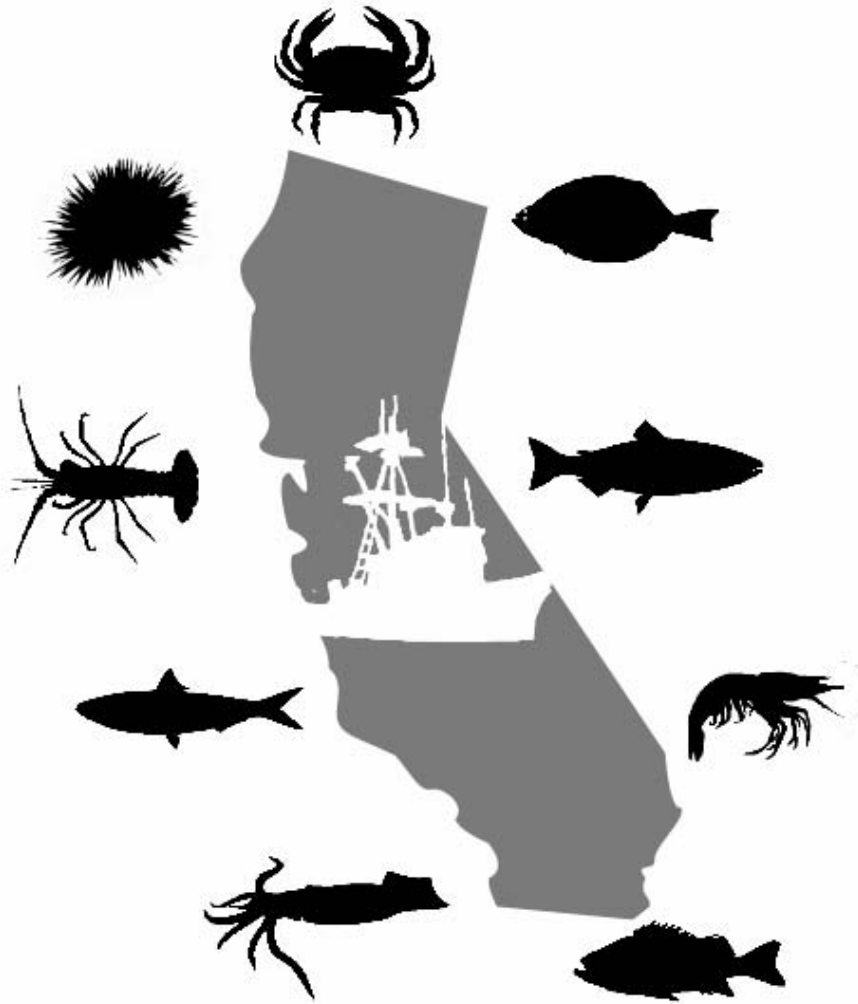


# What is the Economic Contribution of California's Commercial Fisheries?



A survey by Humboldt State University, and endorsed by



Dear California Commercial Fisherman:

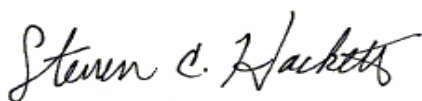
What is the economic contribution of California's commercial fisheries? For years this question has gone unanswered, leaving regulators and members of the public in the dark. We aim to change that. This survey is part of an economic study conducted by Humboldt State University and funded by the California Department of Fish and Game. The purpose of this study is to assess the economic contribution of each of California's commercial marine fisheries to coastal counties and to the overall California economy. This survey differs from others you may have received recently in that it is focused specifically on producing information on the economic contribution provided by California's unique fisheries, down to the county level, and including both live and dead landed condition of the fish.

All information we receive from you will be anonymous and cannot be linked back to you. Your revenue and expenditure information from the survey will be grouped by fishery, gear type, and landed condition of the fish. We will then use this grouped information to estimate how these fishing dollars ripple through the economy and contribute additional jobs and income throughout the economy. By focusing on the landed condition of fish we can take into account the economic contribution of both traditional fisheries and more recent live-fish sales.

This won't just be a report to sit on the shelf. The results of this survey will give commercial fishermen and others the tools they will need to explain to regulators and the public in clear economic terms the contribution of commercial fisheries to the California economy.

I would greatly appreciate your filling out and returning this short questionnaire. To be certain that the results represent the full range of experiences of California commercial license holders we need to hear from **you**. We estimate that the survey should take less than 30 minutes to complete. Your participation is voluntary and I guarantee your answers will be kept completely confidential and will only be used to calculate grouped averages for the individual fisheries. All data with individual identifiers will be destroyed at the end of the study. The number on the survey will be used for mailing purposes only.

Simply mail the completed survey back to us using the enclosed postage-paid pre-addressed envelope. We appreciate your efforts to fill out the survey as completely as possible. A summary of the survey results will be available at the website [www.humboldt.edu/~econ/collaborate.html](http://www.humboldt.edu/~econ/collaborate.html) by April 2009. If you have any questions about this study, feel free to contact me. Thank you.



Steven C. Hackett  
Professor of Economics  
Humboldt State University  
Arcata, CA 95521  
707.826.3237  
fishecon@humboldt.edu

**First we'd like to know about your participation in California's commercial fisheries.**

1. How many years have you been in the CA commercial fishing industry? \_\_\_\_\_
2. Did you fish commercially in 2006?    Yes        No        (Circle one)
3. If you didn't fish in 2006, what was the last year you fished commercially? \_\_\_\_\_
4. If you own or lease a vessel, what is your primary vessel's length? \_\_\_\_\_ feet
5. What year was your primary vessel's hull built or replaced? \_\_\_\_\_
6. What is the homeport for your vessel? \_\_\_\_\_
7. At what port did you land most of your catch (by weight) in 2006?  
\_\_\_\_\_
8. At what other ports did you land your catch in 2006? \_\_\_\_\_  
\_\_\_\_\_

**Now we would like to know about your yearly fishing expenditures.**

9. Please tell us how much you spent in the following vessel-related cost categories in **2006**. If you haven't kept records for all this information, please provide your best estimates. Please limit yourself to expenditures that you made **in California**.

Vessel Related Expenditures	2006 Expenditures Made in California	
	Repairs and Maintenance	Replacement, Supplies, and Purchases
HULL	\$	\$
ENGINE	\$	\$
ELECTRONIC GEAR	\$	\$
OTHER GEAR - including fishing, safety equipment, live holding tanks	\$	\$
Other: (specify _____)	\$	\$

10. Continued from previous page. Please tell us how much you spent in the following vessel-related categories in **2006**. If you haven't kept records for all this information, please provide us with your best estimates.

Vessel Related Expenditures	2006 Expenditures	
	Spent in CA	Spent Outside CA
Boat slip/moorage in home port	\$	\$
Boat slip/moorage in other ports	\$	\$
Fuel and Lube	\$	\$
Storage for vessel/gear	\$	\$
Insurance	\$	\$
Boat registration	\$	\$
Interest	\$	\$
Depreciation	\$	\$

11. Please tell us what you spent in the following fishing-related categories in **2006**. If you haven't kept records for all this information, please provide us with your best estimates.

Fishing Related Expenditures	2006 Expenditures	
	Spent in CA	Spent outside CA
Permit lease or purchase	\$	\$
Membership (association) fees	\$	\$
Harbor fees (ex: hoist)	\$	\$
Federal taxes	\$	\$
State and Local taxes	\$	\$
Landing taxes from direct to consumer sales	\$	\$
Commodity Board Assessments	\$	\$
Transportation related to fishing (truck and auto)	\$	\$
Bait	\$	\$
Ice	\$	\$
Food	\$	\$
**Crew wages/ shares/ compensation	\$ / %	\$ / %

\*\* Please indicate dollars or percent of landings

12. Please tell us about your activity in the fisheries in which **you participated** in 2006. If you haven't kept records for all this information, then please provide us with your best estimates. (H&L = Hook and Line).

Fishery and Gear Type Group	Average Expenditure per Trip (fuel, bait, harbor fees...)	Typical Number of Days per Trip	Total Fishing Revenue in 2006	Percentage of 2006 Catch Landed LIVE	Percentage of 2006 Catch Sold :			
					Directly to CA Consumer	Directly to CA Restaurant	To CA Processor or Other Buyer	Outside CA
Albacore - H&L, Troll	\$		\$	%	%	%	%	%
Calif. Halibut – H&L, Gillnet	\$		\$	%	%	%	%	%
Calif. Halibut - Trawl	\$		\$	%	%	%	%	%
Coastal Pelagic Species (sardine, anchovy, mackerel, <b>NOT</b> squid)	\$		\$	%	%	%	%	%
Crab (rock, sheep) & Lobster	\$		\$	%	%	%	%	%
Dungeness Crab	\$		\$	%	%	%	%	%
Groundfish - Gillnet	\$		\$	%	%	%	%	%
Groundfish - H&L, Longline	\$		\$	%	%	%	%	%
Groundfish - Trap	\$		\$	%	%	%	%	%
Groundfish - Trawl	\$		\$	%	%	%	%	%
Herring	\$		\$	%	%	%	%	%
Nearshore - H&L	\$		\$	%	%	%	%	%
Nearshore – Trap	\$		\$	%	%	%	%	%

12. Continued from previous page. Please tell us about your activity in the fisheries in which **you participated** in 2006. If you haven't kept records for all this information, then please provide us with your best estimates. (H&L = Hook and Line).

Fishery and Gear Type Group	Average Expenditure per Trip (fuel, bait, harbor fees...)	Typical Number of Days per Trip	Total Fishing Revenue in 2006	Percentage of 2006 Catch Landed LIVE	Percentage of 2006 Catch Sold :			
					Directly to CA Consumer	Directly to CA Restaurant	To CA Processor or Other Buyer	Outside CA
Salmon - H&L, Troll	\$		\$	%	%	%	%	%
Shark & Swordfish - Gillnet	\$		\$	%	%	%	%	%
Shark & Swordfish - H&L, Trawl, Dive	\$		\$	%	%	%	%	%
Shrimp & Prawn - Trawl, Net	\$		\$	%	%	%	%	%
Squid - All Gear	\$		\$	%	%	%	%	%
Tuna - H&L, Longline, Jig	\$		\$	%	%	%	%	%
Tuna - Seine	\$		\$	%	%	%	%	%
Urchin	\$		\$	%	%	%	%	%
Other: _____	\$		\$	%	%	%	%	%
Other: _____	\$		\$	%	%	%	%	%
Other: _____	\$		\$	%	%	%	%	%

13. For many fishermen, 2006 was an unusual fishing year due to area closures, season restrictions, and changing market conditions.

How would you rate the 2006 fishing year compared to a typical year? (Circle One)

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
WORST	WORSE THAN NORMAL	NORMAL	BETTER THAN NORMAL	BEST

14. Do you have any other comments?

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I thank you for your time for completing this questionnaire. Your answers will be kept anonymous. Please return in the enclosed pre-addressed and postage paid envelope.

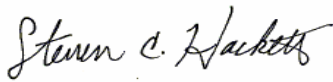
Cover art credit: Alexandra Hackett, 2007

## REMINDER POST CARD

Dear California Commercial Fisherman,

About a week and a half ago, you should have received a survey booklet from me. The survey is part of an economic contribution study for all active California commercial fishermen.

If you haven't already sent in your survey, this is a friendly reminder that your response is important to the study. Please remember that this study will be a useful tool explaining how commercial fishermen contribute to the California economy.

A handwritten signature in cursive script that reads "Steven C. Hackett".

Steven C. Hackett  
Professor of Economics  
Humboldt State University



COVER LETTER FOR SECOND SURVEY MAILING



**HUMBOLDT STATE UNIVERSITY**

September 22, 2007

Dear California Commercial Fisherman,

In late August I sent you an economic survey. I haven't received a completed survey from you, so I am sending you this replacement.

This survey is part of an economic study for all active California commercial fishermen. This is a one-time opportunity for commercial fishing industry participants, like you, to document the critical contribution that California's commercial fisheries make to our State's economy. Your operation cost information from commercial fishing will help us to preserve one of California's legacy industries and safeguard the communities and businesses that depend upon it.

The PCFFA, the California Wetfish Producers Association, and the California Sea Urchin Commission have endorsed this survey. These organizations recognize the importance of identifying the economic contribution of California's commercial fishing industry.

**How can this information be used to help preserve California's commercial fishing legacy?**

- To clearly show the economic importance of commercial fisheries to coastal counties and the state overall.
- To estimate the negative economic impacts due to any future regulations that might reduce fishing activity.
- To show how commercial fishing expenditures and revenues ripple through the economy as they provide additional jobs and income.
- To accurately describe the distinctive economic characteristics of California's commercial fisheries, which in many cases are unlike those of other states on the west coast.

Thank you,

Steven C. Hackett  
Professor of Economics  
Humboldt State University

**PCFFA COVER LETTER FOR SECOND SURVEY MAILING**

Chuck Wise

*President*

David Bitts

*Vice-President*

Larry Miyamura

*Secretary*

**PACIFIC COAST FEDERATION  
of FISHERMEN'S ASSOCIATIONS**



W.F. "Zeke" Grader, Jr.

*Executive Director*

Glen H. Spain

*Northwest Regional Director*

Mitch Farro

*Fishery Enhancement Director*

<http://www.pcffa.org>

September 3, 2007

Dear Friend,

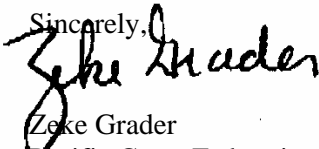
We all know how important California's fisheries are to us and we know that they affect the well being of countless others around the State. Over 25 years ago California fishermen participated an economic study describing how income, jobs, taxes, and wealth were generated throughout California by fishing activities. The information gathered from that study has helped us to lobby and for the protection of our fish resources, and protect our industry against needless interference. However, the time has come to revise that study.

The Pacific Coast Federation of Fishermen's Associations (PCFFA) and other fishery-related trade organizations are supporting Humboldt State University (HSU) on the revision of the past study to update data involving economic activity generated by our fishing activities. PCFFA is assisting HSU by encouraging members of our industry to answer the survey questions as best they can and then return the questionnaire **promptly** in the enclosed self-addressed envelope.

HSU researchers do not need to know your name or the name of your vessel. All your responses will be averaged in groups before they are used. All questionnaires will be mailed back anonymously to insure the confidentiality of your identity.

We realize that some of your valuable time will be required to answer these questions; however, without this study we can only use insufficient and out-dated information to show Federal, State, and local governments that policies affecting us have impacts throughout the California economy. By promptly returning the enclosed questionnaire, you will contribute essential data for accomplishing this purpose.

Your individual response will never be known, but your cooperation will be appreciated and will help us all in many ways.

Sincerely,  
  
Zeke Grader  
Pacific Coast Federation of  
Fishermen's Associations

## **APPENDIX 2: DESCRIPTION OF SURVEY DESIGN AND DATA METHODOLOGY**

### **PRE-SURVEY OUTREACH**

Hackett and Hansen began by developing a list of key informants (prominent commercial fishermen, leaders of commercial fishing organizations, and harbor representatives) spanning the state's commercial fisheries. This list began with fishermen and fishing organization leaders involved with prior research on the Dungeness crab (Hackett), salmon (Hansen), and sea urchin (Hansen) fisheries in California. Additional assistance from California Sea Grant marine advisors Christopher Dewees, John Richards, and Carrie Culver provided more key informants from a more diverse set of fisheries and home port locations. From this starting point, and utilizing additional snowball interview methods, Hackett and Hansen developed a contact list of approximately 50 key informants from Crescent City to San Diego.

Hackett then met with key informants in Eureka, San Francisco, Morro Bay, Santa Barbara, and Ventura in late June and early July 2007 to discuss the project, to identify economic issues of concern to them, to gain their input, trust, and cooperation, and to spread the word about the project and the upcoming survey. Research assistant Carmen King engaged in additional face-to-face key informant interviews in San Diego and Fort Bragg. Hackett and associates also engaged in key informant interviews via telephone with prominent commercial fishermen, fishing organization leaders, and harbor representatives in Crescent City, Sacramento, Monterey, and Ventura.

Hackett (with assistance from Hansen) also gained survey endorsements from three major commercial fishing organizations: The Pacific Coast Federation of Fishermen's Associations, the California Sea Urchin Commission, and the California Wetfish Producer's Association. These groups, along with the California Lobster and Trap Fisherman's Association, published an outreach and pre-survey informational article in their respective newsletters. Craig Fusaro of California Trout and the Joint Oil Fisheries Liaison Office in Santa Barbara also sent out outreach and pre-survey information to his mailing list of approximately 245 commercial fishermen in late July 2007.

Outreach and pre-survey information letters were sent to all California commercial fishermen who made landings in 2006. These letters were sent out from Humboldt State University on 07 August 2007. Hackett and associates began fielding telephone calls from fishermen who had received outreach and pre-survey information and who had questions, comments, or concerns to share with the research team. These fishermen phone calls started on 15 August 2007 and continued throughout most of the fall 2007 survey period. Many salmon fishermen expressed concerns about the survey covering the poor salmon fishing season in 2006. Other fisheries, such as Dungeness crab, had a strong year in 2006.

### **SURVEY DESIGN, PEER REVIEW, AND PRE-TESTING**

Hackett and associates spent much of the summer of 2007 designing the survey instrument. A draft survey questionnaire was sent to Dr. Christopher Dewees for peer review. CDFG project manager Terry Tillman and COFHE model developer Dr. Dennis King also reviewed the questionnaire and provided feedback. The resulting revised draft survey questionnaire was pre-tested with the cooperation of 14 prominent commercial fishermen, spanning the state's major commercial fisheries.

Comments from the pre-testing process were used to develop the final survey instrument. Alexandra Hackett volunteered to produce cover art for the questionnaire that reflected the diversity of commercial fisheries in California.

## **SURVEY MAILOUT AND APPLICATION OF TOTAL RESEARCH DESIGN METHOD**

Hackett and associates contracted with the UC-Davis Sea Grant office to print, code, address, and mail out survey questionnaires to California commercial fishermen. The survey was mailed out from UC Davis on 20 August 2007. The survey was sent to all commercial fishermen who had made landings in 2006, according to landing receipts from CDFG. This included a small number of out-of-state commercial fishermen, such as those from Oregon or Washington, who landed fish in California in 2006. All together, 1,948 surveys were sent out.

Hackett and associates utilized the total research design method developed by Dillman (1978). This process began with mailing reminder postcards. Reminder postcards were sent from UC Davis on 29 August 2007. A second set of survey questionnaires were mailed out from UC Davis on 26 September 2007 to commercial fishermen who had not yet returned a completed questionnaire. Both Hackett and Zeke Grader (Executive Director of the PCFFA) provided separate cover letters encouraging fishermen who had not responded to the first wave of surveys to participate in the survey. Fishermen were deleted from the master list when surveys or postcards were returned with a postal statement indicating that the address was undeliverable, when letters were received explaining that the intended survey respondent had died, and when specifically requested by fishermen to be taken off the mailing address list.

Hackett and associates received 266 surveys from the initial mailing, and 144 surveys from the second survey mailing. Six unusable surveys were received (surveys sent back blank or with unusable information given). Six surveys were undeliverable due to incorrect mailing addresses. Letters were received indicating that two fishermen active in 2006 had subsequently died. December 1<sup>st</sup> was the cut-off date for receiving surveys. Five duplicate surveys were received (where fishermen sent in both the first and the second mailing of survey questionnaires). These duplicate surveys were removed.

Overall, Hackett and associates received 405 usable surveys, representing a **20.81** percent response rate (405/1946).

## **SURVEY TABULATION**

Survey questionnaire data were tabulated in a Microsoft Access database format designed by Hansen. Research Assistant Carmen King performed all data tabulation. Hansen developed appropriate data tabulation protocols and a code book to support the tabulation process. Hansen performed a random check of 30 percent of the tabulated results against the paper survey data. From thousands of individual datum that were tabulated, only four data point tabulation errors were encountered in the random check process, generally indicating high quality tabulation.

## **GROUND TRUTHING THE TABULATED DATA**

Summary data sheets were developed for the purpose of “ground-truthing” or validating the tabulated survey data. The summary information included both the (anonymous) observed range of responses, as well as the average response, for the various survey cost categories (and other survey questions) by major fishery and vessel size class. Thirteen cooperating commercial fishermen spanning the major fisheries in California agreed to review these summary data for ground-truthing purposes. These summary data were calculated for three vessel size classes (<26’, 26’ to 36’, and >36’) by major fishery category. Fisheries that fishermen voluntarily validated data for includes crab/lobster, nearshore fisheries, sea urchin, groundfish, squid, coastal pelagic species (CPS), Dungeness crab, salmon, and albacore.

The ground-truthing exercise was generally successful. The volunteer commercial fishermen reviewing the data indicated that the summary data presented to them was realistic. Groundfish fishermen determined that some fishermen who stated they were groundfish fishermen were in fact halibut fishermen. Thus the halibut fishermen were re-categorized into one of the halibut fisheries (hook and line/gillnet or trawl). CPS fishermen also identified smaller vessel owners who erroneously reported their fishing activity in the CPS category. These smaller vessels were re-categorized into a different fishery. Groundfish trawl, CPS, and squid fishermen suggested we develop additional vessel size categories for larger sizes, but CDFG project director Terry Tillman determined that this was not necessary. Ground-truthing also helped the team identify a small number of questionable survey responses. This information was then used to either confirm survey results or to identify unusual responses that may require adjustment, as described below.

## **ADJUSTMENTS TO SURVEY DATA**

Following the ground-truthing exercise, the data were combed through to look for any other questionable responses. Data outliers were deleted if no supporting information was provided, modified if a mean value could be applied from survey responses of fishermen of similar characteristics, or were retained if other information provided on the questionnaire (or from CDFG license or landings receipt data) appeared to support the outlier value. Erroneous slip fees were corrected by cross referencing vessel ID home port location (from CDFG records) and vessel size to similar survey responses. All told, about 5 percent of the returned surveys had one or more responses changed because of clearly erroneous data.

Data on each fisherman’s total number of commercial fishing trips (landings) in 2006 were derived by sorting the CDFG 2006 landings receipt database for each individual fisherman’s serial number.

Respondents generally reported crew compensation equal to a percentage of ex-vessel revenue. This crew share was converted into a “crew wage” by multiplying the reported crew share by the vessel’s 2006 ex-vessel revenue.

## **EX-VESSEL REVENUE**

Ex-vessel revenue reported on the survey was compared to revenue from the 2006 CDFG landings receipt (“fish ticket”) database. When Hansen compared reported revenue from the surveys to the disaggregated fish ticket data from the CDFG database, the results showed that reported survey revenue had a number of significant problems. The majority of respondents over-estimated revenue by a large margin. Many stated they made landings in fisheries for which there were no corresponding fish tickets. Other respondents

omitted revenue from fisheries for which the CDFG 2006 fish ticket database indicated they had in fact fished. A hypothesis test (mean = 0) was run to see if the mean difference between stated revenue and fish ticket revenue was statistically significant, and the null hypothesis failed using a normal distribution and t-test at the 5 percent significance level. Therefore Hackett and associates decided to instead utilize ex-vessel revenue from the CDFG landings receipt database. One exception was fishermen who stated they obtained revenue outside California; their reported “outside of California” ex-vessel revenue data was retained for that fishery type. Data relating to trip costs, days per trip, and proportion of catch sold were also left alone for all fishermen.

## **UNIT AND ITEM NON-RESPONSE ESTIMATES**

The disaggregated survey data were then merged with license and landings receipt datasets provided by CDFG. These additional data provided observations on all active fishermen, and could thus be used to infer both unit and item non-responses. Mean values (calculated by observable characteristic) were used in some cases, while regression models were used to estimate some fixed and variable costs for unit and item non-respondents based on the merged dataset. By combining the survey respondent cost data with the cost estimates addressing unit and item non-responses, and with CDFG’s ex-vessel revenue dataset, a complete dataset was created that represents estimated costs and revenues for all 1,946 California commercial fishermen active in the 2006 commercial fishing season.

## **ESTIMATES USED FOR ITEM NON-RESPONSES**

The following methods were used to estimate item non-responses (i.e., blanks) on respondent surveys:

- Years in the California commercial fishing industry – blanks were left blank.
- Did you fish commercially in 2006 – blanks were left blank.
- If you didn’t fish in 2006, what was the last year you fished commercially? – blanks were left blank.
- Vessel length – blank entries were replaced with data for that vessel from the CDFG license and vessel permit database.
- Year hull built or replaced – blanks left blank.
- Home port – blank entries were replaced with data for that fisherman from the CDFG license and vessel permit database.
- Port where most landings occurred – blanks left blank (landings port data in subsequent analysis were accessed from the CDFG landings receipt database).
- Other landing ports – blanks left blank (landings port data in subsequent analysis were accessed from the CDFG landings receipt database).
- Vessel related fixed-cost expenditures (hull, engine, electronic gear, other gear) – blanks treated as zeros.
- Vessel related variable cost expenditures:
  - Home port slip fees – Estimated as a mean of slip fees by vessel length reported on other surveys (also done for unit non-responses).
  - Slip fees at other ports – blanks treated as zeros.
  - Fuel and lube – regression estimate (see unit non-response description below).
  - Storage of vessel/gear – estimated as a mean value of reported storage costs.

- Insurance – regression estimate (see unit non-response description below).
- Boat registration fees – blanks were estimated from CDFG fees - \$35 for each salmon vessel, \$2,300 for each squid vessel, and \$267 for all other commercial vessels
- Interest – blanks treated as zeros.
- Depreciation – blanks treated as zeros (since depreciation isn't an explicit cost, it was not used in subsequent analysis).
- Fishing related expenditures:
  - Permit lease or purchase – estimated by applying CDFG fees, based on the fisheries in which each survey respondent participated.
  - Membership (association) fees – regression estimate (see unit non-response description below).
  - Harbor fees – regression estimate (see unit non-response description below).
  - Federal taxes – regression estimate (see unit non-response description below).
  - State taxes – regression estimate (see unit non-response description below).
  - Landing taxes from direct-to-consumer sales – applied CDFG tax rates to type of fish landed and pounds landed (also applied to unit non-responses).
  - Salmon and sea urchin commodity board assessments – non-responses were replaced with estimates equal to \$0.005 per pound of sea urchins landed, and \$0.02 per pound (round weight) of salmon landed (also applied to unit non-responses).
  - Transportation related to fishing – regression estimate (see unit non-response description below).
  - Bait – regression estimate (see unit non-response description below).
  - Ice – regression estimate (see unit non-response description below).
  - Food – regression estimate (see unit non-response description below).
  - Crew wage / shares – regression estimate (see unit non-response description below).
- Average expenditure per trip – blanks left blank.
- Typical number of days per trip – blanks left blank.
- Total fishing revenue in 2006 – as previously noted, all ex-vessel revenue figures were derived from CDFG landings receipt dataset.
- Percentage of 2006 catch landed live – blanks left blank.
- Percentage of 2006 catch sold direct to California consumer – blanks left blank.
- Percentage of 2006 catch sold directly to California restaurant – blanks left blank.
- Percentage of 2006 catch sold to California processor or other buyer – blanks left blank.
- Percentage of 2006 catch sold outside California – blanks left blank.
- Likert scale rating of 2006 fishing year – blanks left blank
- Commercial California license fee – estimated by CDFG fee rate. This was omitted from the original survey.
- For all questions: Costs outside of California – blanks treated as zeros.

## ESTIMATES USED FOR UNIT NON-RESPONSES

The following methods were used to estimate unit non-responses (fishermen who did not respond to the survey):

- Vessel length – Gathered from CDFG license and vessel permit database.
- Year hull built or replaced – not estimated.
- Home port – Gathered from CDFG license and vessel permit database.
- Port where most landings occurred – not estimated (landings port data in subsequent analysis were accessed from the CDFG landings receipt database).
- Other landing ports – Gathered from CDFG landings receipt database.
- Vessel related fixed-cost expenditures (hull, engine, electronic gear, other gear) – means by vessel size category from survey data (see Table A1 below).
- Vessel related variable cost expenditures:
  - Home port slip fees – Estimated mean value by vessel length reported on surveys (see Table A2).
  - Slip fees at other ports – not estimated
  - Fuel and lube – regression estimate (see Table A4 for regression model below).
  - Storage of vessel/gear – mean value from survey applied to unit non-respondents (see Table A2 below). Non vessel owners had a storage cost of zero.
  - Insurance – regression estimate (see Table A4 for regression model below).
  - Boat registration fees – derived from CDFG fees - \$35 for each salmon vessel, \$2,300 for each squid vessel, and \$267 for all other commercial vessels
  - Interest – estimated as mean by vessel size category by vessel age from survey responses (see Table A2 below).
  - Depreciation – estimated as mean by vessel size category by vessel age from survey responses (see Table A2) (since depreciation isn't an explicit cost, it was not used in subsequent analysis).
- Fishing related expenditures:
  - Permit lease or purchase – estimated by applying CDFG fees, based on the fisheries in which each survey respondent participated.
  - Membership (association) fees – regression estimate (see Table A4 for regression model below).
  - Harbor fees – regression estimate (see Table A4 for regression model below).
  - Federal taxes – regression estimate (see Table A4 for regression model below).
  - State taxes – regression estimate (see Table A4 for regression model below).
  - Landing taxes from direct-to-consumer sales – applied CDFG tax rates to type of fish landed and pounds landed.
  - Salmon and sea urchin commodity board assessments – estimates equal to \$0.005 per pound of sea urchins landed, and \$0.02 per pound (round weight) of salmon landed.
  - Transportation related to fishing – regression estimate (see Table A4 for regression model below).
  - Bait – regression estimate (see Table A4 for regression model below).
  - Ice – regression estimate (see Table A4 for regression model below).



- Food – regression estimate (see Table A4 for regression model below).
- Crew wage / shares – regression estimate (see Table A4 for regression model below).
- Average expenditure per trip – not estimated
- Typical number of days per trip – not estimated.
- Total fishing revenue in 2006 – as previously noted, all ex-vessel revenue figures were derived from CDFG landings receipt dataset.
- Percentage of 2006 catch landed live – not estimated.
- Percentage of 2006 catch sold direct to California consumer – not estimated
- Percentage of 2006 catch sold directly to California restaurant – not estimated.
- Percentage of 2006 catch sold to California processor or other buyer – not estimated.
- Percentage of 2006 catch sold outside California – not estimated.
- Likert scale rating of 2006 fishing year – not estimated.
- Commercial California license fee – estimated by CDFG fee rate. Not in original survey. Added later.
- For all questions: Costs outside of California – not estimated

Table A1 provides the dollar values that were applied as estimates for unit non-responses.

**Table A1: Elective Maintenance Estimated Average Values for Unit Non=Responses**

Vessel Size Class (ft)	Hull Repair (\$)	Hull Purchase (\$)	Engine Repair (\$)	Engine Purchase (\$)	Elect Gear Repair (\$)	Elect Gear Purchase (\$)	Other Gear Repair (\$)	Other Gear Purchase (\$)
0	0	0	0	0	0	0	455	80
< 26	584.46	478.47	1137.19	1,410.81	206.44	431.97	1,277.44	853.84
26-36	2,268.68	962.34	2,151.83	3,649.86	615.25	743.01	2,183.35	2,869.95
37-50	4,356.99	932.65	1,877.68	714.88	1,658.59	1,096.25	4,239.54	4,583.18
> 50	12,424.42	2,110.323	3,737.16	1,819.36	2,080.29	513.00	3,116.85	6,972.97

Home port slip, storage, depreciation, and interest were estimated using average values according to vessel size from the survey data. Storage costs were determined for all vessel owners. Non vessel owners had a zero storage cost. Average cost values used for unit non-response estimation purposes are given below in Table A2. Depreciation data was requested in the survey instrument and was estimated for item and unit non-responses. Depreciation is a reduction in value of an asset, and thus is defined as an implicit cost. Since depreciation is not an explicit dollar expenditure, it was not utilized in subsequent analysis.

**Table A2: Estimated Average Cost Values for Slip, Storage, Depreciation, and Interest Costs by Vessel Length**

Vessel Length (ft)	Slip costs (\$)	Storage (\$)	Depreciation (\$)	Vessel Length (ft)	Interest (\$)
0 to 15	388	706	279	0 to 15	122
16 to 19	998	706	279	16 to 19	122
20 to 29	1,588	706	1,167	20 to 29	363
30 to 39	2,582	706	2,912	30 to 39	3,000
40 to 49	2,899	706	5,339	40 to 49	3,046
50 and up	2,988	706	20,457	50 to 59	7,371
				60 to 69	3,558
				70 and up	9,292

### Estimating CDFG fees

As noted earlier, boat registration, permit, and commercial license fees were all applied to fishermen according to landing records from the 2006 CDFG landings receipt database. Multiple vessel owners were assessed multiple boat registration fees. Non-vessel owners (according to CDFG boat registration records) had no boat registration fees applied to them. Species landed and gear used determined what permits fees fishermen accrued. Crew permits or boat operator fees were not assessed since this information cannot be gleaned from the landings records.

### Regressions

Regression models were used to estimate unit non-responses for 10 cost categories. The mail survey data set provided the basis for the regression estimates. The regression models were estimated using SPSS version 15. All models utilized a semilog structure in which the natural logarithm of the dependent variable was regressed on linear or quadratic forms of the independent variables. Item nonresponses in the dependent variables were coded as missing for cost categories where fishermen were unlikely to have incurred zero costs, and were otherwise coded as zeros. The natural logarithmic transformation of the dependent variable ultimately removed those observations with zero costs.

Heteroskedasticity and multicollinearity were tested for in each model. When models could not be adjusted to resolve heteroskedasticity, in some cases noted below, some outlier observations had to be removed from the model estimation process.

The following 10 cost categories were estimated using regressions models (removal of outliers is also noted):

- Bait
- Crew Wage – 6 outlier observations removed in order to resolve heteroskedasticity.
- Food
- Fuel and lube – 3 outlier observations removed in order to resolve heteroskedasticity.

- Harbor Fees
- Ice
- Insurance
- Transportation costs – 3 outlier observations removed in order to resolve heteroskedasticity.
- Federal Taxes
- State Taxes
- Membership Fees.

Table A3 lists and describes the variables used in the 10 regression models. Table A4 provides adjusted  $R^2$ , F- statistics, total degrees of freedom, coefficients, and T- statistics for each model.

**Table A3: Regression Variable Descriptions**

<b>Variable</b>	<b>Description</b>	<b>Variable</b>	<b>Description</b>
Constant	Constant	TF1	Type Fishery - Albacore
VL	Vessel Length (ft.)	TF2	Type Fishery - CA Halibut Hook & Line, Gillnet
VL <sup>2</sup>	Vessel Length (ft.) squared	TF3	Type Fishery - CA Halibut - Trawl
NT	Number of Trips	TF4	Type Fishery - CPS
NT <sup>2</sup>	Number of Trips squared	TF5	Type Fishery - Crab & Lobster
TR	Fisherman's Total Revenue	TF6	Type Fishery - Dungeness Crab
TR <sup>2</sup>	Fisherman's Total Revenue Squared	TF7	Type Fishery - Groundfish - Gillnet
HP2	Home port - Eureka/ Trinidad	TF8	Type Fishery - Groundfish - Hook & Line, Longline
HP5	Home port - Bodega Bay/Tomales Bay	TF10	Type Fishery - Groundfish - Trawl
HP6	Home port - San Francisco Bay Area	TF11	Type Fishery - Herring - Gillnet
HP8	Home port - Santa Cruz	TF12	Type Fishery - Nearshore - Hook & Line
HP9	Home port - Moss Landing	TF13	Type Fishery - Nearshore - Trap
HP10	Home port - Monterey	TF14	Type Fishery - Salmon
HP11	Home port - Morro Bay/Avila/Port San Luis	TF16	Type Fishery - Shark & Swordfish—Hook & Line, Harpoon/Spear, Trawl
HP14	Home port - Ventura	TF17	Type Fishery - Shrimp & Prawn - Trawl, Net
HP15	Home port - Oxnard/Port Hueneme	TF18	Type Fishery - Squid
HP16	Home port - San Pedro/LA/Fish Harbor/ Terminal Is.	TF19	Type Fishery - Tuna - Hook & Line, Longline, Jig
HP20	Home port - Oregon	TF21	Type Fishery - Sea Urchin
		TF24	Type Fishery - Prawn - Trap
		TF25	Type Fishery - Sea Cucumber
		TF26	Type Fishery - Shad
		TF27	Type Fishery - Smelt
		TF30	Type Fishery - Other Invertebrates

**Table A4: Regression Models for Cost Estimates**

Model	ln (Bait)	ln (Crew Wage)	ln (Food)	ln (Fuel)	ln (Harbor Fees)	ln (Ice)	ln (Insurance)	ln (Transportation)	ln (Fed Tax)	ln (State Tax)	ln (Member Fees)
<b>Adj. R<sup>2</sup></b>	0.609	0.617	0.359	0.431	0.162	0.391	0.464	0.262	0.350	0.301	0.192
<b>F-Stat.</b>	36.302	30.682	29.657	29.425	8.156	11.870	23.655	12.250	36.771	37.623	8.094
<b>df</b>	227	166	256	338	111	169	182	254	133	170	209
<b>Variable</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>	<b>Coeff. (t-stat)</b>
Constant	3.821 (8.11)	8.242 (65.95)	5.088 (27.85)	5.775 (32.17)	5.715 (42.57)	4.124 (16.36)	5.847 (25.27)	6.251 (30.06)	7.121 (47.67)	5.410 (37.09)	4.767 (45.77)
VL	0.097 (4.01)		0.046 (10.14)	0.056 (12.04)		0.042 (5.59)	0.057 (9.74)	0.028 (4.926)			
VL <sup>2</sup>	-0.001 (-2.18)										
NT	0.034 (0.79)		0.009 (5.60)	0.011 (7.80)				0.007 (4.59)			
NT <sup>2</sup>	0.001 (-6.485)										
TR		6.96E-006 (10.36)							1.31E-005 (7.14)	1.34E-005 (6.83)	
TR <sup>2</sup>									-1.2E-011 (-4.09)	-1.2E-011 (-3.56)	
HP2	0.720 (2.55)					-0.947 (2.02)					
HP5		-1.187 (-4.2)		-0.312 (-2.12)							
HP6							-0.593 (-2.46)				
HP8		-1.864 (-3.78)				-0.588 (-1.84)					
HP9		-1.106 (-1.90)									
HP10		-2.850 (-2.64)						-0.963 (-2.52)			

Variable	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)
HP11							-0.803 (-2.99)				
HP14			1.288 (3.06)								
HP15				-1.290 (-1.86)				-1.612 (-2.20)			
HP16							-0.867 (-2.42)				
HP20								-1.289 (-1.83)			
TF1											0.705 (2.51)
TF2	-0.373 (-1.87)										
TF3			-1.791 (-2.94)	-0.908 (-1.89)							
TF4					2.801 (2.72)			1.054 (2.36)			2.153 (4.35)
TF5	0.873 (3.97)										
TF6	0.381 (2.27)	0.923 (4.92)				-0.360 (-2.18)	0.301 (1.65)				0.563 (2.86)
TF7						1.442 (2.20)					
TF8				0.288 (2.10)							
TF10		2.061 (3.08)		0.804 (1.88)		1.869 (3.28)					
TF11								-7.23 (-1.75)			
TF12											-1.218 (-3.61)

Variable	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)
TF13											2.031 (4.53)
TF14	-0.796 (-5.40)										
TF16											
TF17											
TF18		-9.03 (-1.77)									
TF19											1.235 (2.15)
TF21	-1.557 (-4.00)								0.538 (2.71)		
TF24		1.141 (2.22)									
TF25			0.997 (2.25)	0.823 (2.20)							
TF26				-2.640 (-2.76)							
TF27					3.496 (2.52)						1.866 (2.17)
TF30					1.571 (2.38)	1.231 (2.28)					

### **Miscellaneous notes on regression costs estimates**

Fishermen who owned multiple vessels had costs estimated for each vessel. Some fishermen (referred to as “unclassified”) did not make landings in vessels that they either owned or that were “business owned” (based on CDFG vessel registration records). These unclassified cases represent fishermen who shared, borrowed, or perhaps leased the use of vessels owned by others. Unclassified fishermen without a vessel ID did not have crew wages, insurance, and harbor fee cost estimates assigned to them. Where relevant, all fishermen had bait, ice, food, fuel (some non-vessel owners reported they spent money on boat fuel), transportation, federal taxes, state taxes, and membership fee cost estimates assigned to them. Out of the 696 non-respondent vessel owners in the CDFG database, 67 owned multiple vessels.

Some regression models did not perform well for the small number of very large vessels (>80 ft.) in the California commercial fishing fleet, or for the small number of California fishermen who made over 120 trips in 2006. Thus separate bait, ice, and crew wage estimates were made for very large vessels and/or fishermen with a very high number of trips. These estimates were made by applying the mean of the regression estimates for vessels of nearly the same size or number of trips in instances where the regression models worked satisfactorily.

We found that the regression for crew wages overestimated values for very large vessels (> 70 feet) and/or fishermen who had very high annual revenues (> \$450,000). Three fishermen had crew wages estimates exceeding \$1 million. For these instances we calculated the average crew share for fishermen who had revenues greater than \$500,000 and determined that they paid their crew an average of 41 percent of total revenue. Then this average crew share was applied to the revenue received by the three fishermen in question to estimate their crew wages.

### **OPERATIONAL CONFIGURATIONS**

For the final report and IMPLAN analysis, the vessel configurations and target species groups landed are categorized into “operational configurations” (OCs). These OCs were developed in close cooperation with CDFG project director Terry Tillman, and are listed below:

- CPS Seine (includes smelt fishermen with appropriate gear and squid fishermen)
- Dungeness Crab - medium and large vessels
- Dungeness Crab - small vessel
- Harpoon/Spear
- Herring Gillnet
- Hook & Line
- Hook & Line Live
- Lobster & Crab
- Longline
- Nearshore and Groundfish Trap (covers live)
- Prawn Trap (covers live)
- Other Gillnet (set and drift)
- Salmon
- Salmon & Albacore
- Salmon & Dungeness Crab - small vessel
- Salmon & Dungeness Crab - medium and large vessels
- Sea Urchin (includes sea cucumber)



Trawl - Northern California  
Trawl - Southern California  
Tuna/Other Seine  
Unknown

Some cases required additional consideration:

- Trawl fishermen with home ports south of Santa Barbara who made a majority of landings (by pounds landed) north of Santa Barbara were classified in the “Northern California” trawler OC.
- Fishermen who targeted albacore, salmon, and Dungeness crab had their albacore landings categorized in the “Albacore & Salmon” OC, and their salmon and Dungeness crab landings in the “Salmon & Dungeness” OC.

## **FIXED AND VARIABLE COSTS**

In consultation with CDFG project director Terry Tillman we determined which costs were categorized as fixed costs, and which as variable costs. Fixed costs include slip fees, other California slip fees, storage fees, interest, vessel registration fees, permit fees, federal and state taxes, insurance, hull purchases and repairs, engine purchases and repairs, electrical purchases and repairs, and gear purchases and repairs. Variable costs include bait, food, fuel, ice, transportation related to fishing, harbor fees, crew wages, and 2006 landing taxes.

### **Proportioning Fishermen’s Costs by County and OC**

After each category of cost was estimated (or tabulated from the survey) for each fisherman, these cost totals by category for each fisherman were then aggregated by OC. In the majority (67%) of cases, fishermen only participate in one OC, in which case their costs are simply aggregated into that OC. In the minority of cases where fishermen participate in more than one OC, the aggregation process worked as follows. If, for example, a fisherman made 40 percent of his total 2006 fishing trips in OC 1, and 60 percent of his fishing trips in OC 2, then the estimated totals for each cost category for this fisherman were allocated 40 percent to OC 1 and 60 percent to OC 2. Moreover, costs were further aggregated by county in order to facilitate spatial economic impact modeling and assessment. In particular, fixed costs were attributed to a fisherman’s home port county, and variable costs were assigned to a fisherman’s landing port county.

The method of cost estimation and aggregation by OC implies a small amount of cost blending across OCs, due to the minority of cases (33%) of fishermen who participate in more than one OC. Blending raises some issues for some potentially large cost categories, such as bait and ice, which are not incurred in all OCs. Bait and ice costs are tabulated from (survey respondents) or estimated for (non-respondents) a fisherman due to their activity in an OC in which these fishing inputs are used. But for the minority of cases in which that fisherman also participates in an OC where bait and ice are not used, nevertheless a share of his bait and ice costs are allocated to that OC where they are not used. The OCs that do not require bait include CPS, Gillnet, Harpoon/Spear, Herring, Sea Urchin, Tuna/Other Seiner, and Trawlers. Likewise ice is not used in the Dungeness Crab, Lobster & Crab, and Sea Urchin OCs.

To remedy the bait and ice cost issue, two assessments were made. First, if the total estimated bait or ice costs for an OC that does not use these inputs appeared relatively high, those costs were zeroed out. This

policy is likely to provide a more accurate portrayal of these costs in the OCs that do not use these inputs. In the remainder of cases, bait or ice costs were deemed to be relatively small, and these costs were retained. Thus when bait or ice costs are seen in the tables that follow in this report for some OC that clearly do not utilize these inputs, these costs will tend to be relatively small, and can be attributed to modest levels of activity in OCs that utilize these inputs. Other cost categories that are not common to all OC (such as association membership fees) are also blended to a minor degree, but these costs are generally much smaller and were not modified. The bait and ice costs that were removed from OCs that do not use these inputs were added back to the statewide totals.

Similar cost blending occurs with “unclassified” fishermen. Although costs such as crew wage, insurance, and harbor fees were not estimated for “unclassified” fishermen, cost values appear under this classification as some “unclassified” fishermen are also vessel owners. As an example, a fisherman who fishes someone else’s vessel for part of a season would fit this circumstance.

## **SUMMARY COST AND REVENUE DATA**

Table 5 provides fixed, variable, and total costs grouped by California coastal county, by region (northern, central, and southern), and by OC. As noted previously, fixed costs were assigned to a fisherman’s home port county, and variable costs were assigned to a fisherman’s landing port counties. In a few cases where fishermen had no assignment of home port and/or landing port (according to CDFG records) or, had home ports outside of California, the associated costs were categorized as “Costs Not Attributed to a Specific California Region.” Fishermen who had home ports outside of California spent a total of \$2.66 million on fixed costs. Due to CDFG fees, slip fees, and landing taxes, it is estimated that fishermen with home ports outside of California, on average, spend at least 13 percent of their fixed costs within California. However, the percentage may be higher if some of the elective maintenance costs are incurred at landing ports within California.

Costs, revenue, net revenues and descriptive statistics are presented in a two-page table format (Tables 6 to 25) for each of the 20 OCs. The following describes the calculation of values.

- Number of Participating Fishermen: The number of fishermen that participate in a specific OC.
- Number of Participating Fishermen in Size Class: The number of fishermen who landed in a vessel size class category within a specific OC. Fishermen can land in multiple vessels throughout the season, thus double counting can occur.
- Estimated Costs by cost category and vessel size class: As stated.
- Grand Total Costs: Sum of estimated costs (presented as a column).
- Ex-Vessel Revenue: Sum of ex-vessel revenue from CDFG landings records.
- Ex-Vessel Net Revenue: Total Ex-Vessel Revenue less Grand Total Costs.
- Descriptive Statistics: derived mainly from the 2007 mail survey values and from CDFG landing records for each specific OC. Table A5 provides number of observations used to calculate the following:
  - Respondent’s average years in industry: As reported.

- Average age of vessel: The year a vessel was built, or had its hull replaced, was subtracted from the year 2008.
- Average number of days per trip: The average of reported days it takes to complete a single commercial fishing trip.
- Average shares of activity by market channel category:
  - % Resp. Active in Category: The number of instances in which survey respondents reported that they sold into a given market channel category, divided by total number of observations of respondents to this question.
  - Average % Sales in Category for Those Active: For those survey respondents who reported selling into a given market channel category, the average reported share of a fisherman's total landings sold into that market channel category.
- Likert scale rating of 2006 fishing year: The average reported rating. Where "1" = worst and "5" = best.
- Comment and concerns: The primary comments and concerns reported by fishermen.
- 3 Most important landing counties: Derived from 2006 CDFG landing records.
  - By Number of Trips: Calculated number of trips/landings made in each county by counting number of individual 2006 fish tickets.
  - By Value of Catch: Calculated total ex-vessel values for each county.

**Table A5: Number of Observations Used for Descriptive Statistics**

<b>Operational Configuration</b>	<b>CPS</b>	<b>Dungeness Crab –Med and Large</b>	<b>Dungeness Crab - Small</b>	<b>Harpoon/Spear</b>	<b>Herring gillnet</b>	<b>Hook &amp; Line</b>	<b>Hook &amp; Line LIVE</b>	<b>Lobster &amp; Crab</b>	<b>Longline</b>	<b>Nearshore &amp; Groundfish Trap</b>
“Original” n – number of survey respondents	15	31	5	7	12	111	40	38	3	25
Average years in industry n	15	30	4	7	11	106	40	35	3	24
Average age of vessel n	15	30	4	7	11	103	39	36	3	23
Average # of days per trip n	15	24	4	6	7	105	44	34	1	14
% respondents active in category n (n = responses that reported landings sold into one or more market channels)	20	32	5	7	12	194	46	41	3	30
Average % sales in category for those active n :										
Direct to consumer n	4	6	0	0	0	24	9	9	0	1
Direct to restaurant n	0	1	1	2	0	19	6	5	1	2
To processor n	14	26	4	6	7	91	40	31	0	11
Sold outside CA n	1	1	0	0	1	1	0	2	0	1
Likert scale rating n	14	27	4	6	11	103	40	35	3	21
Comments and concerns n	5	13	3	4	7	86	31	16	1	20

**Table A6: Number of Observations Used for Descriptive Statistics cont.**

<b>Operational Configuration</b>	<b>Other Gillnet</b>	<b>Prawn Trap</b>	<b>Salmon</b>	<b>Salmon &amp; Albacore</b>	<b>Salmon &amp; Dungeness Crab - Med &amp; Large</b>	<b>Salmon &amp; Dungeness Crab - Small</b>	<b>Trawl - Northern CA</b>	<b>Trawl - Southern CA</b>	<b>Tuna/Other Seine</b>	<b>Sea Urchin</b>
“Original” n – number of survey respondents	24	6	94	33	52	5	8	3	1	61
Average years in industry n	21	6	93	32	51	5	8	3	1	59
Average age of vessel n	20	6	93	33	49	5	8	2	1	47
Average # of days per trip n	22	5	77	42	92	8	9	1	1	49
% respondents active in category n (n = responses that reported landings sold into one or more market channels)	41	6	94	47	104	9	15	5	1	66
Average % sales in category for those active n :										
Direct to consumer n	2	1	18	9	13	5	0	0	0	4
Direct to restaurant n	2	1	6	3	4	3	0	0	0	4
To processor n	23	6	70	25	81	7	9	1	1	51
Sold outside CA n	0	0	2	14	3	0	0	0	0	4
Likert scale rating n	19	4	91	30	49	4	7	3	1	59
Comments and concerns n	15	4	68	25	33	4	0	5	0	38

## **IMPLAN DATA SET FOR THE CALIFORNIA OCEAN FISH HARVESTER ECONOMIC (COFHE) MODEL**

The IMPLAN data set includes the entire costs, revenue, and net revenue data set of commercial fishermen that were active in 2006.

The data were prepared in the following way:

- **Costs**

The costs for each fisherman were aggregated by cost category and by operational configuration. Two costs tables were provided – costs based in California (home and landing ports in CA), and costs based outside of California.

The cost category for depreciation was left out of the IMPLAN data set. Although depreciation generates economic activity, this economic activity is picked up within IMPLAN as an inter-industry purchase/sale when the depreciated amount is spent on replacement equipment or gear.

- **Revenue**

Total ex-vessel revenue was grouped by OC. Total ex-vessel revenue was further broken down by fisherman's resident county and by OC.

- **Net Revenue**

Due to current market conditions and the health of the fishing industry (management, MPAs, price of fuel, ex-vessel prices...) many of the OCs experience negative total net revenues. IMPLAN cannot operate with negative net revenues. Therefore, after much consideration and seeking out expert advice, individual fishermen who had negative net revenues in an OC had those negative net revenues equal to one dollar.

- **Number of Fishermen**

The number of fishermen participating in each OC for the 2006 fishing year was provided.

- **Landings outside home county**

Determined the percentage of fishermen who made at least one landing outside their registered home county.

### **Accommodating OCs in the IMPLAN Sectors**

King and Associates replaced 20 nonessential sectors in California's IMPLAN model with the fishery OCs for this project.