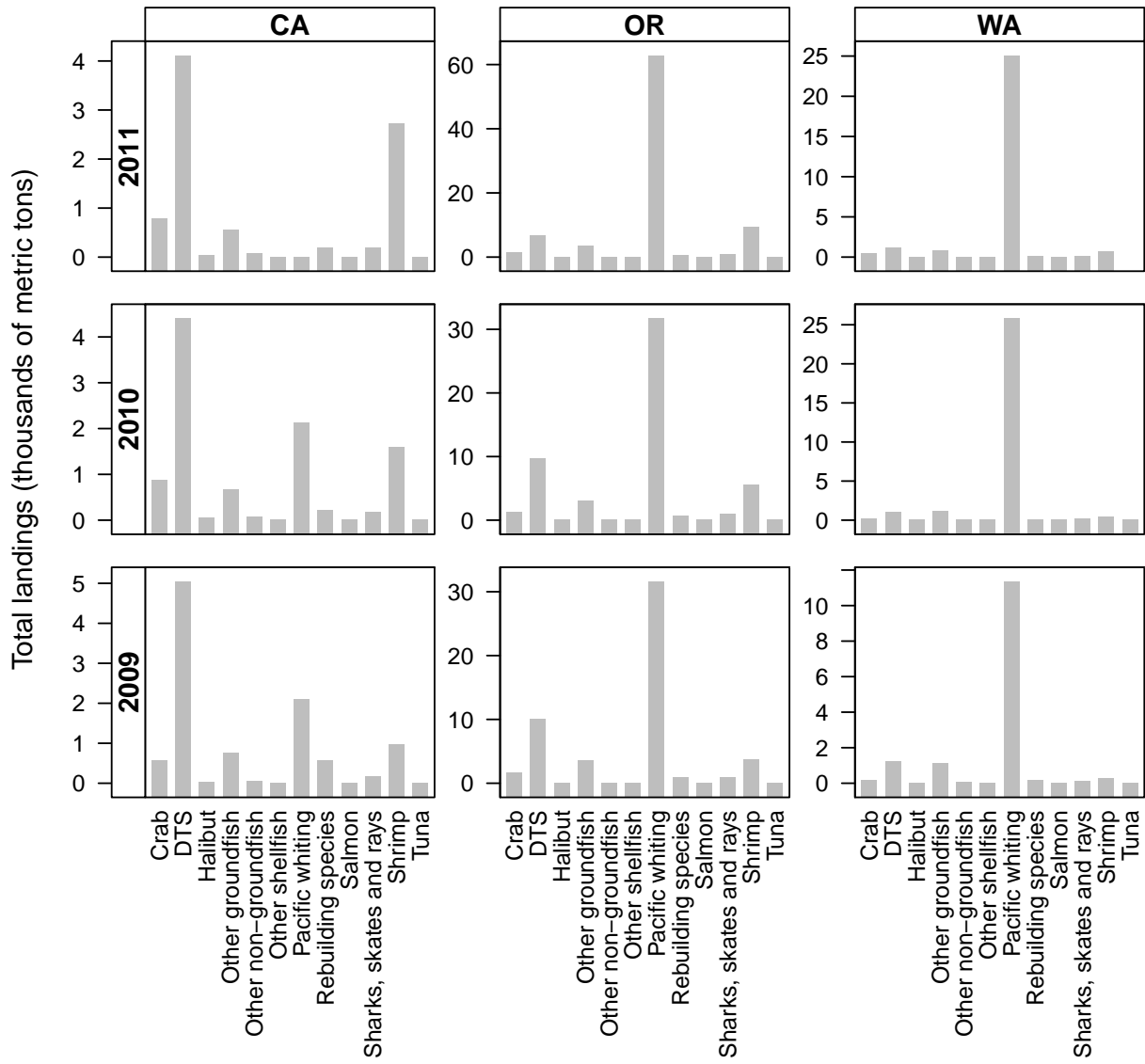


Figure 7.1: Total landings by state (thousands of metric tons).

## **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, but is not available for at-sea deliveries. EDC data are used for all at-sea delivery revenues. Additionally, the EDC 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.

### **8.1 All revenue sources**

**Table 8.1: Average annual revenue.** Annual average revenue (\$) for all categories (N = number of EDC vessels).

Activity	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Shoreside deliveries	\$406,414	124	\$429,780	121	\$673,030	126
At-sea deliveries	\$363,524	20	\$465,202	20	\$613,489	18
Alaska shoreside landings and at-sea deliveries	\$1,226,537	31	\$1,320,654	31	\$1,840,863	34
Sale of limited entry trawl permit	\$0	0	\$403,333	3	***	***
Lease of limited entry trawl permit	***	***	***	***	\$126,348	8
Sale of other permits	\$136,200	3	\$85,000	3	\$181,161	5
Lease of other permits	***	***	***	***	\$142,412	6
Sale of quota shares	***	***	\$0	0	***	***
Lease of quota shares	\$0	0	\$0	0	\$60,009	11
Sale of quota pounds	***	***	***	***	\$189,849	17
Lease of quota pounds	\$0	0	***	***	\$66,892	48
Chartering or leasing the vessel	\$117,472	11	\$157,493	11	\$180,338	13
Salmon disaster payments	\$26,051	16	\$1,667	3	***	***
Other	\$88,833	16	\$117,458	9	\$134,530	11
Average Total Revenue	\$754,217	132	\$833,808	129	\$1,251,474	138

## 8.2 Ex-vessel revenue

**Table 8.2:** Total ex-vessel revenue by species group from shoreside landings of groundfish (N=number of EDC vessels)

Species group	2009		2010		2011	
	Total	N	Total	N	Total	N
Arrowtooth flounder	\$761,836	89	\$634,209	84	\$494,452	81
Dover sole	\$8,000,402	107	\$6,752,932	100	\$6,813,548	85
English sole	\$158,658	102	\$99,860	90	\$74,871	68
Lingcod	\$163,244	113	\$129,062	99	\$423,012	85
Pacific cod	\$64,184	40	\$85,694	36	\$322,458	38
Pacific whiting	\$6,435,396	38	\$9,494,192	39	\$20,888,138	46
Petrale sole	\$3,105,312	107	\$1,811,462	97	\$2,514,323	72
Rex sole	\$367,118	108	\$278,825	98	\$268,530	74
Rockfish	\$1,115,764	121	\$1,197,627	113	\$1,645,205	103
Sablefish	\$13,209,066	115	\$12,179,352	109	\$18,019,461	108
Sanddab	\$242,051	42	\$148,671	28	\$176,671	27
Sharks, skates and rays	\$543,965	103	\$605,825	99	\$869,001	86
Thornyheads	\$2,529,083	107	\$2,612,453	104	\$2,095,882	90
Other species	\$107,593	40	\$146,725	40	\$175,037	39



**Table 8.3:** Total ex-vessel revenue by species group from shoreside landings of non-groundfish species (N=number of vessels)

Species group	2009		2010		2011	
	Total	N	Total	N	Total	N
California halibut	\$376,413	7	\$466,461	7	\$480,518	5
Coastal pelagics	***	***	***	***	\$8,374	15
Crab	\$9,506,019	57	\$9,353,747	57	\$14,553,530	66
Echinoderms	\$0	0	***	***	***	***
Pacific halibut	***	***	***	***	\$150,819	3
Pacific herring	***	***	\$0	0	\$0	0
Salmon	\$0	0	***	***	\$91,206	6
Shrimp	\$3,413,617	32	\$5,529,185	36	\$14,206,659	41
Squid	\$13,995	35	\$8,435	24	\$1,058	21
Sturgeon	\$175	3	\$0	0	\$0	0
Tuna	\$224,324	17	\$336,999	13	\$233,583	9
Other shellfish	\$2,600	21	\$1,529	22	\$1,166	22
Other species	\$40,665	63	\$40,934	61	\$34,970	56

**Table 8.4:** Total ex-vessel revenue by species group in at-sea fishery. Revenue data are only available at an annual basis and is not reported by species. It is assumed that all at-sea revenue is derived from Pacific whiting (N=number of vessels).

Species group	2009		2010		2011	
	Total	N	Total	N	Total	N
Pacific whiting	\$7,270,479	20	\$9,304,038	20	\$11,042,798	18

### 8.3 Ex-vessel revenue by state

<sup>0</sup>It is assumed that all at-sea revenue is derived from landings of Pacific whiting.

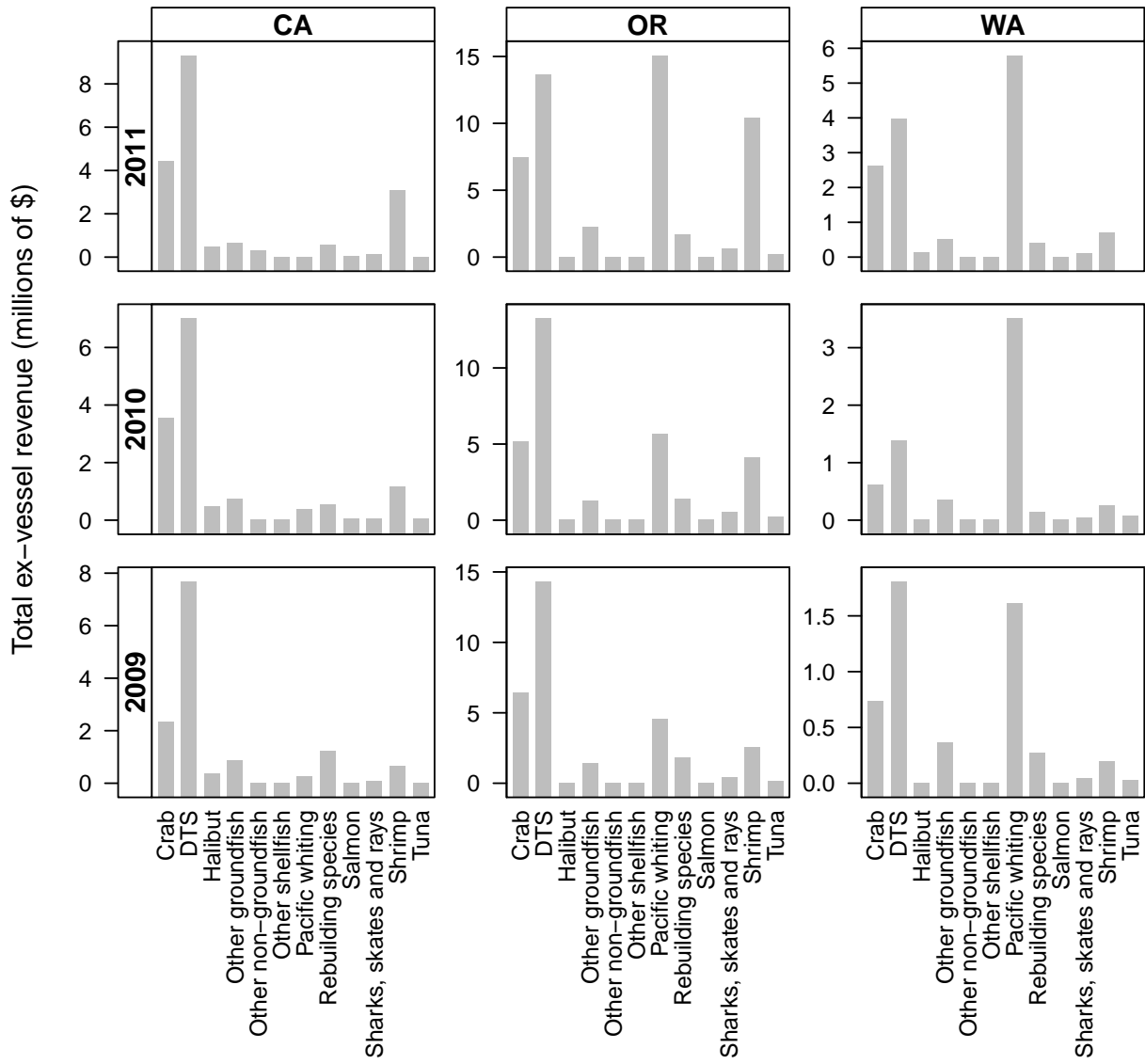


Figure 8.1: Total ex-vessel shoreside revenue (millions of \$).

## 9 Costs

This section of the report describes the cost data that are collected on the EDC catcher vessel form. It reports on variable costs, fixed costs, and 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, costs are divided into two categories, variable costs and fixed costs. Variable costs vary with the level of fishery participation, and generally include items such as fuel and crew payments. Fixed costs do not vary with the level of fishery participation, and generally include items such as vessel capital improvements. The designation of a cost as variable or fixed depends on many factors, including the relevant time horizon and use of the data. While some costs would clearly be considered fixed (e.g., the purchase of a new engine), others are more difficult to categorize as fixed versus variable. For the purposes of this report, we consider the costs listed in Tables 9.2, 9.3 and 9.4 to be fixed, and the costs listed in Table 9.1 to be variable. The EDC Program will continue to explore, and possibly improve, the categorization of these costs.

The cost section of the EDC form collects both “capitalized expenditures” and “expenses” for vessel improvements and maintenance, fishing gear, and processing equipment. This is because certain costs may be treated for tax accounting purposes as either capitalized or expensed. Capitalized expenditures are depreciated over a number of years. Expensed items are fully deducted as a cost for the year in which they occur. In an effort to reduce the reporting burden and errors, these data are collected as they are reported in the 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 attempt 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 three years, the crew wages made up the largest portion of total variable expenses, followed by captain wages, and fuel and lubrication (Table 9.1). Together, these expenses made up 89.5% of all variable costs on the West Coast in 2011.

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

Expense category	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Bait	\$9,852	58	\$10,848	55	\$14,756	71
Captain wages	\$79,235	120	\$83,004	118	\$137,438	126
Communication	\$2,294	106	\$2,627	101	\$2,489	131
Crew wages	\$90,355	116	\$98,037	114	\$144,119	107
Fishing association dues	\$4,413	69	\$4,448	66	\$6,010	94
Food	\$5,598	112	\$5,704	108	\$6,058	106
Freight	\$788	14	\$992	16	\$2,491	20
Fuel and lubrication	\$52,728	130	\$71,562	125	\$81,080	135
Ice	\$6,664	94	\$5,956	93	\$5,870	100
License fees	—		—		\$3,191	132
Observers	\$5,491	12	\$10,362	16	\$3,490	111
Offloading	\$6,713	42	\$7,380	42	\$7,423	53
Supplies	\$9,010	94	\$10,522	88	\$6,172	99
Travel	\$2,083	31	\$2,190	30	\$1,801	25
Trucking of fish	\$0	0	\$3,530	3	\$5,248	5
Average total variable costs	\$234,515	130	\$265,632	127	\$364,073	134

## 9.2 Fixed costs

### 9.2.1 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

**Table 9.2: Capitalized expenditures on vessel and on-board equipment, fishing gear, and processing equipment.** Average capitalized expenditures (\$) on vessel and on-board equipment, fishing gear, and processing equipment (N = number of EDC vessels with non-zero, non-NA responses).

Expenditure category	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Vessel and on-board equipment in all fisheries	\$84,419	75	\$55,548	73	\$85,317	99
Fishing gear only used on the West Coast	\$26,200	67	\$25,817	62	\$41,409	93
Fishing gear shared between the West Coast and Other fisheries	\$75,457	17	\$65,911	20	***	***
Processing equipment used only on the West Coast	***	***	***	***	\$3,706	4
Processing equipment shared between the West Coast and Other fisheries	\$0	0	\$0	0	***	***

**Table 9.3: Expenses on vessel and on-board equipment, fishing gear, and processing equipment.** Average expenses (\$) on vessel and on-board equipment, fishing gear, and processing equipment (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Fishing gear repair and maintenance on the West Coast	\$22,003	104	\$22,943	95	\$24,941	108
Fishing gear repair and maintenance shared between the West Coast and Alaska	\$60,163	29	\$57,955	30	\$100,709	31
Processing equipment repair and maintenance in all fisheries	\$0	0	***	***	***	***
Vessel and onboard equipment in all fisheries	\$69,612	120	\$64,579	114	\$92,407	119
Average total costs on vessel and on-board equipment, fishing gear, and processing equipment	\$94,553	131	\$88,860	127	\$127,909	132

### 9.2.2 Other fixed costs



**Table 9.4: Other fixed expenses.** Average fixed expenses (\$) on all other categories (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Insurance	\$35,133	120	\$36,631	119	\$37,388	131
Lease of vessel	\$86,438	12	\$108,673	10	\$86,546	11
Moorage	\$5,635	130	\$6,228	124	\$5,897	139
Average total fixed costs	\$45,347	132	\$48,202	129	\$48,682	137

**Table 9.5: Depreciation.** Average depreciation (\$) taken during the survey year (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Expenses on depreciation	\$86,704.0	85	\$76,542.5	80	\$108,638.5	96

### 9.3 Fixed costs on the West Coast only

As described above, not all costs reported on the EDC forms are for West Coast only operations. Therefore, cost disaggregation was required both to estimate total costs and net revenues on the West Coast and for individual fisheries. Research is currently being conducted to establish a method for allocating vessel level costs to the fishery level. This research explores allocating costs based on three variables, ex-vessel revenue, landings weight (including at-sea deliveries), and days at sea. The analyses below use a “mixed method” which chooses for each cost category the variable for disaggregation that is conceptually consistent with prior expectations from economic theory. A full description of the cost disaggregation method and a sensitivity analysis comparing cost disaggregation by the three variables, and the “mixed” method can be found in the appendix.

Calculation of the costs on vessel and on-board equipment, fishing gear, and processing equipment on the West Coast required first allocating a share of the total shared capitalized expenditures and expenses to the West Coast and then summing the capitalized expenditures and expenses (Table 9.6). The same cost disaggregation methods were also used to calculate the West Coast share of other fixed costs (Table 9.7).

**Table 9.6: West Coast costs on vessel and on-board equipment, fishing gear, and processing equipment.** Average costs on vessel and on-board equipment, fishing gear, and processing equipment vessel and on-board equipment, fishing gear, and processing equipment on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Cost category	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Vessel and on-board equipment	\$71,628	122	\$56,757	118	\$111,241	119
Fishing gear	\$42,037	125	\$44,288	119	\$68,962	126
Processing equipment	***	***	***	***	\$16,138	6
Average total costs on vessel and on-board equipment, fishing gear, and processing equipment	\$108,860	130	\$97,904	124	\$169,413	130

**Table 9.7: West Coast other fixed expenses.** Average other fixed expenses on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Insurance	\$23,915	117	\$24,986	115	\$26,902	121
Lease of vessel	\$22,561	12	\$48,123	10	\$39,455	9
Moorage	\$3,772	127	\$4,120	120	\$4,375	130
Average total other fixed costs	\$27,291	130	\$30,548	126	\$30,955	135

## 9.4 Summary of West Coast costs

**Table 9.8: Summary of costs on the West Coast.** Average costs on vessel and on-board equipment, fishing gear, and processing equipment, other fixed costs, and all variable costs on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Cost category	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Total costs on vessel and on-board equipment, fishing gear, and processing equipment	\$108,860	130	\$97,904	124	\$169,413	130
Total other fixed costs	\$27,291	130	\$30,548	126	\$30,955	135
Total variable costs	\$234,515	130	\$265,632	127	\$364,073	134

## 9.5 Quota and permit costs on the West Coast

## 9.6 Landings taxes and buyback fees

Costs associated with landings taxes were not requested on the catcher vessel forms because it can be calculated based on gross shore-side landings information. These costs were calculated according to the table provided on page 14 of Leonard and Watson (2011)<sup>1</sup>. Unlike in the description in Leonard and Watson (2011), moorage was requested on the EDC forms.

<sup>1</sup>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.

## 10 Net Revenue and Economic Profit

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

Labor costs for the net revenue measure are the total payments to the crew and captain. If work is performed that is not paid for, then it is not included as a cost. This commonly occurs in commercial fishing when the owner of a vessel is also the captain, but does not draw a captain's wage. In this case, the net revenue is higher than it would be if the captain drew a wage or hired a captain. In the end, the vessel owner-captain is not necessarily any worse off since s/he is the residual claimant to the net revenue. However, the net revenue would be higher than a comparable vessel that hired a captain.<sup>2</sup> Economic profit, on the other hand, accounts for the cost associated with an owner's time that is used as a captain. This is called an opportunity cost in the economics literature<sup>3</sup>, and is typically approximated by the wage of a comparably productive captain<sup>4</sup>.

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

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<sup>1</sup>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

<sup>2</sup>The same would also be true when a vessel owner does not receive a wage for work performed to repair or maintain a vessel or gear.

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

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

opportunity cost of capital, and is typically approximated by the market rate of return associated with businesses of comparable risk, multiplied by the market value of the vessel.

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

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

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

There are several caveats associated with the net revenue calculations in this report. As noted in the Section 9, there are a variety of costs that are associated with running a vessel that are not requested by the EDC form because it is difficult to determine the share of the cost associated with the vessel. These costs include items that can be used for activities other than fishing, or are too difficult to allocate to a particular vessel in a multi-vessel company. These expenses include office space, vehicles and transport trucks, storage of equipment, professional fees, and marketing. In general, the EDC forms attempt to capture only costs that are directly related to vessel maintenance and fishing operations, and not costs that are related to activities or equipment off the vessel. Therefore, the EDC calculated net revenue is an underestimate of the true net revenue. The difference is likely much greater for total cost net revenue than variable cost net revenue since most of the excluded costs are fixed costs.

Another caveat is that the EDC forms do not collect information about income taxes or financing costs. This has several implications. The first is that these costs are not included in the net revenue calculations. Therefore, net revenue is greater than it would be otherwise. The second is that in lieu of financing information (principal and interest payments), EDC total cost net revenue uses the total costs associated with vessel and gear purchases, repair, maintenance and improvements. For example, if a new engine is purchased, the total cost of the engine is used, even though the actual cash outlay, if it were financed, would only be the principal and

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<sup>5</sup>See Section 9 for a more complete discussion of variable and fixed costs used in this report

interest payments made that year. It is likely that many larger capital costs, and perhaps some operating costs, are financed. This would mean that the actual cash outlays in a particular year for those items would be less than what is used in the EDC for the net revenue calculation. This may balance out over time, because previously financed or purchased capital and equipment are also not included, except for the year in which they are purchased<sup>6</sup>. Total cost net revenue is expected to be representative of actual total cost net revenue only when averaged over many years and across vessels because relatively large capital costs occur periodically.

## 10.1 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.

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

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

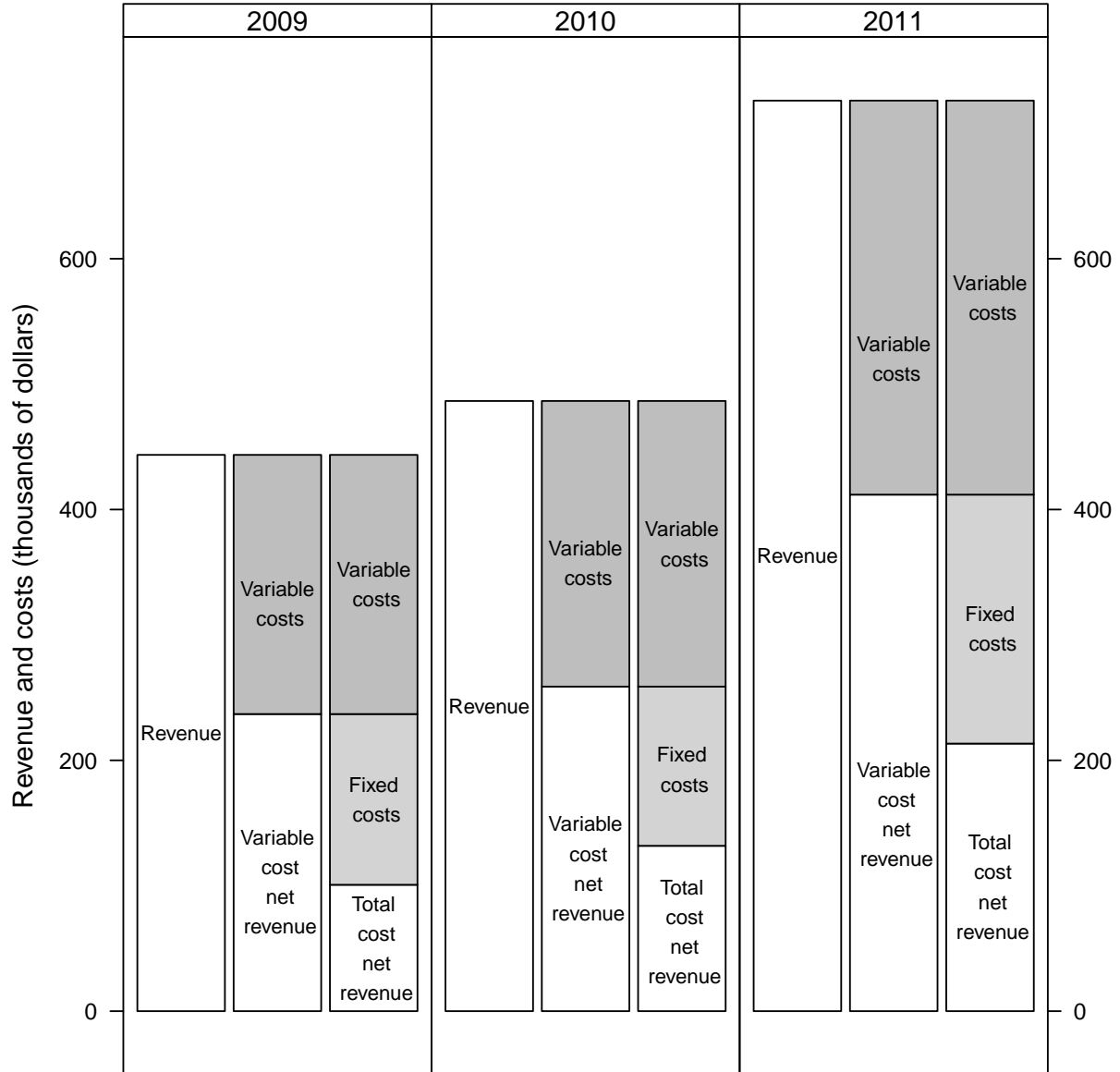
**Table 10.1: West Coast average variable cost and total cost net revenue.** Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast (N = number of vessels). Fixed costs include capitalized expenditures, capital expenses, and other fixed costs (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$443,583	130	\$486,567	126	\$726,096	132
(Variable costs)	(\$206,668)	130	(\$227,833)	126	(\$314,216)	132
<b>Variable cost net revenue</b>	<b>\$236,915</b>	<b>130</b>	<b>\$258,733</b>	<b>126</b>	<b>\$411,880</b>	<b>132</b>
(Fixed costs)	(\$136,151)	130	(\$126,897)	126	(\$198,505)	132
<b>Total cost net revenue</b>	<b>\$100,764</b>	<b>130</b>	<b>\$131,836</b>	<b>126</b>	<b>\$213,374</b>	<b>132</b>

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

**Table 10.2: Revenues and costs on permits and quota.** Revenues and costs from sale, lease, and purchase of limited entry groundfish permits, quota pounds, and quota shares on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Type	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Limited entry permit revenues	***	***	309,265	4	140,875	12
Limited entry permit costs	20,277	23	59,644	24	140,814	17
Quota pounds revenues	***	***	333,999	3	103,701	64
Quota pounds costs	19,112	3	48,124	4	77,698	75
Quota shares revenues	***	***	0	0	64,184	13
Quota shares costs	0	0	***	***	***	***



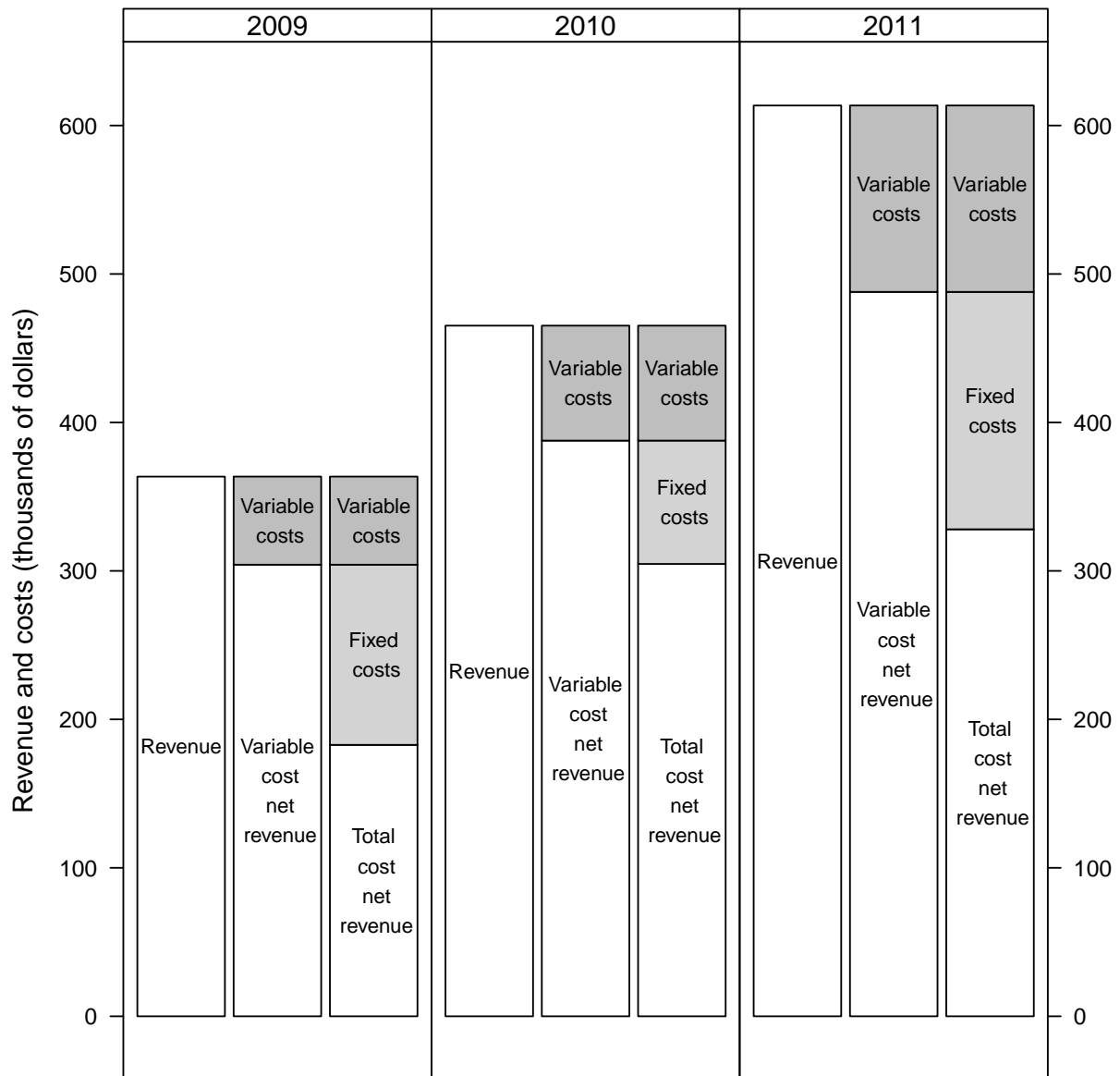
**Figure 10.1: West Coast average variable cost and total cost net revenue.** Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast. Fixed costs include capitalized expenditures, capital expenses, and other fixed costs.



## 10.2 Net revenue by West Coast catch share fisheries and other fisheries

**Table 10.3: 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 in the at-sea Pacific whiting fishery (N = number of EDC vessels with non-zero, non-NA responses). Fixed costs include capitalized expenditures, capital expenses, and other fixed costs.

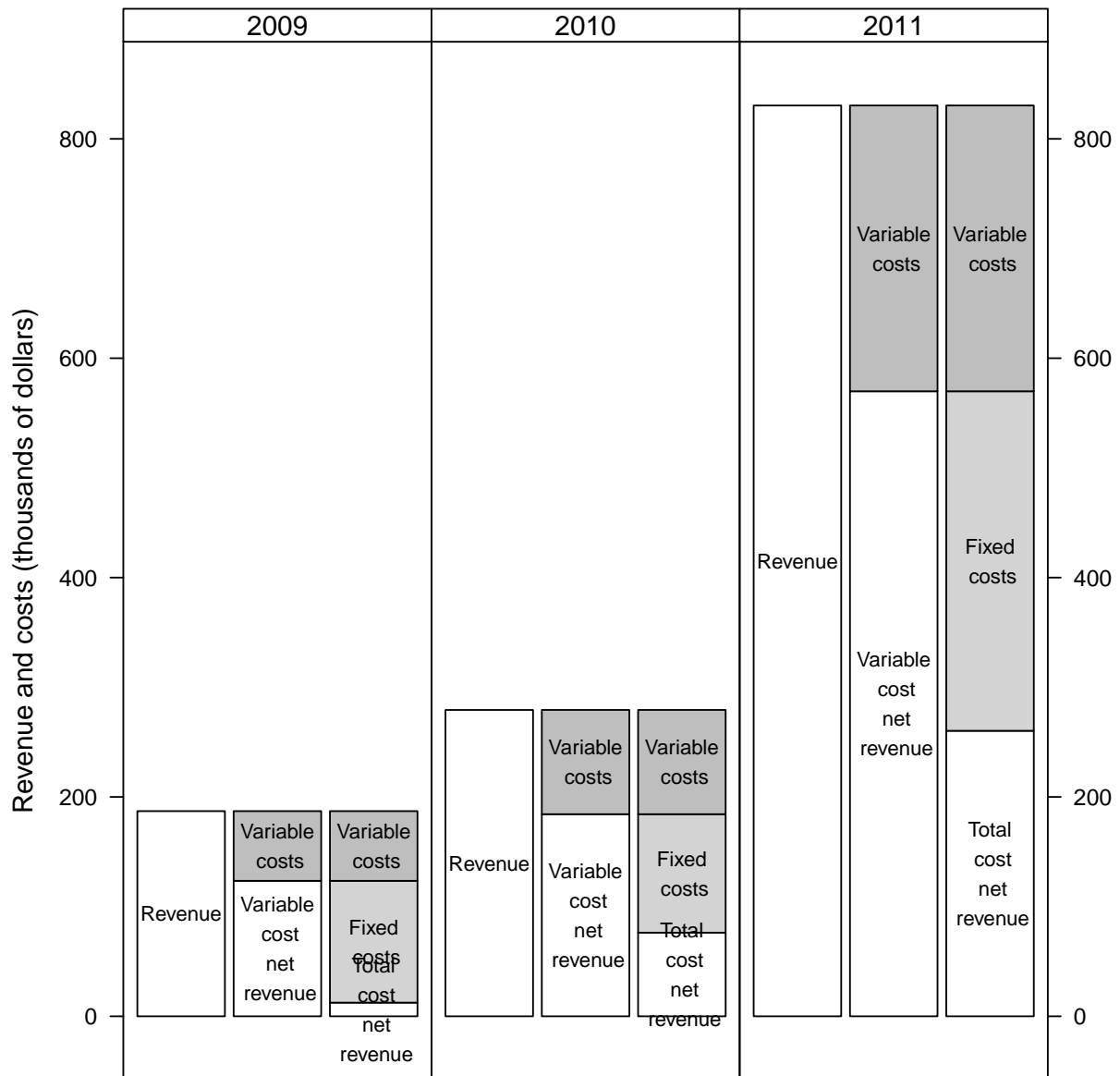
	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$363,524	20	\$465,202	20	\$613,489	18
(Variable costs)	(\$59,341)	20	(\$77,423)	20	(\$125,563)	18
<b>Variable cost net revenue</b>	<b>\$304,183</b>	<b>20</b>	<b>\$387,779</b>	<b>20</b>	<b>\$487,926</b>	<b>18</b>
(Fixed costs)	(\$121,368)	20	(\$83,098)	20	(\$159,904)	18
<b>Total cost net revenue</b>	<b>\$182,814</b>	<b>20</b>	<b>\$304,681</b>	<b>20</b>	<b>\$328,023</b>	<b>18</b>



**Figure 10.2: 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.

**Table 10.4: 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 in the shoreside Pacific whiting fishery (N = number of EDC vessels with non-zero, non-NA responses). Fixed costs include capitalized expenditures, capital expenses, and other fixed costs.

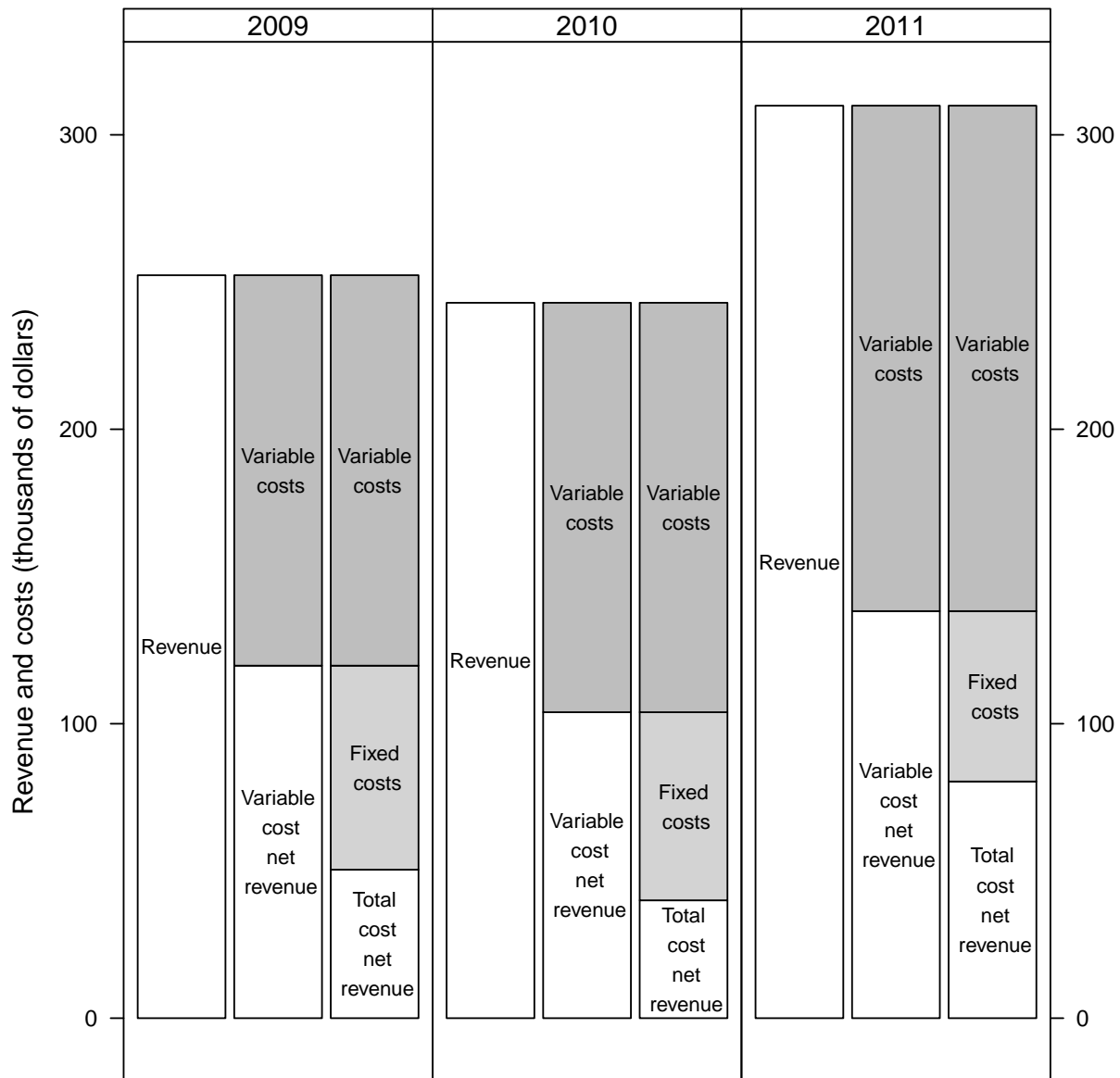
	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$187,054	35	\$279,318	35	\$830,425	26
(Variable costs)	(\$63,545)	35	(\$95,057)	35	(\$260,558)	26
<b>Variable cost net revenue</b>	<b>\$123,509</b>	<b>35</b>	<b>\$184,261</b>	<b>35</b>	<b>\$569,866</b>	<b>26</b>
(Fixed costs)	(\$111,052)	35	(\$108,031)	35	(\$309,555)	26
<b>Total cost net revenue</b>	<b>\$12,457</b>	<b>35</b>	<b>\$76,230</b>	<b>35</b>	<b>\$260,311</b>	<b>26</b>



**Figure 10.3: 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.

**Table 10.5: 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 in the DTS trawl with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses). Fixed costs include capitalized expenditures, capital expenses, and other fixed costs.

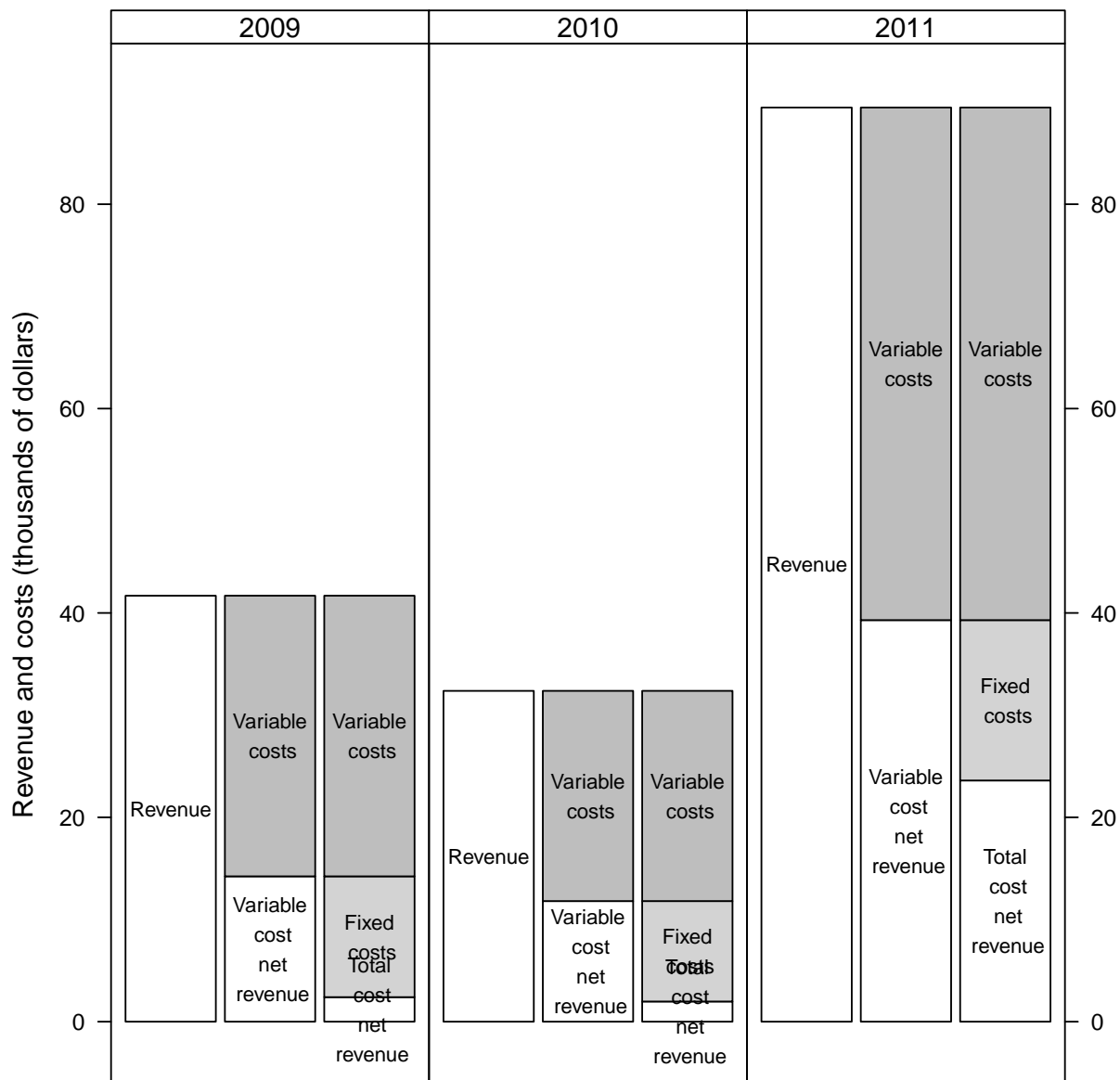
	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$252,322	102	\$242,959	93	\$309,895	65
(Variable costs)	(\$132,604)	102	(\$139,060)	93	(\$171,664)	65
<b>Variable cost net revenue</b>	<b>\$119,718</b>	<b>102</b>	<b>\$103,899</b>	<b>93</b>	<b>\$138,230</b>	<b>65</b>
(Fixed costs)	(\$69,296)	102	(\$63,876)	93	(\$57,851)	65
<b>Total cost net revenue</b>	<b>\$50,422</b>	<b>102</b>	<b>\$40,023</b>	<b>93</b>	<b>\$80,379</b>	<b>65</b>



**Figure 10.4: 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.

**Table 10.6: 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 in the non-whiting, non-DTS trawl with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses). Fixed costs include capitalized expenditures, capital expenses, and other fixed costs.

	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$41,687	76	\$32,373	62	\$89,465	46
(Variable costs)	(\$27,465)	76	(\$20,573)	62	(\$50,168)	46
<b>Variable cost net revenue</b>	<b>\$14,223</b>	<b>76</b>	<b>\$11,801</b>	<b>62</b>	<b>\$39,298</b>	<b>46</b>
(Fixed costs)	(\$11,821)	76	(\$9,827)	62	(\$15,694)	46
<b>Total cost net revenue</b>	<b>\$2,402</b>	<b>76</b>	<b>\$1,974</b>	<b>62</b>	<b>\$23,604</b>	<b>46</b>

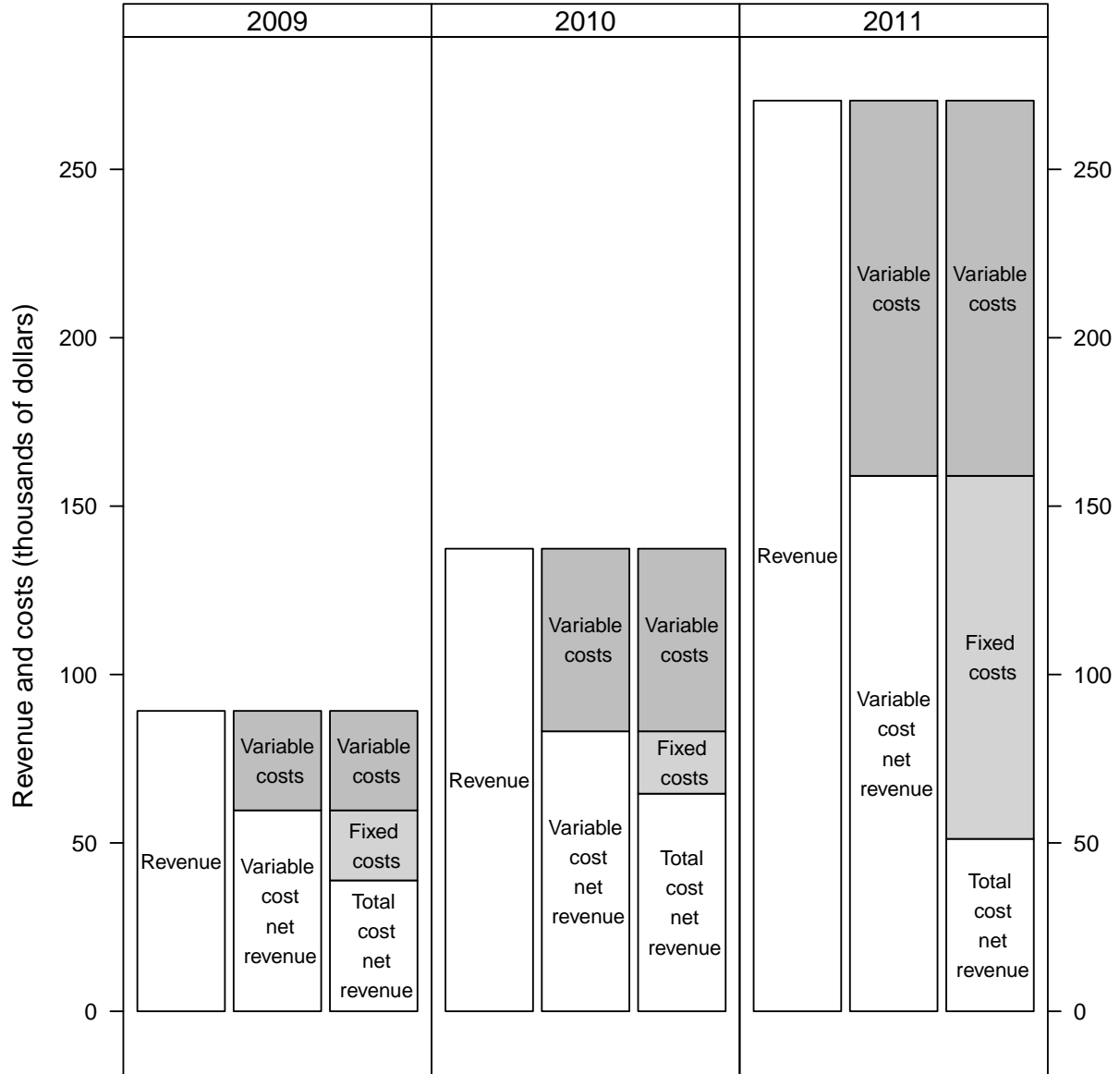


**Figure 10.5: Non-whiting, non-DTS trawl with trawl endorsement fishery variable cost net revenue and total cost net revenue.** Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the non-whiting, non-DTS trawl with trawl endorsement fishery.



**Table 10.7: 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 in the groundfish fixed gear with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses). Fixed costs include capitalized expenditures, capital expenses, and other fixed costs.

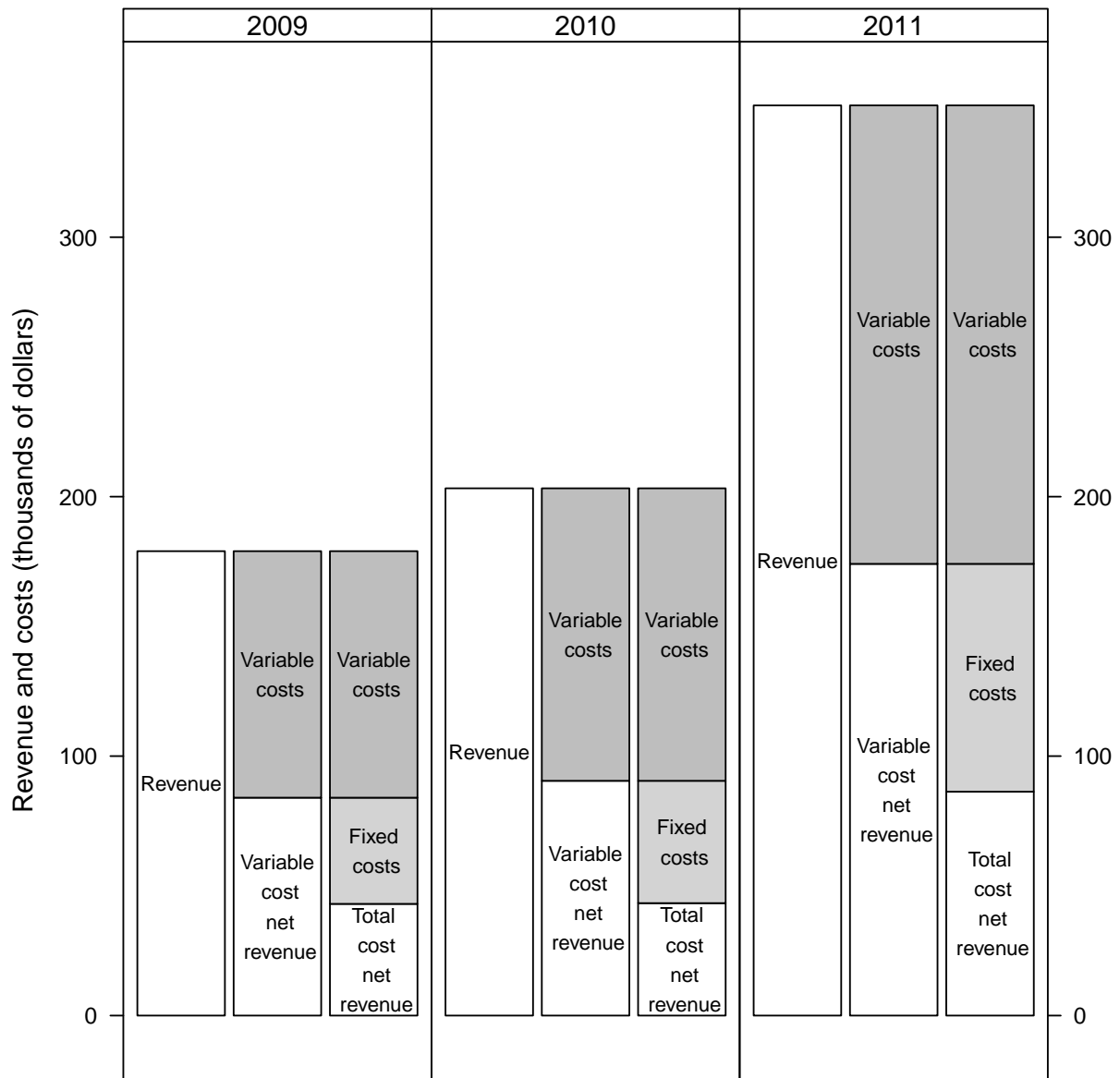
	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$89,194	5	\$137,361	7	\$270,411	26
(Variable costs)	(\$29,534)	5	(\$54,228)	7	(\$111,425)	26
<b>Variable cost net revenue</b>	<b>\$59,660</b>	<b>5</b>	<b>\$83,133</b>	<b>7</b>	<b>\$158,986</b>	<b>26</b>
(Fixed costs)	(\$20,793)	5	(\$18,517)	7	(\$107,784)	26
<b>Total cost net revenue</b>	<b>\$38,867</b>	<b>5</b>	<b>\$64,617</b>	<b>7</b>	<b>\$51,202</b>	<b>26</b>



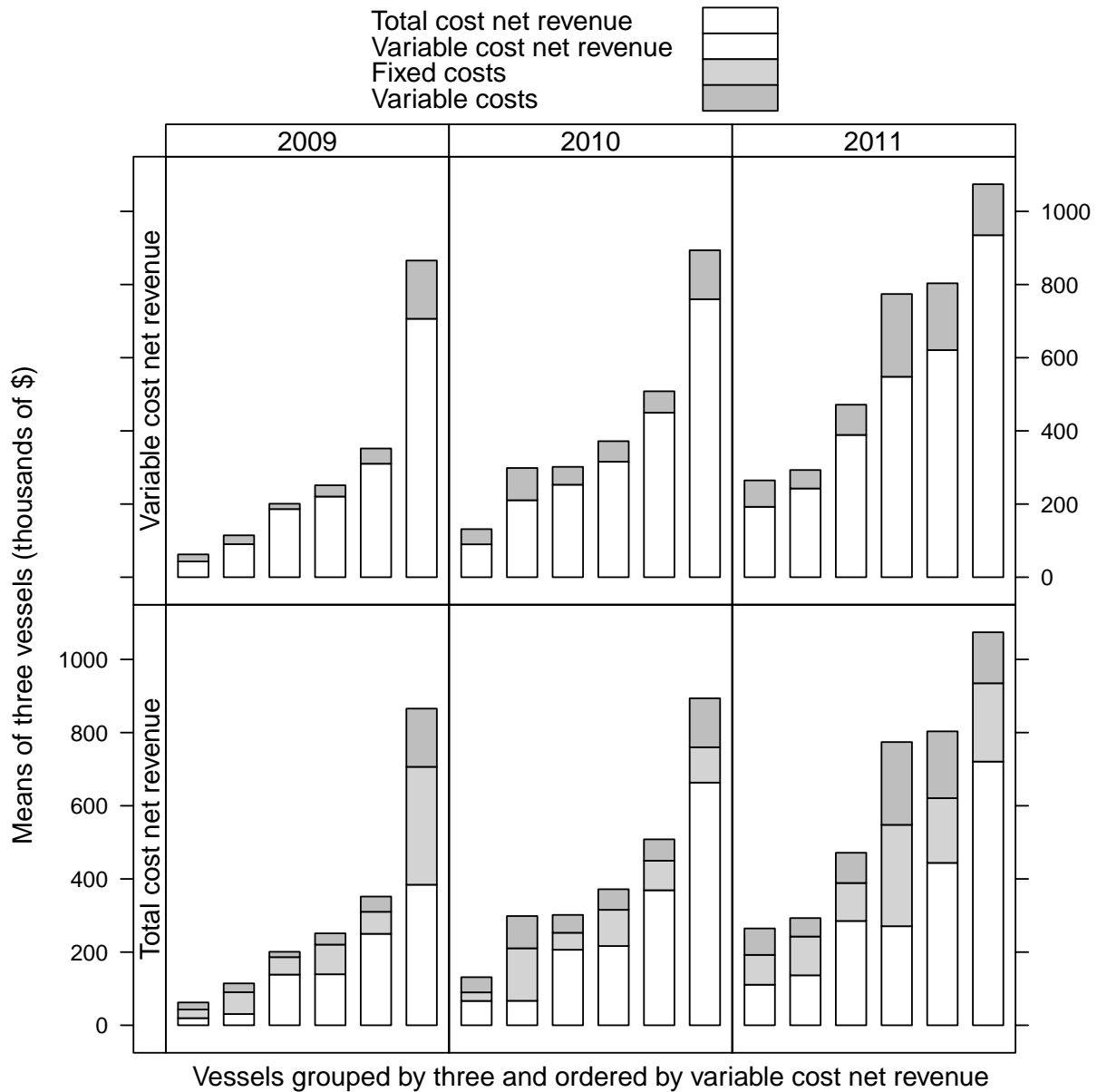
**Figure 10.6: Groundfish fixed gear with trawl endorsement fishery variable cost net revenue and total cost net revenue.** Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the groundfish fixed gear with trawl endorsement fishery.

**Table 10.8: Other 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 in the other fishery (N = number of EDC vessels with non-zero, non-NA responses). Fixed costs include capitalized expenditures, capital expenses, and other fixed costs.

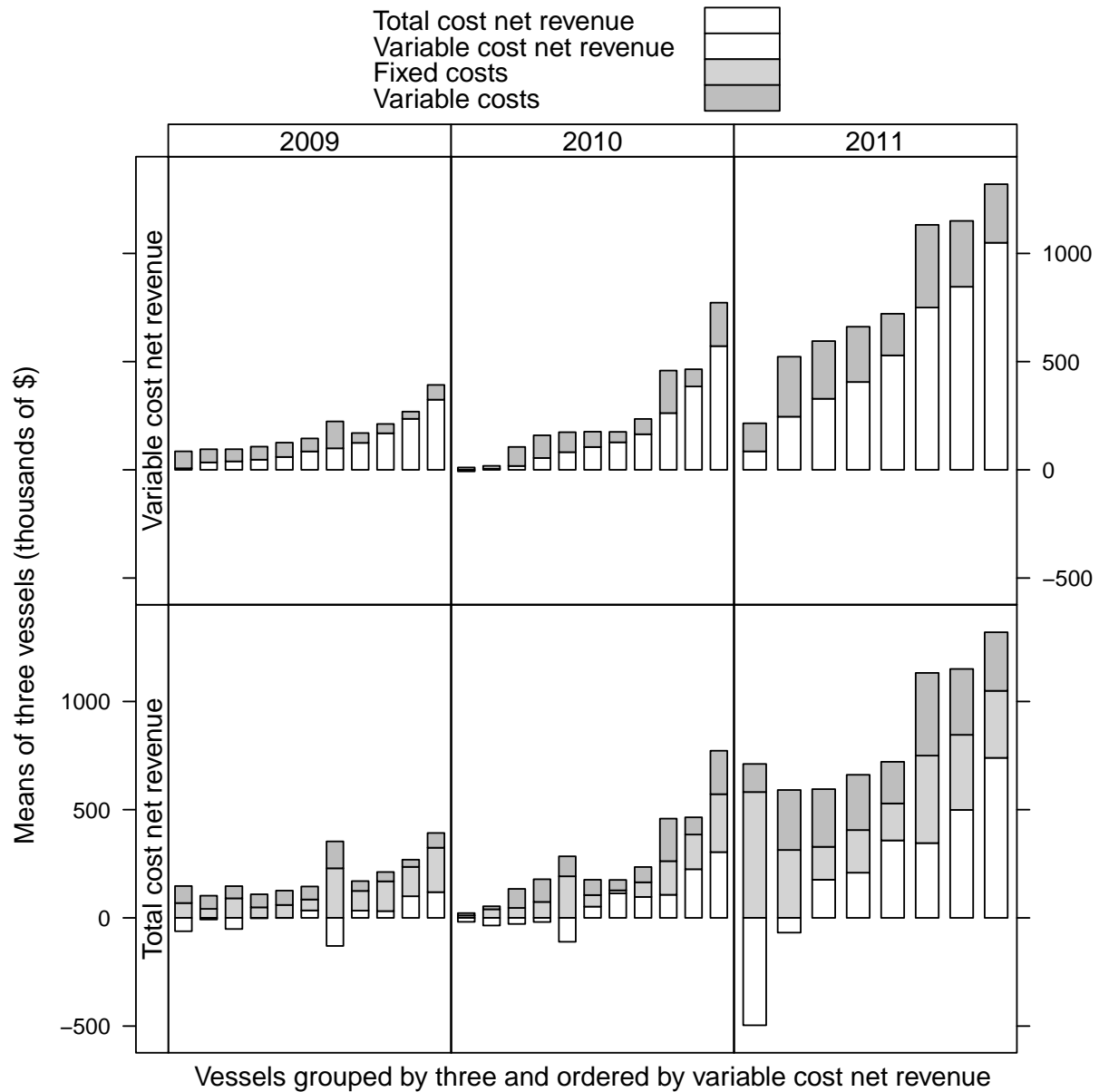
	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$178,980	81	\$203,211	82	\$350,786	91
(Variable costs)	(\$95,004)	81	(\$112,730)	82	(\$176,691)	91
<b>Variable cost net revenue</b>	<b>\$83,976</b>	<b>81</b>	<b>\$90,481</b>	<b>82</b>	<b>\$174,095</b>	<b>91</b>
(Fixed costs)	(\$40,926)	81	(\$47,155)	82	(\$87,818)	91
<b>Total cost net revenue</b>	<b>\$43,050</b>	<b>81</b>	<b>\$43,326</b>	<b>82</b>	<b>\$86,277</b>	<b>91</b>



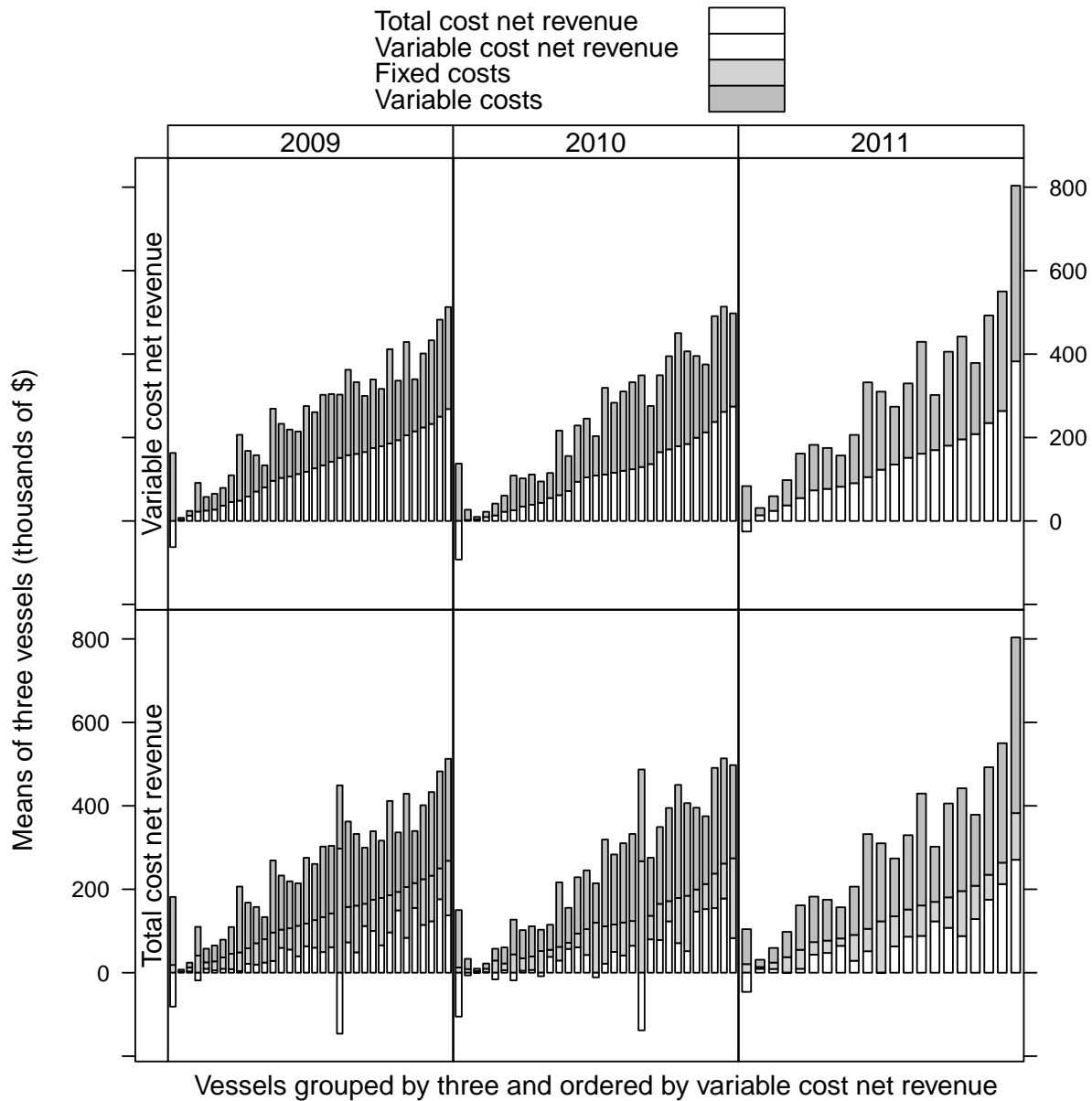
**Figure 10.7: Other fisheries variable cost net revenue and total cost net revenue.** Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in other fisheries.



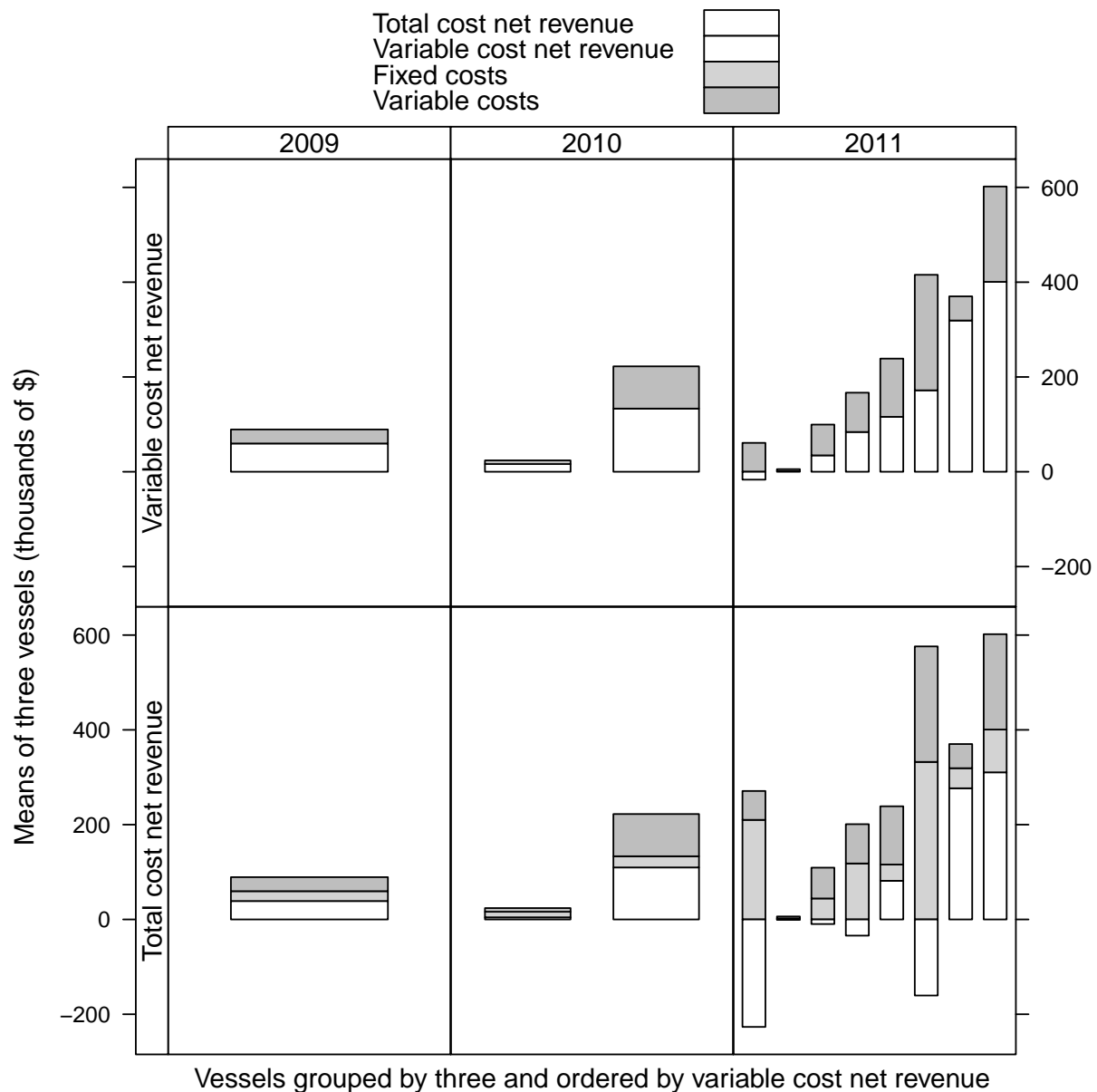
**Figure 10.8: Net revenue in the at-sea Pacific whiting fishery by vessels groups.** Revenue, fixed costs, variable costs, variable cost net revenue, and total cost net revenue in the at-sea Pacific whiting fishery. To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.



**Figure 10.9: Net revenue in the shoreside Pacific whiting fishery by vessels groups.** Revenue, fixed costs, variable costs, variable cost net revenue, and total cost net revenue in the shoreside Pacific whiting fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

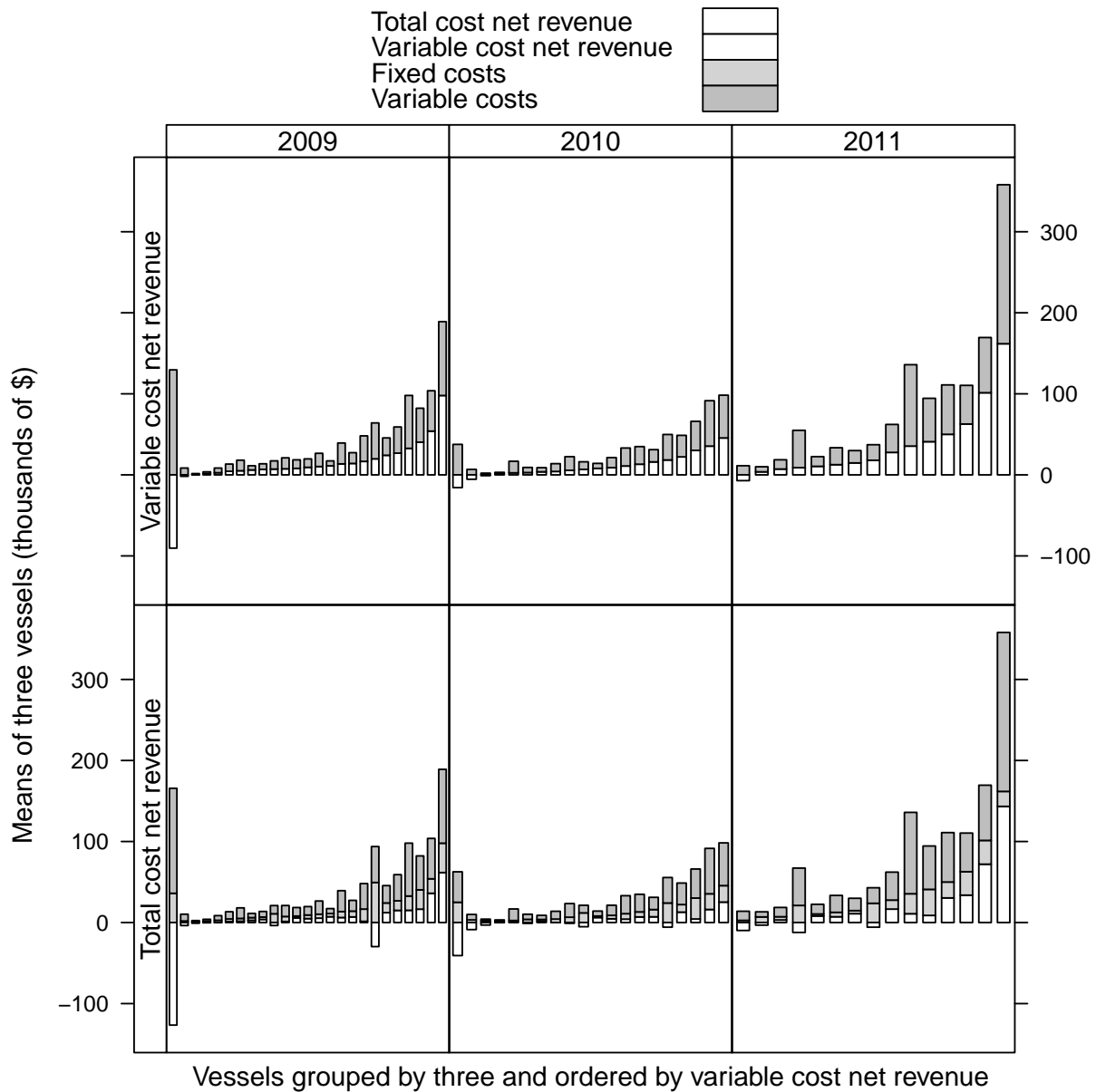


**Figure 10.10: Net revenue in the DTS trawl with trawl endorsement fishery by vessels groups.** Revenue, fixed costs, variable costs, variable cost net revenue, and total cost net revenue in the DTS trawl with trawl endorsement fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

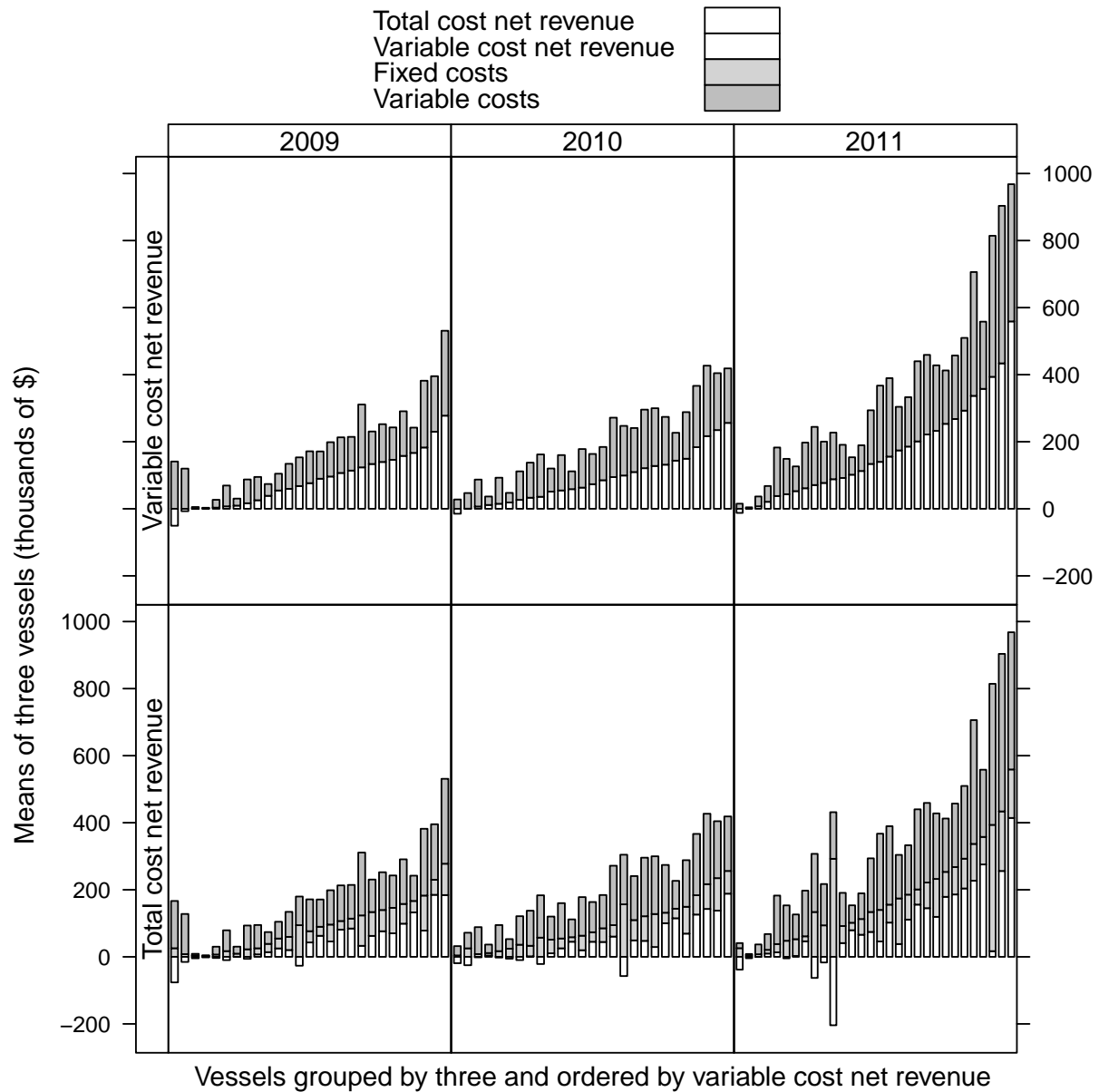


**Figure 10.11: Net revenue in the groundfish fixed gear with trawl endorsement fishery by vessels groups.** Revenue, fixed costs, variable costs, variable cost net revenue, and total cost net revenue in the groundfish fixed gear with trawl endorsement fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels. There were not enough vessels in the 2009 fishery in order to calculate the means of groups of three vessels.





**Figure 10.12: Net revenue in the non-whiting, non-DTS trawl with trawl endorsement fishery by vessels groups.** Revenue, fixed costs, variable costs, variable cost net revenue, and total cost net revenue 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 10.13: Net revenue in the other fishery by vessels groups.** Revenue, fixed costs, variable costs, variable cost net revenue, and total cost net revenue in the other fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

# 11 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 11.1).

**Table 11.1: Frequency of crew share distributions.** 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 as 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
YES	127	123	121
NO	5	5	14
No response	1	2	8

Participants were asked to provide the percentage of fishing trips in which the vessel owner served as captain in the West Coast groundfish fishery (Table 11.2). In 2011, 22 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 11.2: Percentage of trips with owner operated vessels.** Average percentage of trips when the vessel owner served as captain.

Share	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Percentage of trips vessel owner served as captain	34.9	125	33.9	123	38.4	118

**Table 11.3: Average crew shares when vessels were owner operated.** share paid to captain, crew, vessel, and other on trips when the vessel owner served as captain.

Share	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Captain share	24	41	21	36	23	41
Crew share	24	52	23	52	25	52
Other share	—		—		13	3
Vessel share	59	51	62	51	60	51

**Table 11.4: Average crew shares when using a hired captain.** Average share paid to captain, crew, vessel, and other on trips when the vessel owner did not serve as captain.

Share	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Captain share	18	94	18	93	18	91
Crew share	22	98	21	96	22	93
Other share	—		—		7	6
Vessel share	60	96	61	94	59	92

**Table 11.5: Fixed costs deducted before calculating crew shares.** Percent of entities who deducted fixed costs by cost category (N = number of entities that used a crew share system to pay its crew when operating in the West Coast groundfish fisheries during the survey year). An entity is defined as a unique combination of an owner or lessee and vessel, whereas as vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Expenses category	2009		2010		2011	
	%	N	%	N	%	N
Depreciation	0%	133	0%	130	—	
Lease of vessel	0%	133	1.5%	130	0.7%	143
Moorage	0%	133	0%	130	—	
Onboard equipment repair and maintenance	0%	133	0%	130	2.8%	143
Repair and maintenance on fishing gear	0%	133	0%	130	—	
Repair and maintenance on processing equipment	0%	133	0%	130	—	

**Table 11.6: Variable costs deducted before calculating crew shares.** Percent of entities who deducted variable costs by cost category (N = number of entities that used a crew share system to pay its crew when operating in the West Coast groundfish fisheries during the survey year). An entity is defined as a unique combination of an owner or lessee and vessel, whereas as vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Expenses category	2009		2010		2011	
	%	N	%	N	%	N
Bait	32.3%	133	31.5%	130	37.8%	143
Buy back taxes	—		—		58%	143
Communication	3%	133	2.3%	130	2.8%	143
Fishing association dues	36.8%	133	36.9%	130	32.2%	143
Food	46.6%	133	42.3%	130	51.7%	143
Freight to the vessel on supplies	0%	133	0%	130	0.7%	143
Fuel and lubrication	55.6%	133	57.7%	130	64.3%	143
Ice	47.4%	133	44.6%	130	45.5%	143
Insurance	2.3%	133	1.5%	130	1.4%	143
Licensing fees	—		—		4.2%	143
Limited entry permit	0%	133	0.8%	130	2.1%	143
Observer coverage	14.3%	133	16.9%	130	46.9%	143
Offload fees	24.1%	133	21.5%	130	27.3%	143
Other expenses	15.8%	133	16.2%	130	9.1%	143
Other permits	0%	133	0%	130	0%	143
Other supplies	1.5%	133	2.3%	130	2.1%	143
Quota pounds held at the start of the year	0%	133	0%	130	NaN%	0
Quota pounds purchased or leased during the year	6%	133	4.6%	130	28%	143
Quota shares purchased or amortized during the year	0%	133	0%	130	2.8%	143
Travel	1.5%	133	1.5%	130	5.6%	143
Trucking of fish	3%	133	2.3%	130	3.5%	143

## 12 Cost, Revenue, and Net Revenue Rates

**Table 12.1: West Coast average variable cost and total cost net revenue per West Coast fishing day and per West Coast shoreside or at-sea pound landed.** Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast. Fixed costs include capitalized expenditures, capital expenses, and other fixed costs. West Coast days include days at sea in any West Coast fishery.

Description	2009	2010	2011
	Mean	Mean	Mean
Revenue per day	\$5,488	\$6,086	\$9,672
Revenue per metric ton landed	\$287	\$273	\$330
Variable cost per day	\$2,557	\$2,850	\$4,185
Variable cost per metric	\$134	\$128	\$143
Variable cost net revenue per day	\$2,931	\$3,236	\$5,486
Variable cost net revenue metric ton	\$154	\$145	\$187
Fixed cost per day	\$1,684	\$1,587	\$2,644
Fixed cost per metric ton	\$88	\$71	\$90
Total cost net revenue per day	\$1,247	\$1,649	\$2,842
Total cost net revenue per metric ton	\$65	\$74	\$97

# Appendix A 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.

Research is currently being conducted at the Northwest Fisheries Science Center to determine the “best” method of cost allocation relative to certain criteria. For the purposes of this report, four different methods were explored: 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”).

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, figures A.1, A.2, and A.3 show 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 for all West Coast operations using ex-vessel revenue to disaggregate costs from other fisheries.

	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$443,583	130	\$486,567	126	\$726,096	132
(Variable costs)	(\$206,797)	130	(\$228,678)	126	(\$315,671)	132
<b>Variable cost net revenue</b>	<b>\$236,786</b>	<b>130</b>	<b>\$257,889</b>	<b>126</b>	<b>\$410,424</b>	<b>132</b>
(Fixed costs)	(\$132,138)	130	(\$123,514)	126	(\$194,863)	132
<b>Total cost net revenue</b>	<b>\$104,648</b>	<b>130</b>	<b>\$134,375</b>	<b>126</b>	<b>\$215,562</b>	<b>132</b>

**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 for all West Coast operations using at-sea deliveries and shoreside landings to disaggregate costs from other fisheries.

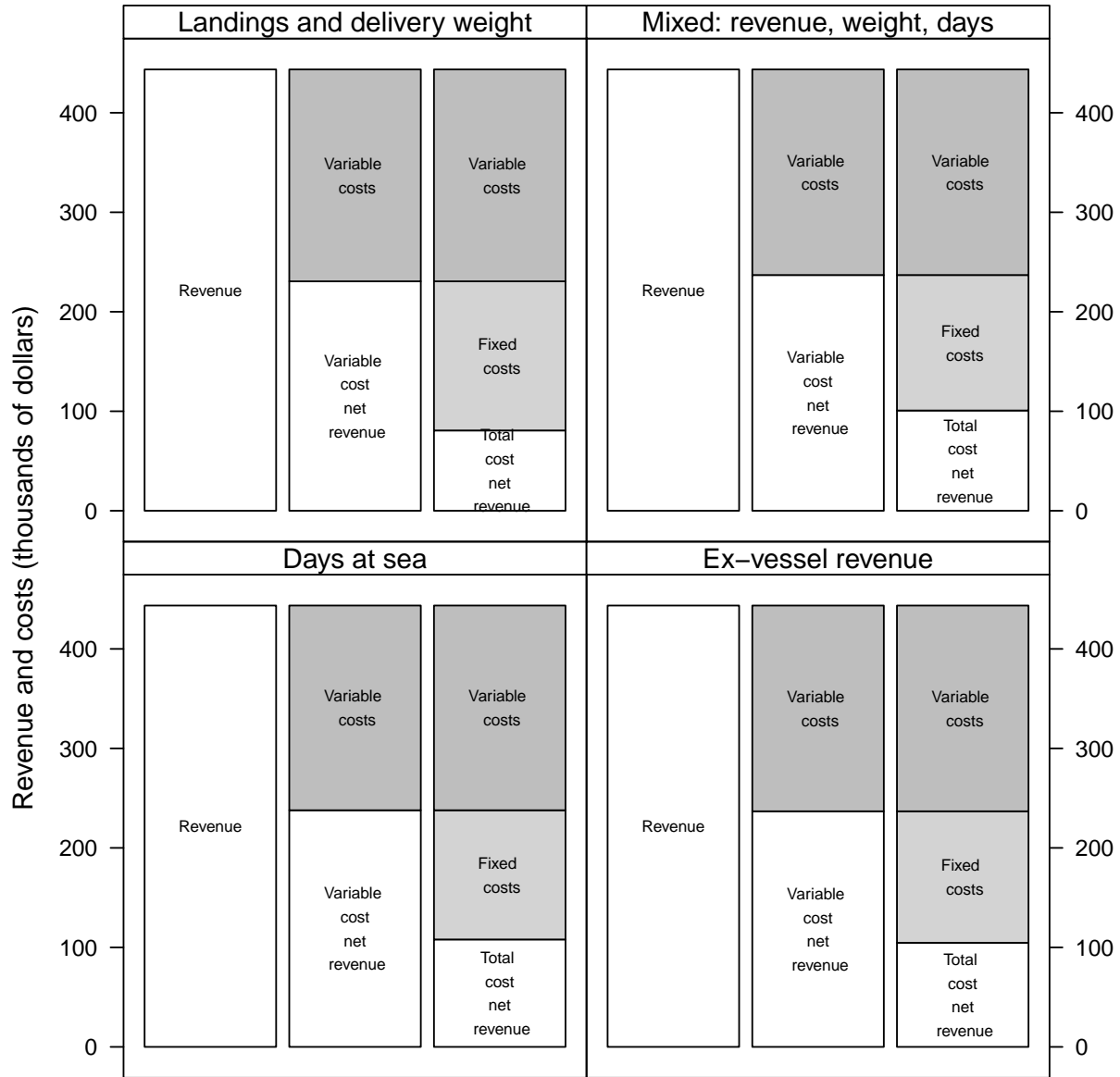
	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$443,583	130	\$486,567	126	\$726,096	132
(Variable costs)	(\$213,006)	130	(\$236,884)	126	(\$325,704)	132
<b>Variable cost net revenue</b>	<b>\$230,577</b>	<b>130</b>	<b>\$249,683</b>	<b>126</b>	<b>\$400,392</b>	<b>132</b>
(Fixed costs)	(\$149,875)	130	(\$135,220)	126	(\$206,579)	132
<b>Total cost net revenue</b>	<b>\$80,702</b>	<b>130</b>	<b>\$114,462</b>	<b>126</b>	<b>\$193,812</b>	<b>132</b>

**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 for all West Coast operations using days at sea to disaggregate costs from other fisheries.

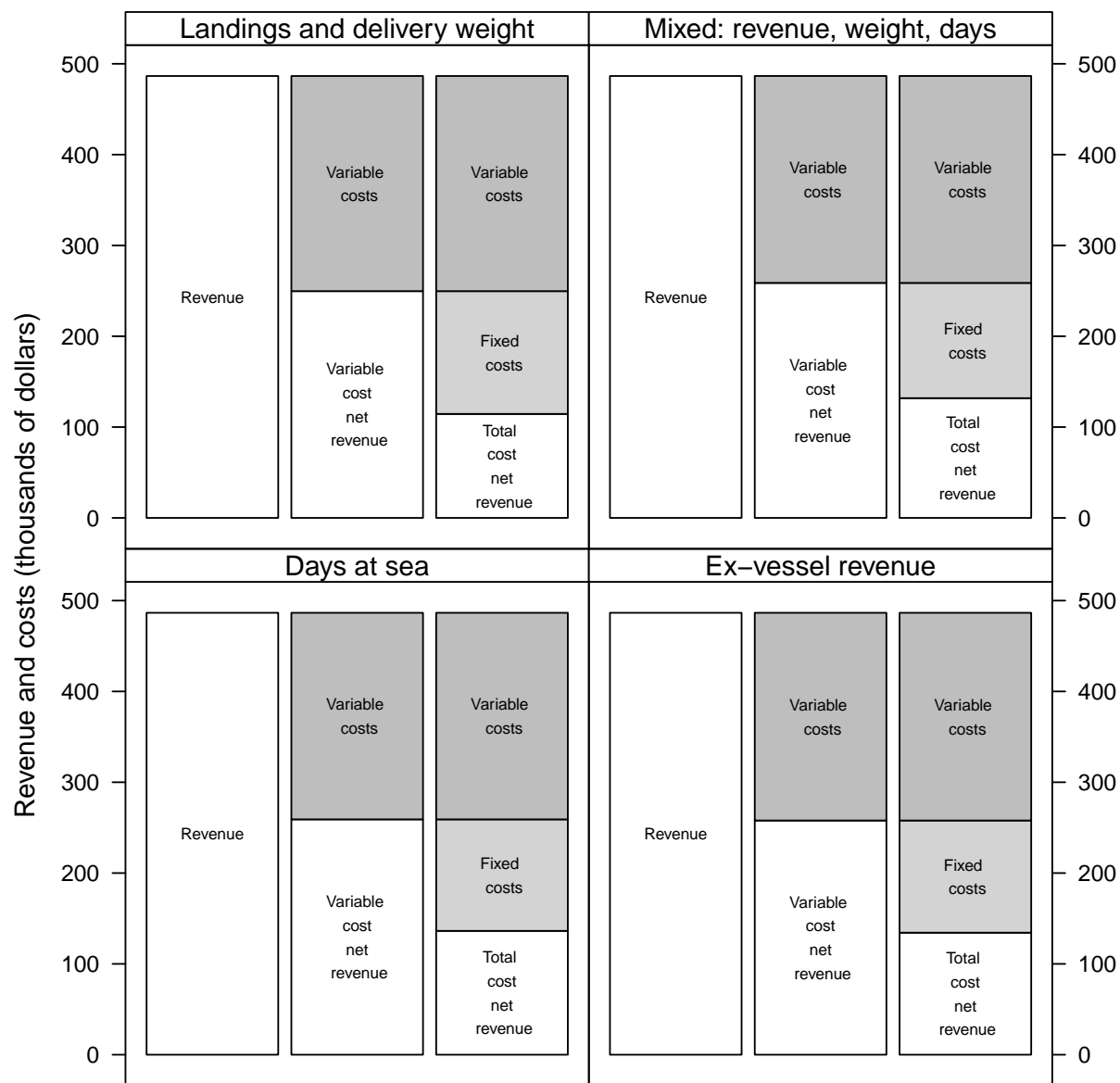
	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$443,583	130	\$486,567	126	\$726,096	132
(Variable costs)	(\$205,743)	130	(\$227,443)	126	(\$310,256)	132
<b>Variable cost net revenue</b>	<b>\$237,839</b>	<b>130</b>	<b>\$259,124</b>	<b>126</b>	<b>\$415,839</b>	<b>132</b>
(Fixed costs)	(\$129,862)	130	(\$122,794)	126	(\$189,186)	132
<b>Total cost net revenue</b>	<b>\$107,978</b>	<b>130</b>	<b>\$136,330</b>	<b>126</b>	<b>\$226,654</b>	<b>132</b>

**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 for all West Coast operations using the mixed method to disaggregate costs from other fisheries.

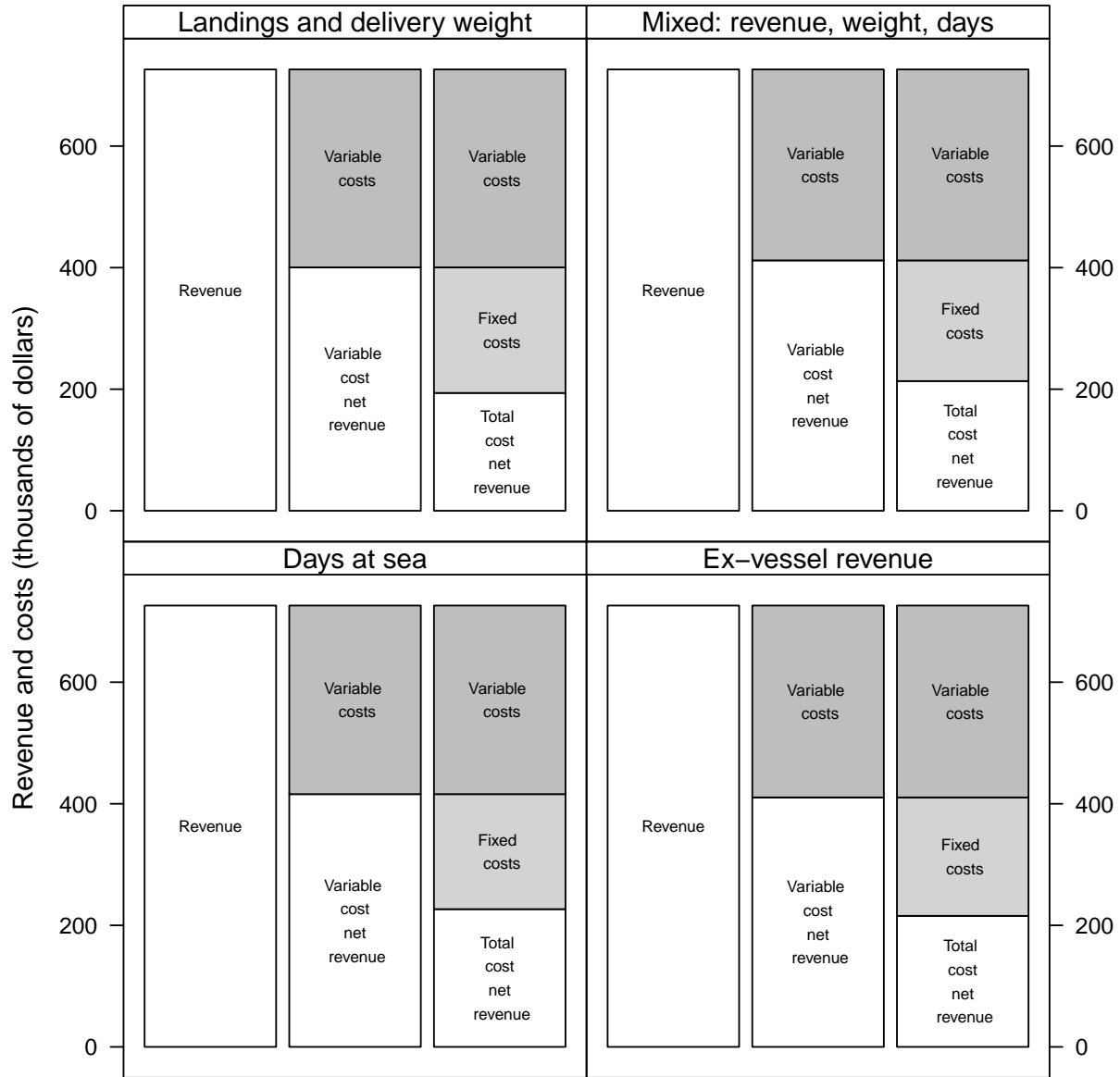
	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	\$443,583	130	\$486,567	126	\$726,096	132
(Variable costs)	(\$206,668)	130	(\$227,833)	126	(\$314,216)	132
<b>Variable cost net revenue</b>	<b>\$236,915</b>	<b>130</b>	<b>\$258,733</b>	<b>126</b>	<b>\$411,880</b>	<b>132</b>
(Fixed costs)	(\$136,151)	130	(\$126,897)	126	(\$198,505)	132
<b>Total cost net revenue</b>	<b>\$100,764</b>	<b>130</b>	<b>\$131,836</b>	<b>126</b>	<b>\$213,374</b>	<b>132</b>



**Figure A.1: Sensitivity analysis 2009 cost disaggregation methods.** Sensitivity analysis for 2009 cost data of four different cost disaggregation methods in terms of variable costs, fixed costs, variable cost net revenue, and total cost net revenue. 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.



**Figure A.2: Sensitivity analysis 2010 cost disaggregation methods.** Sensitivity analysis for 2010 cost data of four different cost disaggregation methods in terms of variable costs, fixed costs, variable cost net revenue, and total cost net revenue. 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.



**Figure A.3: Sensitivity analysis 2011 cost disaggregation methods.** Sensitivity analysis for 2011 cost data of four different cost disaggregation methods in terms of variable costs, fixed costs, variable cost net revenue, and total cost net revenue. 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.