**Survey Methods and Summary Statistics
for Ecotrust's North Coast Study Region Fishery Uses and Values Project**
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1. BACKGROUND

In California, as elsewhere on the Pacific Coast, commercial and recreational fisheries support coastal communities and economies. Fisheries are a complex system comprised of fishermen from varying backgrounds, vessels of all shapes and sizes, and numerous gear types and fishing strategies. It is well known that fisheries utilize a large portion of the coastal ocean; however, how to differentiate use areas related to specific fisheries and/or communities and connecting these areas to the human and economic dimensions of fisheries is still not well understood.

In order to make informed marine planning decisions, there is a need to measure and determine the importance of ocean areas. While a variety of data are collected by state and federal agencies to monitor and enforce fishery regulations and set harvest allocations, the thematic, temporal, and spatial resolution of these data vary considerably. Data types include agency observer data, voluntary reports, mandatory daily logbooks with detailed location information, and landing receipts using large statistical reporting blocks, among others. With marine and fisheries management becoming more focused on ecosystem-based approaches and the use of tools such as time and area closures, accurate spatial information about coastal fisheries is central to informing policy and management decisions.

Basing these decisions on the spatial information contained in existing data sources is problematic. The alternative is to collect new information on the spatial extent of fishing activities from fishermen who are actively engaged in these fisheries. In the absence of comprehensive observer coverage, vessel monitoring systems or other fishery-independent data collection devices, by far the best source of information about the fishing grounds is the fleet itself.

Therefore, in this project, we went directly to the fishing community to solicit their expert knowledge. During interviews with Ecotrust staff, hundreds of commercial, Commercial Passenger Fishing Vessel (CPFV), and recreational fishermen mapped the spatial extent of their fishing grounds and designated or weighted (using a 100-point system) the relative importance of these areas. We used this knowledge to create data layers (maps) with the intent of (1) helping stakeholders minimize the potential impact of marine protected area (MPA) designations and (2) analyzing the relative effects of alternative MPA proposals on fisheries conducted in the state waters of the North Coast Study Region (NCSR).

The following sections contain detailed descriptions of the survey methods used to address the spatial information gaps as it pertains to commercial and recreational fisheries in the context of the Marine Life Protection Act (MLPA) and its implementation in the NCSR.

2. METHODS

In June 2009, before commencing interviews, Ecotrust staff conducted a series of outreach meetings with members of the NCSR fishing community to provide a project overview, answer questions, raise general awareness, and solicit potential interview participants and port liaisons. In addition, Ecotrust staff made follow-up phone calls, met with port liaisons, and provided information (i.e., handouts, Frequently Asked Questions (FAQs), and PowerPoints) for fishing organizations/associations to use at meetings and/or post on blogs, websites, and discussion boards. We also described the project on a web page (http://www.ecotrust.org/mlpa), which included an online form for submitting questions and a FAQ page where submitted questions were answered by Ecotrust staff.

2.1. Survey Design
Given the expert nature of the information we were interested in for this project, the use of a random sample for the commercial fisheries was not the most desirable sampling method. Instead, we constructed a purposive, proportional quota sample designed to be representative of the commercial fisheries overall. To create our

sample, we used California Department of Fish and Game (CDFG) ex-vessel revenue landings data to identify fishermen in each target commercial fishery so that respondents for each fishery would represent (region wide and by port):

- At least 50% of the total landings and/or ex-vessel revenue from 2000–07[1]; and
- At least five fishermen, except in cases where the sample population was fewer then five.

In consultation with Marine Life Protection Act Initiative (MLPAI), CDFG staff, and fishermen in the NCSR, we selected ten key commercial fisheries and five key recreational/Commercial Passenger Fishing Vessel (CPFV) fisheries on which to focus our efforts. The target commercial fishery groupings in alphabetical order were: anchovy/sardine – lampara net, Dungeness crab – trap, herring – gillnet, rockfish – fixed gear, salmon – troll, seaweed – hand harvest, shrimp – trap, smelt – brail (dip net), surfperch – hook and line, and urchin – dive. The five target species and/or species groupings for recreational and CPFV in alphabetical order were: California halibut, Dungeness crab, Pacific halibut, rockfish/bottomfish, and salmon. Further details on species targeted can be found in Appendix G. These fisheries are all predominately conducted in state waters, are of economic importance in the study region, mostly involve fishing gear that is expected to have some benthic habitat interactions, and are not well captured spatially by existing fisheries-independent data sets.

Based on landings data, port groups were defined (from north to south) as Crescent City, Trinidad, Eureka, Shelter Cove, Fort Bragg, and Albion. After target commercial fishermen were identified in these ports, port liaisons and Ecotrust staff initiated contact with individual fishermen to ask for their participation in the process and to schedule interview times. During the interviews, commercial fishermen were asked if they knew other commercial fishermen who they felt either should be interviewed or would be interested in being interviewed.

It should be noted that Ecotrust field staff collected data on the deeper nearshore, nearshore, and lingcod fisheries; however, at the recommendation of the fishing community we combined these fisheries into a single rockfish – fixed gear fishery. Furthermore, to account for the relatively recent Rockfish Conservation Area (RCA) spatial closure, Ecotrust collected additional data on rockfish fishing grounds (commercial, CPFV, and recreational) both prior to (pre) and after (post) the establishment of the RCA. The RCA was established to rebuild key rockfish populations and may re-open to fishing if fish stocks improve. This additional data on pre and post RCA fishing grounds may be useful in determining the relative impact of the RCA and the possible impact of MPA designation if the RCA were to re-open. Further investigation on stratifying the rockfish landings pre-RCA is necessary, however, before we are able to provide pre-RCA economic importance maps. Currently, the maps and the landings associated with those fishing grounds are all post-RCA (2001–07).

Ecotrust identified Commercial Passenger Fishing Vessel (CPFV) operators by networking in each port. Through advertisements of fishing trips, CPFV operations are often highly visible in a harbor and widely known. Using this method, Ecotrust field staff compiled a list of CPFV operations in each port, and later confirmed and added to this list as each CPFV operator was interviewed.

Recreational fishermen were selected through a solicitation for volunteers. More specifically, Ecotrust staff conducted a series of outreach meetings, worked with key leaders in the recreational community, met with port and sector liaisons, etc. A number of factors, including the unknown overall size of the NCSR recreational fishing community by mode, geography, and demographics and the time constraints imposed on the project, made the use of this sampling methodology the most practical. Recreational fishermen interested in participating in the interview process were asked to sign up online or by contacting Ecotrust staff.

2.2. Data Collection
The interview process varied by sector. Commercial fishermen were interviewed in-person using a desktop version of a custom-built Geographic Information System (GIS) application known as Open OceanMap[2], as were CPFV operators. Recreational interviews were done either in-person, by phone, or using a web-based version of Open OceanMap.

As mentioned above, recreational fishermen interested in participating were asked to sign up in-person, online or by phone. Signup was open both before and during the survey process. An initial email communication was sent

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[1] When considering landings revenue, we omit the landings revenue of deceased fishermen in order to more accurately represent the active fishing population.
[2] For more information on Open OceanMap, see http://www.ecotrust.org/ocean/OpenOceanMap.html.

in June 2009 to individuals who had already expressed interest to let them know about the process. Those who had signed up online were then sent an email containing account activation information (i.e., an individual username and password). Throughout the process, Ecotrust staff responded to questions by phone and email and posted frequently asked questions to a FAQ page specific to the web-based tool.

The majority of recreational interviews were completed in-person with field staff; however, approximately 5% of recreational surveys were completed online (17 respondents) or over the phone (8 respondents). Over the course of collecting data, we found that some participants felt the online survey was cumbersome or difficult to complete. Ecotrust staff responded quickly to requests for help and/or complaints about the online survey; however, we realize that some participants may not have completed the survey for various reasons, including complications, connection speed, or the general difficulty of the software, among others. Our rationale for offering the online survey option was to increase participation. Based on our experience in the North Central Coast Study Region (NCCSR) in 2007 and the South Coast Study Region (SCSR) in 2008, we felt we had two options for the North Coast Study Region (NCSR): in-person and online interviews. In the NCCSR, the use of in-person interviews only resulted in a limited number of recreational respondents. The success of the online tool in the SCSR to help reach a greater number of individuals led to our decision to continue to offer this option in the NCSR. We were also able to incorporate suggestions from the SCSR into the tool for the NCSR. We are using feedback received during the NCSR interview process to continue to improve our methods and the online interview tool.

Data were entered directly into a spatially enabled, Open Source GIS database using Open OceanMap, which is programmed to allow fishermen to draw shapes in their natural sizes (polygons) rather than confining responses to a statistical grid or to political boundaries. We are then able to standardize this information across respondents or fisheries. Although data are later summarized to a variety of different raster outputs for the subsequent analysis, the raw data are entered in natural shapes and at whatever spatial scale makes sense to respondents limited to the base information (nautical charts, 1:200,000) used to guide their responses.

All interviews followed a shared protocol:
1. Maximum extent: Using electronic and paper nautical charts of the area, fishermen were asked to identify the maximum extent north, south, east, and west they would forage or target each fishery in which they participate.
2. Scaling: Fishermen were then asked to identify, within this maximum forage area, which areas are of critical economic importance over their cumulative fishing experience and to rank these using a weighted percentage—an imaginary "bag of 100 pennies" that they distributed over the fishing grounds.
3. Non-spatial information pertaining to demographics and basic operations was also collected.

The first step established the maximum extent of the fleet in each fishery. This differed for all fisheries, some of which range far along the entire Pacific Coast, and others of which are confined to inshore waters. In the subsequent analysis, this allowed us to distinguish between fisheries that take place wholly in the NCSR and those that take place both inside and outside. When respondents provided the extent of their fishing grounds, they were not constrained to just state waters or to any other political or management boundary. This allowed for further analysis regarding which fisheries occur wholly or partially in a given area regardless of its designation.

The second step scaled respondents' reporting of the relative importance of the fishing grounds to a common scale. This was important for making inter- and intra-fishery comparisons. We chose to use the term "a bag of 100 pennies" to represent an intuitive, common sum scale and percentage allocation for scoring the relative importance of sub-areas within the larger fishing grounds. It also provided us with a convenient accounting unit for aggregating the stated importance per unit area in the intermediary steps of our analyses.

The third step collected non-spatial information related to demographics and basic operations that was helpful in creating summary statistics and estimating basic operating costs (a necessary component of the impact assessment).

2.3. Map Products
Once interviews were complete, the fishing areas of all respondents with landings revenue during our study period were aggregated to create relative economic importance maps for each fishery in each port and region wide (see Appendix B for the availability of these maps). These aggregate maps were created by simply weighing each individual's fishing grounds by his or her average ex-vessel revenues for that fishery during 2000–07. These

weighted fishing grounds were then summed or overlaid together to create a "heat map" of economic importance (Red areas are of high economic importance, orange areas are of moderate economic importance, yellow areas of lower economic importance, and grey areas are of lowest economic importance.)

To provide additional information on locating economically important fishing grounds, we also provided percent volume contour (PVC) lines on each of the economic importance aggregate maps. These lines delineate the area(s) that contain the top 25%, 50%, and 75% relative economic value or importance (recreational) of each map. For example, for the commercial Dungeness crab map for Crescent City, the 25% PVC line delineates the fishing grounds that contain the top 25% of the economic revenue for the Dungeness crab fishery in Crescent City. The PVCs are useful as it is not always easy to determine from the color gradations ("heat maps") the areas of importance other than the red areas. PVC lines give the eye a definitive marker that delineates areas of importance.

In addition to region and port scale fishery maps, Ecotrust also created cross-sector aggregate maps for each port. These maps highlight areas of importance across all sectors and fisheries. In order to combine all fishery maps from each sector we performed a max normalization on each map dataset. This step was executed so that each dataset would be transformed into an index on the same scale (0 – 1) and therefore comparable to each other. For the max normalization we used the following equation:

$X_{iy} = (X_y - X_{min}) / (X_{max} - X_{min})$
where, i = index value for a particular grid cell value (y) in the dataset
and X_{min} and X_{max} are the minimum and maximum value grid cells in each dataset

Applying the max normalization allowed us to compare data and create a single map for each port which depicts the footprint of the fishing grounds as well as the high valued areas across sectors (commercial, charter, and recreational).

2.4. Confidentialty and Quality Assurance and Quality Control
Throughout the project, we took every step possible to protect the confidentiality of information provided by fishermen. In addition to obtaining the explicit consent of individual participants, we undertook several additional steps for protecting sensitive information. These included training field staff on confidentiality protocols; masking all names and identifying characteristics of shapefiles; incorporating new security features into Open OceanMap; showing draft aggregated maps for each fishery to no one outside the fishing community for review; developing a mechanism for incorporating the information into the MarineMap at sufficiently aggregated levels; and devising a display format for stakeholder group meetings that maintained the information content without making individual fishermen's information visible. MarineMap is a web-based decision support tool developed to enable stakeholders to visualize geospatial data layers, draw prospective MPA boundaries with attributed information, assemble prospective MPA boundaries into arrays, share MPA boundaries and arrays with other users, and generate graphs and statistics to evaluate MPAs using science-based guidelines.

Quality assurance and quality control (QAQC) involved a four step process:
1. Editing of shapes by Ecotrust staff based on notes from interviews and/or when required to standardize the data (e.g., clipping a shape to the shoreline);
2. Opportunities for each participant to review his/her individual maps and information[3];
3. Review by the fishing community though multiple group meetings to verify aggregated results; and
4. Coordination with the fishing community to ensure confidentiality of any publicly displayed information.

3. SUMMARY STATISTICS

During the summer and fall months of 2009 (June through October), Ecotrust personnel and field staff interviewed 219 commercial fishermen and 22 commercial passenger fishing vessel (CPFV) operators. Additionally, 574 NCSR recreational fishermen participated via in-person, phone, and online interviews. The following sub-sections highlight survey findings.

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[3] Individual maps were mailed only to commercial and CPFV respondents.

3.1. Commercial

Overall, survey respondents represented the majority of the total NCSR ex-vessel fishing revenue (2000–07) for target fisheries. We reached and often exceeded our sampling goal of representing at least 50% of the ex-vessel revenue in each target fishery[4]. Salmon – troll was the only fishery for which we did not reach our overall sampling goal (sampled at 34%), due to the hundreds of fishermen who are involved in this fishery. For example, by interviewing 17 rockfish – fixed gear fishermen in Fort Bragg, we achieved 60% representation of that fishery in that port, yet by interviewing 63 salmon – troll fishermen in Fort Bragg, we achieved only 32% representation in that port.

It is notable that even though hundreds of fishermen participate in the Dungeness crab fishery, we were able to represent approximately 59% of the ex-vessel revenue for this fishery within the study region, exceeding our sampling goal. This is an important achievement as Dungeness crab is the most economically important fishery in the NCSR.

Table 1 captures the percentage of ex-vessel revenue (2000–07) that our sample represents for each fishery in each port. The overall representation for the study region was highest for anchovy/sardine – lampara net (100%), followed by herring – gillnet (80%), and smelt – brail (dip net) (71%). By port, the highest representation was in Trinidad (81%), followed by Shelter Cove (76%), Eureka (68%), Albion (65%), Crescent City (49%), and Fort Bragg (47%). It was easier to achieve a greater percentage of the ex-vessel landings revenue in the smaller ports of Trinidad and Shelter Cove and in the smaller fisheries like anchovy/sardine – lampara net and herring – gillnet because the overall pool of potential respondents was smaller.

As mentioned above, Ecotrust collected data on the nearshore, deeper nearshore, and lingcod fisheries for all fixed gear types; however, at the recommendation of the rockfish fishing community we combined the data into one fishery entitled rockfish – fixed gear.

Table 1: Percentage of ex-vessel revenue the sample represents (2000–07)[5]

Fishery	Crescent City	Trinidad	Eureka	Shelter Cove	Fort Bragg	Albion	NCSR
Anchovy/Sardine (Lampara Net)	—	—	100%	—	—	—	100%
Dungeness Crab (Trap)	49%	81%	70%	98%	69%	74%	59%
Hagfish (Trap)	6%	—	37%	—	—	—	35%
Herring (Gillnet)	54%	—	85%	—	—	—	80%
Rockfish (Fixed Gear)[6]	61%	95%	77%	93%	60%	6%	62%
Sablefish (Longline)	50%	—	45%	—	77%	—	57%
Sablefish (Trap)	46%	—	—	—	40%	—	41%
Salmon (Troll)	40%	66%	44%	67%	32%	75%	34%
Seaweed (Hand Harvest)[7]	—	—	—	—	—	—	69%
Shrimp (Trap)	50%	—	—	—	—	—	50%
Smelt (Brail – Dip Net)	60%	—	73%	—	—	—	71%
Surfperch (Hook and Line)	43%	—	56%	—	—	—	53%
Urchin (Dive)	—	—	—	—	55%	69%	59%
Total	**49%**	**81%**	**68%**	**76%**	**47%**	**65%**	**—**

Table 2 summarizes the number of fishermen interviewed who landed at least 10% of their catch for each fishery (2000–07) in each port. For example, we interviewed 57 fishermen who landed Dungeness crab in Eureka, which comprises 70% of the ex-vessel revenue (2000–07) for that fishery in Eureka, compared to one fisherman who landed Dungeness Crab in Albion, which comprises 74% of the ex-vessel revenue for that same period. In both

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[4] Target fisheries do not include sablefish or hagfish.
[5] Blank areas in the table indicate that the fishery does not occur in a particular port.
[6] Rockfish – fixed gear includes nearshore, deeper nearshore, and lingcod using hook and line, longline, and trap fishing gear.
[7] CDFG landings data of seaweed harvesting is provided only by pounds landed on a region wide scale. It cannot be determined what percentage of gross revenue (by port and region wide) seaweed harvester respondents represent. The percent we report is the percentage of poundage represented by our seaweed harvester respondents.

cases, we exceeded our sampling criteria, but because there are considerably more landings and fishermen in Eureka, it took a greater number of interviews to reach our target of 50%.

As mentioned previously, in total, we interviewed 219 commercial fishermen. The following fisheries received the highest number of responses: Dungeness crab – trap (145), salmon – troll (99), rockfish – fixed gear (61) and urchin – dive (35). These numbers and those in Table 2 are not mutually exclusive, in that a fisherman often participates in more than one fishery. In general, the breakdown of fishermen interviewed per fishery matches the overall distribution of fishermen and value of the fisheries in the NCSR (Appendix A).

For analytical purposes, we chose to group fishermen by their port(s) of landing (Table 2) rather than their homeport(s) (Table 3). We did this because CDFG landings information is limited to where fishermen land their catch, thus making it difficult to estimate the total number of fishermen per homeport; however, we can estimate the total number of fishermen and ex-vessel revenue for each fishery based on landing port and these values are what we use to derive our sample. Additionally, when fishermen provided their fishing grounds during the interview, their responses were not restricted to landing or homeport, but rather, we asked them to base their responses on the entire extent of their fishing grounds and cumulative fishing experience. During the interview process, we asked each fisherman to identify his/her homeport, which is summarized in Table 3. For example, when comparing the number of fishermen per homeport versus landing port, out of the 219 commercial fishermen whose information we used, 23 considered Trinidad to be their homeport, but according to the landings receipts, only 20 of the 219 fishermen landed in Trinidad in the 2000–07 period.

It should also be noted that not all of the information collected from the 219 respondents was used. There are cases where a fisherman provided information for a particular fishery but his/her landings were not detected when compared to the CDFG landing receipts (2000–07). Since ex-vessel value from in-study region CDFG landing receipts forms the basis for weighting an individual fisherman's fishing grounds in the aggregated fishing grounds analysis, including those without landings information would effectively decrease the value of the aggregated grounds. This difference in total number of fishermen interviewed and the number actually used is reflected in Table 2, Columns NCSR and NCSR used. For example, we interviewed 35 fishermen who provided information for the urchin – dive fishery but we only considered 32 of them in our analysis due to lack of CDFG landings information for three fishermen who provided harvest areas for this fishery.

Table 2: Summary of the number of fishermen interviewed by landing port

Fishery	Crescent City	Trinidad	Eureka	Shelter Cove	Fort Bragg	Albion	NCSR[8]	NCSR used
Anchovy/Sardine (Lampara Net)	—	—	1	—	—	—	1	1
Dungeness Crab (Trap)	59	15	57	2	30	1	145	141
Hagfish (Trap)	1	—	5	—	—	—	9	6
Herring (Gillnet)	1	—	1	—	—	—	3	2
Rockfish (Fixed Gear)[9]	15	7	20	7	17	4	61	55
Sablefish (Longline)	2	—	12	—	5	—	24	18
Sablefish (Trap)	6	—	—	—	10	—	18	16
Salmon (Troll)	18	5	35	7	63	2	99	86
Seaweed (Hand Harvest)[10]	1	—	—	—	4	—	5	4
Shrimp (Trap)	6	—	1	—	2	—	9	9
Smelt (Brail – Dip Net)	7	—	11	—	1	—	14	14
Surfperch (Hook and Line)	7	—	9	—	1	—	17	14
Urchin (Dive)	—	—	—	—	23	17	35	32
Total	**77**	**20**	**91**	**14**	**102**	**26**		

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[8] Since many fishermen make landings in multiple ports, the total number of individuals we interviewed in the NCSR is less than the sum of fishermen assigned to each port group.

[9] Rockfish – fixed gear includes nearshore, deeper nearshore, and lingcod using hook and line, longline, and trap fishing gear.

[10] Seaweed harvesters do not have a homeport, yet for reporting purposes, four seaweed survey respondents who operate across the Fort Bragg, Albion, and Elk areas were indicated to operate out of Fort Bragg. One seaweed harvester who operates out of both Crescent City and Trinidad was indicated as belonging to the Crescent City homeport.

Table 3 shows a breakdown of the number of fishermen interviewed by homeport and the general demographics of these respondents. By port group, Fort Bragg had the highest number of commercial fishery respondents, with 59 respondents citing it as their homeport. The average commerical fishery respondent was a 54 year old male with 30 years of fishing experience. The majority of respondents reported that 100% of their income came from fishing.

Table 3: Survey representation by homeport grouping

Homeport	# sampled	Age Mean	Median	Years experience Mean	Median	Income from fishing (%) Mean	Median
Albion	11	52	50	27	25	77%	85%
Crescent City	50	56	53	32	30	90%	100%
Eureka	52	55	55	30	31	89%	100%
Fort Bragg	59	53	53	30	29	82%	100%
Shelter Cove	7	60	59	33	40	72%	75%
Trinidad	23	50	49	24	24	77%	80%
None Given	3	69	63	37	42	90%	100%
Outside Study Region	18	54	57	32	32	90%	100%
Study Region	**219**	**54**	**55**	**30**	**30**	**85%**	**100%**

Table 4 displays survey responses on demographics, fishery related income and vessel information broken out by commercial fishery. Dungeness crab – trap was the largest group of commercial fishery respondents (145) followed by salmon – troll (99) and rockfish – fixed gear (61). Rockfish – fixed gear is a combination of deeper nearshore rockfish, nearshore rockfish, and lingcod fisheries for hook and line, longline, and trap gear types, which are combined here (and throughout this report) at the request of respondents.

Many respondents across all gear types and fisheries reported that their entire personal income comes from fishing, with averages across fisheries between 78–100%. Aside from seaweed harvesters, urchin divers reported the highest average income from a specific fishery—an average of 88% of their fishing related income comes from urchin diving. Individuals who participated in fisheries with fewer than three respondents were given the option to have their statistics withheld from the report. Data shown here for commercial fisheries with fewer than three respondents are shown with explicit approval from the respondents.

Table 4: Survey results by fishery and gear type

Fishery	# sampled	Age Mean	Age Median	Gender Male	Gender Female	Years experience fishing Mean	Years experience fishing Median	Income from fishing (%) Mean	Income from fishing (%) Median	Income from specific fishery (%) Mean	Income from specific fishery (%) Median	Vessel length (ft) Mean	Vessel length (ft) Median	Haul capacity (lbs) Mean	Haul capacity (lbs) Median
Anchovy/Sardine (Lampara Net)	1	59	59	100%	0%	42	42	100%	100%	50%	50%	32	32	16,000	16,000
Dungeness Crab (Trap)	145	54	55	98%	2%	32	32	96%	100%	64%	65%	44	44	23,477	16,500
Hagfish (Trap)	9	53	54	100%	0%	27	26	100%	100%	25%	10%	41	41	17,250	16,500
Herring (Gillnet)	3	51	51	100%	0%	35	39	100%	100%	20%	25%	34	32	21,333	16,000
Rockfish (Fixed Gear)	61	53	52	100%	0%	29	28	86%	100%	39%	28%	32	30	14,173	6,000
Sablefish (Longline)	24	53	52	100%	0%	31	29	94%	100%	26%	20%	44	44	26,500	22,500
Sablefish (Trap)	18	50	51	94%	6%	30	29	96%	100%	34%	20%	45	47	23,533	20,000
Salmon (Troll)	99	53	54	97%	3%	31	32	87%	100%	34%	30%	39	39	16,490	10,000
Seaweed (Hand Harvest)[11]	5	56	56	60%	40%	20	18	100%	100%	100%	100%	—	—	—	—
Shrimp (Trap)	9	53	54	100%	0%	32	35	99%	100%	18%	10%	40	36	18,467	14,000
Smelt (Brail – Dip Net)	14	54	57	79%	21%	29	25	78%	100%	59%	65%	29	23	6,840	3,000
Surfperch (Hook & Line)	17	56	58	82%	18%	29	25	78%	95%	32%	20%	21	22	1,740	1,000
Urchin (Dive)	35	52	52	97%	3%	26	25	80%	95%	88%	100%	29	29	6,410	5,000

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[11] Seaweed harvesters do not operate vessels. They hand harvest by walking or kayaking in rocky intertidal areas.

3.2. Commercial Passenger Fishing Vessel (CPFV)

A total of 22 CPFV operators were interviewed by field staff. By port group, Trinidad comprised the highest percentage of respondents (32%). Additional information on CPFV respondents is below in Table 5.

Table 5: CPFV respondents by port

Port	# of respondents	% of total respondents
Crescent City	2	9%
Trinidad	7	32%
Eureka	5	23%
Shelter Cove	3	14%
Fort Bragg	5	23%
NCSR	**22**	**100%**

The average CPFV respondent in the NCSR has operated one vessel for ten years, fishes an average of 97 days per year, and takes an average of six passengers per trip (of whom 21%, on average, are from out of state). Average responses are shown in Table 6.

Table 6: Mean summary statistics for CPFV respondents

	Crescent City	Trinidad	Eureka	Shelter Cove	Fort Bragg	NCSR
Age (years)	62	44	57	51	44	50
Vessel Length (ft)	44	34	27	24	46	34
Number of vessels operated	1	1	1	1	1	1
Number of years operating	12	10	9	6	13	10
Number of vessels owned	1	1	1	1	1	1
Number of years owned	12	9	8	7	8	9
Days fishing per year	113	87	73	103	134	97
Number of passengers	5	6	4	5	10	6
Out of state passengers (%)	28%	21%	27%	8%	21%	21%
Number of crew	1	1	0	1	1	1

Table 7 shows mean and median CPFV related income for the entire study region and for each port, as well as information on operating costs as a percentage of gross revenue. On average, CPFV operators receive 54% of their income from CPFV operations and 32% of their gross revenue goes towards operating costs, of which 9% goes towards crew and 16% goes towards fuel.

Table 7: CPFV related income and operating costs

Port		% income	Operating costs	Labor costs	Fuel costs
Crescent City	Mean	50%	58%	4%	9%
	Median	50%	58%	4%	9%
Trinidad	Mean	49%	16%	13%	15%
	Median	50%	15%	8%	13%
Eureka	Mean	54%	43%	0%	21%
	Median	50%	38%	0%	20%
Shelter Cove	Mean	38%	30%	12%	12%
	Median	25%	30%	10%	10%
Fort Bragg	Mean	79%	33%	11%	18%
	Median	93%	25%	10%	10%
NCSR	Mean	54%	32%	9%	16%
	Median	50%	25%	4%	11%

CPFV respondents were asked to identify their primary trip type for each fishery in which they participate. All of the respondents operate rockfish trips and 95% operate salmon trips. Across all fisheries, the majority of respondents in the NCSR operate six pack trips (i.e., vessels that hold only up to six passengers). Within the NCSR, California halibut trips are concentrated in the Eureka area (specifically Humboldt Bay), while combo trips (where more than one species is fished – usually rockfish and Dungeness crab) occur in most ports. More results are shown in Table 8.

Table 8: CPFV trip type

Fishery		Crescent City		Trinidad		Eureka		Shelter Cove		Fort Bragg		NCSR	
		#	%	#	%	#	%	#	%	#	%	#	%
California Halibut	Charter	0	0%	1	17%	1	17%	0	0%	0	0%	2	33%
	Six Pack	0	0%	1	17%	3	50%	0	0%	0	0%	4	67%
	No Response	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total	**0**	**0%**	**2**	**33%**	**4**	**67%**	**0**	**0%**	**0**	**0%**	**6**	**100%**
Dungeness Crab	Charter	1	7%	1	7%	2	13%	0	0%	3	20%	7	46%
	Six Pack	1	7%	4	27%	1	7%	0	0%	1	7%	7	47%
	No Response	0	0%	0	0%	0	0%	0	0%	1	7%	1	7%
	Total	**2**	**13%**	**5**	**33%**	**3**	**20%**	**0**	**0%**	**5**	**33%**	**15**	**100%**
Pacific Halibut	Charter	0	0%	2	22%	1	11%	0	0%	0	0%	3	33%
	Six Pack	0	0%	1	11%	3	33%	2	22%	0	0%	6	67%
	No Response	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total	**0**	**0%**	**3**	**33%**	**4**	**44%**	**2**	**22%**	**0**	**0%**	**9**	**100%**
Rockfish	Charter	1	5%	2	10%	2	9%	1	5%	3	14%	9	41%
	Six Pack	1	5%	5	23%	3	14%	2	9%	1	5%	12	55%
	No Response	0	0%	0	0%	0	0%	0	0%	1	5%	1	5%
	Total	**2**	**9%**	**7**	**32%**	**5**	**23%**	**3**	**14%**	**5**	**23%**	**22**	**100%**
Salmon	Charter	1	5%	2	10%	2	10%	1	5%	3	14%	9	43%
	Six Pack	1	5%	4	19%	3	14%	2	10%	1	5%	11	52%
	No Response	0	0%	0	0%	0	0%	0	0%	1	5%	1	5%
	Total	**2**	**10%**	**6**	**29%**	**5**	**24%**	**3**	**14%**	**5**	**24%**	**21**	**100%**

CPFV respondents were also asked to identify their primary trip length for each fishery in which they participate. Halibut trips (both Pacific and California) have the highest average of full day trips while 73% of Dungeness crab fishing occurs on half day trips. More results are shown in Table 9.

Table 9: CPFV trip length

Fishery		Crescent City		Trinidad		Eureka		Shelter Cove		Fort Bragg		NCSR	
		#	%	#	%	#	%	#	%	#	%	#	%
California Halibut	1/2 day	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	3/4 day	0	0%	0	0%	2	33%	0	0%	2	33%	2	33%
	1 day	0	0%	2	33%	2	33%	0	0%	2	33%	4	67%
	No Response	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total	**0**	**0%**	**2**	**33%**	**4**	**67%**	**0**	**0%**	**4**	**67%**	**6**	**100%**
Dungeness Crab	1/2 day	1	7%	4	27%	2	13%	0	0%	2	13%	11	73%
	3/4 day	1	7%	0	0%	0	0%	0	0%	0	0%	1	7%
	1 day	0	0%	1	7%	1	7%	0	0%	1	7%	3	20%
	No Response	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total	**2**	**13%**	**5**	**33%**	**3**	**20%**	**0**	**0%**	**3**	**20%**	**15**	**100%**
Pacific Halibut	1/2 day	0	0%	1	11%	0	0%	0	0%	0	0%	1	11%
	3/4 day	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	1 day	0	0%	2	22%	4	44%	2	22%	4	44%	8	89%
	No Response	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total	**0**	**0%**	**3**	**33%**	**4**	**44%**	**2**	**22%**	**4**	**44%**	**9**	**100%**
Rockfish	1/2 day	1	5%	5	23%	0	0%	1	5%	0	0%	12	55%
	3/4 day	0	0%	0	0%	1	5%	1	5%	1	5%	2	9%
	1 day	1	5%	2	9%	4	18%	1	5%	4	18%	8	36%
	No Response	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total	**2**	**9%**	**7**	**32%**	**5**	**23%**	**3**	**14%**	**5**	**23%**	**22**	**100%**
Salmon	1/2 day	1	5%	4	19%	0	0%	0	0%	0	0%	10	48%
	3/4 day	0	0%	0	0%	1	5%	0	0%	1	5%	1	5%
	1 day	1	5%	2	10%	4	19%	3	14%	4	19%	10	48%
	No Response	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total	**2**	**10%**	**6**	**29%**	**5**	**24%**	**3**	**14%**	**5**	**24%**	**21**	**100%**

3.3. Recreational
As mentioned previously, the recreational fishing community was stratified into three key user groups:
– Private boat anglers;
– Kayak anglers; and
– Divers/Spear anglers.

Recreational fishermen had the opportunity to register and complete the survey for multiple user groups (e.g., private vessel and dive), and for this reason, the 574 respondents generated 687 survey responses. Table 10 shows the number of user groups completed by each fisherman. The majority of respondents (82%) completed a survey for a single user group, while only 1% of respondents completed a survey for all three user groups.

Table 10: Number of user groups completed per respondent

# of user group surveys completed	# of respondents	% of respondents
1	472	82%
2	97	17%
3	7	1%

Table 11 shows the number of surveys completed for each user group. Private vessel angler respondents were the largest group; out of 574 respondents, 527 (91.5%) completed a private vessel survey.

Table 11: Response statistics

User group	Total surveys
Dive	140
Kayak	20
Private Vessel	527
Total responses generated	**687**

3.3.1. Dive
Based on responses provided by survey participants, the average diver/spear angler is a 45 year old male who dives to fish 31 days per year. In addition, the majority of respondents stated that they are free divers who use a boat as their primary access method. Additional information is provided in Table 12.

Table 12: Dive survey response statistics

Age	Mean	45
	Median	47
Dives per trip	Mean	2
	Median	2
Average annual number of days diving (to fish)	Mean	31
	Median	15
Primary mode of diving	Free	70%
	Scuba	23%
	No Response	5%
	Other	1%
Access method[12]	Boat	68
	Shore	64
	Kayak	15
	No Response	11

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[12] Since respondents were allowed to choose multiple access methods, the total will add to more than 122 (the number of divers interviewed).

3.3.2. Kayak

The average kayak respondent is a 46 year old male who has 11 years of kayak angling experience and fishes from a kayak 29 days per year. Additional information is shown in Table 13.

Table 13: Kayak survey response statistics

Age	Mean	46
	Median	49
Years experience	Mean	11
	Median	5
Average annual number of days kayaking (to fish)	Mean	29
	Median	25

Survey participants were asked to list up to four launch ports or access points based on frequency of usage. Overall, the most popular launch/access site amongst kayak anglers was Fort Bragg, with six respondents citing it among their top four launch sites (see Table 14); however, Trinidad was the most popular primary site, with four respondents indicating it as their primary access site.

It should be noted that individuals were not required to list four launch/access sites but rather were given the option of listing up to four. The numbers of individuals not reporting a second, third, or fourth launch/access site are listed under "No Response".

It should also be noted that the launch/access sites provided by respondents were grouped together. For example, respondents who indicated Noyo Harbor or Fort Bragg were all grouped together as Fort Bragg. Within these areas, kayak launch sites could be boat ramps or an adjacent shore.

Table 14: Top kayak launch/access sites

Launch/access	1	2	3	4	Total
Crescent City	2	0	1	0	3
Trinidad	4	1	0	0	5
Eureka	0	0	1	1	2
Cape Mendocino	1	0	0	0	1
Shelter Cove	0	1	0	0	1
Fort Bragg	1	3	2	0	6
Caspar	2	2	0	1	5
Van Damme State Park	1	0	1	1	3
Albion	1	1	0	1	3
Elk	0	0	2	1	3
Outside Study Region	1	1	0	0	2
Unknown	1	1	0	0	2
No Response	1	5	8	10	24

3.3.3. Private Vessel

The average respondent for the private vessel user group is a 52 year old male who has operated a vessel for 22 years and owned a vessel for 19 years. On average, private vessel users have 30 years of fishing experience and fish 39 days per year as private vessel anglers. Additional information on private vessel respondents is found in Table 15.

Table 15: Private vessel survey response statistics

Age	Mean	52
	Median	53
Years operating a vessel	Mean	22
	Median	20
Years of vessel ownership	Mean	19
	Median	15
Vessel length (ft)	Mean	21
	Median	21
Years experience	Mean	30
	Median	30
Average annual number of days fishing	Mean	39
	Median	30

Private vessel respondents were also asked to list their top four launch sites (Table 16). Trinidad, the most popular primary site for kayakers, was also the most popular primary site for private vessel respondents.

Table 16: Top private vessel launch sites

Launch/access	1	2	3	4	Total
Crescent City	67	9	6	0	82
Klamath River	0	3	1	0	4
Trinidad	81	20	3	2	106
Eureka	62	28	9	3	102
Fields Landing	8	4	3	0	15
Shelter Cove	9	10	10	4	33
Fort Bragg	28	15	1	3	47
Mendocino	0	0	0	1	1
Albion	31	8	2	0	41
Elk	0	1	0	0	1
Outside Study Region	14	22	11	4	51
Unknown	6	4	1	1	12
No Response	208	391	467	496	1562

APPENDIX A: Summary of North Coast Study Region commercial fisheries considered

Fishery	% of total NCSR fisheries revenues (2000–07 average)	% of total CA statewide fisheries revenues (2000–07 average)	% of CA statewide fisheries revenues landed in NCSR (2000–07 average)
Anchovy/Sardine (Lampara Net)[13]	0%	n/a	n/a
Dungeness Crab (Trap)	78%	52%	35%
Herring (Gillnet)	0%	3%	0%
Rockfish (Fixed Gear)[14]	4%	5%	2%
Salmon (Troll)	13%	20%	6%
Seaweed (Hand Harvest)[15]	1%	0%	n/a
Shrimp (Trap)	1%	0%	0%
Smelt (Brail – Dip Net)	1%	0%	0%
Surfperch (Hook and Line)	0%	0%	0%
Urchin (Dive)	5%	19%	2%

Example of how to interpret: From 2000–07, on average, the NCSR Dungeness crab trap fishery accounted for 78% of NCSR fishery related revenues and 52% of California (total) fishery related revenues. During that same time period, on average, 35% of all Dungeness crab trap fishery related revenues for the entire state of California came from the NCSR.

NCSR and statewide fishing revenue percentages were calculated using only the revenue from the fisheries listed above. Examples of fisheries that occur in the NCSR but that are not being considered include sablefish, hagfish, tuna, and trawl fisheries.

Percentages are provided only for the fisheries we created maps for in the NCSR MLPA process. Summary statistics included in this report for sablefish and hagfish are for informational purposes only.

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[13] We were unable to obtain official landings/revenue data for the anchovy/sardine fishery. Based on anecdotal data from the survey respondent, the anchovy/sardine fishery value is less than 1% of the NCSR total fisheries revenue; however, it is a critical bait fishery to the west coast albacore tuna fishery. Moreover, the survey respondent is the only live bait supplier between Santa Cruz, CA and Westport, WA. Based on data collected by the American Albacore Fishing Association, a dollar of anchovy/sardine bait sold, on average, equates to $52 of ex-vessel albacore tuna revenue. Albacore tuna represents approximately 8% of NCSR fishing revenue when added to the fishing revenue of the fisheries listed above.

[14] Rockfish – fixed gear includes nearshore, deeper nearshore, and lingcod using hook and line, longline, and trap fishing gear.

[15] The percentages provided for the value of seaweed harvesting only represent the summed gross revenue (from 2000–07) of our five seaweed survey respondents. There are no existing data on the economic value of seaweed harvesting across the NCSR and California.

APPENDIX B: List of NCSR commercial fishing maps available in MarineMap

Fishery	Crescent City	Trinidad	Eureka	Shelter Cove	Fort Bragg	Albion	NCSR
Anchovy/Sardine (Lampara Net)	—	—	Yes	—	—	—	—
Dungeness Crab (Trap)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Herring (Gillnet)	Yes	—	Yes	—	—	—	—
Rockfish (Fixed Gear)[16]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Salmon (Troll)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seaweed (Hand Harvest)	Yes	—	—	—	Yes	—	—
Shrimp (Trap)	Yes	—	—	—	—	—	Yes
Smelt (Brail – Dip Net)	Yes	—	Yes	—	—	—	Yes
Surfperch (Hook and Line)	Yes	—	Yes	—	—	—	Yes
Urchin (Dive)	—	—	—	—	Yes	Yes	Yes

Above is a list of maps available for each commercial fishery. A "Yes" value indicates that a relative economic importance map is available in MarineMap for that particular fishery in a port or for the region. A null or "—" value indicates that either the data were not collected or that what data were collected do not adequately represent a given set of fishing grounds based on the sampling criteria described in Section 3.1.

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[16] Rockfish – fixed gear includes nearshore, deeper nearshore, and lingcod using hook and line, longline, and trap fishing gear.

APPENDIX C: Number of CPFV respondents by port and species throughout the NCSR and datasets available in MarineMap

Fishery	Crescent City	Trinidad	Eureka	Shelter Cove	Fort Bragg	NCSR
California Halibut	0	2	4	0	0	6
Dungeness Crab	2	5	3	0	5	15
Pacific Halibut	0	3	4	2	0	9
Rockfish	2	7	5	3	5	22
Salmon	2	6	5	3	5	21

The table above indicates the number of CPFV operators who provided information for each species in each port. Maps are available for all indicated CPFV fisheries in each port. Through explicit consent from interview participants, all maps that have fewer than three respondents are also available. CPFV maps are provided only at the port level (not the region wide level) so that larger ports with a higher number of respondents do not bias the relative importance maps.

APPENDIX D: Number of recreational dive respondents by port and species throughout the NCSR and datasets available in MarineMap

Fishery	Crescent City	Trinidad	Eureka	Shelter Cove	Fort Bragg/ Albion[17]	NCSR
Abalone	5	7	11	20	96	130
Dungeness Crab	—	—	—	—	4	4
Rockfish/Bottomfish	3	3	5	16	39	68

Above is a list of the recreational dive fishing ground maps available for each port group. Port level maps are available for each species for which a sufficient number of respondents provided information; in all cases, the number of respondents is never less than three for confidentiality purposes. Recreational dive maps are provided only at the port level (not the region wide level) so that larger ports with a higher number of respondents do not bias the relative importance maps.

A null or "—" value indicates that either the data were not collected or that what data were collected do not adequately represent a given set of fishing grounds.

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[17] For recreational fisheries, Fort Bragg and Albion were merged into one port group because of their proximity to each other and the large number of launch points in between them.

APPENDIX E: Number of recreational kayak angler respondents by county and species throughout the NCSR and datasets available in MarineMap

Fishery	Crescent City	Trinidad	Eureka	Shelter Cove	Fort Bragg/ Albion[18]	NCSR
California Halibut	—	—	—	—	2	2
Dungeness Crab	—	1	—	1	2	4
Pacific Halibut	—	1	—	—	—	1
Rockfish/Bottomfish	1	3	2	1	10	17
Salmon	1	2	1	—	3	7

Above is a list of the recreational kayak fishing ground maps available for each port group. Port level maps are provided for each species for which a sufficient number of respondents provided information; in all cases, the number of respondents is never less than three for confidentiality purposes. Recreational kayak maps are provided only at the port level (not the region wide level) so that larger ports with a higher number of respondents do not bias the relative importance maps.

A null or "—" value indicates that either data were not collected or that what data were collected do not adequately represent a given set of fishing grounds.

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[18] For recreational fisheries, Fort Bragg and Albion were merged into one port group because of their proximity to each other and the large number of launch points in between them.

APPENDIX F: Number of recreational private vessel angler respondents by county and species throughout the NCSR and datasets available in MarineMap

Fishery	Crescent City	Trinidad	Eureka	Shelter Cove	Fort Bragg/ Albion[19]	NCSR
California Halibut	10	7	37	18	8	80
Dungeness Crab	71	32	62	26	47	238
Pacific Halibut	15	14	49	18	9	105
Rockfish/Bottomfish	169	63	111	31	105	479
Salmon	123	62	131	31	72	419

Above is a list of the recreational private vessel fishing ground maps available for each port group. Port level maps are provided for each species for which a sufficient number of respondents provided information; in all cases, the number of respondents is never less than three for confidentiality purposes. Recreational private vessel maps are provided only at the port level (not the region wide level) so that larger ports with a higher number of respondents do not bias the relative importance maps.

A null or "—" value indicates that either data were not collected or that what data were collected do not adequately represent a given set of fishing grounds.

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[19] For recreational fisheries, Fort Bragg and Albion were merged into one port group because of their proximity to each other and the large number of launch points in between them.

APPENDIX G: List of CDFG official names and common names to be used in Ecotrust NCSR reports

Sector	Ecotrust common name in NCSR reports	CDFG species name(s)
Commercial	Anchovy/Sardine	Anchovy and Sardine
	Dungeness Crab	Dungeness Crab
	Hagfish	Pacific Hagfish
	Herring	Pacific Herring
	Rockfish	Nearshore Species: Black-and-yellow Rockfish, China Rockfish, Gopher Rockfish, Grass Rockfish (grass bass), Kelp Rockfish (sugar bass), Cabezon, Kelp Greenling, Monkeyface Prickleback (monkeyface eel), and California Scorpionfish (sculpin) Deeper Nearshore Species: Black Rockfish (black bass or black snapper), Blue Rockfish (blue bass or blue perch), Brown Rockfish (bolina), Copper Rockfish (chucklehead), Olive Rockfish (johnny bass), Quillback Rockfish, and Treefish Rockfish (lipstick bass or convictfish) Lingcod
	Sablefish	Sablefish (blackcod)
	Salmon	Chinook Salmon (king)
	Seaweed	Sea Palm, Wakame, Kombu, Sweet Kombu, Nori, Ocean Ribbon, Dulse, Bull Whip Kelp, Cystosera, Mazzaella, Fucus, Grapestone, and Codium Fragile
	Shrimp	Coonstripe Shrimp
	Smelt	Surf Smelt and Night Smelt
	Surfperch	Redtail Surfperch
	Urchin	Red Sea Urchin
CPFV	California Halibut	California Halibut
	Dungeness Crab	Dungeness Crab
	Pacific Halibut	Pacific Halibut
	Rockfish/Bottomfish	Yelloweye Rockfish, Canary Rockfish, Vermillion Rockfish (red snapper or red rockcod), Black Rockfish (black bass or black snapper), Black-and-yellow Rockfish, Blue Rockfish (blue bass or blue perch), Brown Rockfish (bolina), Cabezon, Calico Rockfish, California Scorpionfish (sculpin), California Sheephead, China Rockfish, Copper Rockfish (chucklehead), Gopher Rockfish, Grass Rockfish (grass bass), Kelp Greenling, Kelp Rockfish (sugar bass), Monkeyface Prickleback (monkeyface eel), Olive Rockfish (johnny bass), Quillback Rockfish, Rock Greenling, and Treefish Rockfish (lipstick bass or convictfish)
	Salmon	Chinook Salmon (king)
Recreational	California Halibut	California Halibut
	Dungeness Crab	Dungeness Crab
	Pacific Halibut	Pacific Halibut
	Red Abalone (dive only)	Red Abalone
	Rockfish/Bottomfish	Same as CPFV
	Salmon	Chinook Salmon (king)

APPENDIX H: Shellfish summary statistics

During the months of January and February of 2010, Ecotrust personnel and field staff interviewed five shellfish companies in the North Coast Study Region (i.e., Eureka, McKinleyville, and Samoa areas). The following section highlights the survey findings.

Shellfish operations participating in the survey include Taylor Mariculture LLC (including Kuiper Mariculture Inc.), Humboldt Bay Oyster Company, Coast Seafood, North Bay Shellfish and Aqua-Rodeo Oyster Farms.

Operations
Companies were asked to report the average number of active and inactive acres for their operations from 2000–08 (see Table H1). The five companies in total reported an average of 4,441.4 (active and inactive) under operation per year[20].

Companies also were asked to provide information about operating costs, which, on average, ranged from ~$2,000–$2,200,000 per year. On average, from 2000–08, these five companies had combined total operating costs of ~$3,221,000 per year. Although not broken out, it should be noted that total operating costs include required costs associated with water quality monitoring, disease prevention and disease pathology, which account for approximately 2.7% of total annual operating costs.

Labor costs, on average, accounted for approximately 31% of the total annual operating costs. All five companies reported the average number of individuals employed from 2000–08, which varied substantially by company. Four of the five respondents had fewer than ten employees, while the fifth company employed a substantially higher number. On average, from 2000–08, these five companies had a combined total of 52 full-time employees and 11.5 part-time employees (see Table H1).

Table H1. Average number of employees per year (2000–08)

	Number of employees	
	Full-time	*Part-time*
Total (5 companies)	52	11.5

The species that companies reported growing and harvesting include Pacific oysters, Kumamoto oysters, and Manila clams. All five companies grow and harvest Pacific oysters and Kumamoto oysters, although different companies focus on different product types (e.g., seed, shellstock). Only two companies reported Manila clam production. Average annual harvests/sales for these species from 2000–08 are reported in Table H2.

Table H2. Summary harvests by product type

Species	Product type	Companies reporting	Total
Pacific oyster	*Seed*	2	104,000,000
	Shellstock	3	190,000
	Shucked (gallons)	1	45,000-100,000
Kumamoto oyster	*Seed*	1	500,000
	Shellstock	4	5,649,000
Manila clam	*Seed*	2	320,000,000-390,000,000

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[20] The total acreage does not include a small area sub-leased in the Crescent City Harbor as this area has been inactive over most of the study period. No further socioeconomic information was collected or included for this area.

Companies were asked to estimate the average price received by shellfish product type from 2000–08. The prices obtained for each shellfish type are provided in Table H4.

Table H4. Total products sold (average 2000–08)

Species	Unit	Units sold	Price range	Gross value estimate
Pacific oyster, seed	*$/1,000*	100,000	$3.80	$380,000
Pacific oyster, seed[21]	*$/1,000*	4,000	$40.00	$160,000
Pacific oyster shellstock	*$/each*	190,000	$0.40-0.42	$80,000
Pacific oyster, shucked	*$/gallon*	72,500	$39.00	$2,827,500
Kumamoto oyster, seed	*$/1,000*	500	$10.00	$5,000
Kumamoto oyster, shellstock	*$/each*	5,649,000	$0.45-1.80	$2,582,000
Manila clam, seed	*$/1,000*	355,000	$3.45-8.00	$1,930,000
			TOTAL	$7,964,500

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[21] There are two sizes of Pacific oyster seed sold.

APPENDIX I: North Central Coast IPA potential impacts on Point Arena

It has been noted that fishing grounds for Point Arena overlap study region boundaries. In an effort to highlight the potential additive impacts of North Coast Study Region proposals, we include potential impacts to Point Arena resulting from the North Central Coast Study Region process. More specifically, the information contained in this appendix comes from the evaluation entitled *Summary of potential impacts of the Integrated Preferred Alternative (IPA) and the North Central Coast Regional Stakeholder Group (NCCRSG) MPA proposals on commercial and recreational fisheries in the North Central Coast Study Region*.

Maps depicting the commercial fishing grounds for Point Arena can be found on MarineMap.

Table I1: Percentage of total commercial fishing grounds affected by IPA

Fisheries	Area	Value
Ca. Halibut	—	—
Coastal Pelagics	—	—
Market Squid	—	—
Deeper Nearshore Rockfish[22]	30.0%	26.4%
Nearshore Rockfish	16.1%	24.3%
Urchin	8.4%	10.4%
Dungeness Crab	8.0%	13.6%
Salmon	1.8%	12.4%

Table I2: Estimated Annual Net Economic Impact (NEI) for Point Arena Commercial Fisheries under IPA

Fishery	Baseline GER	Baseline NER (Profit)	Estimated Annual Net Economic Impact of MPA Proposals $ reduction in profit	% reduction in profit
Ca. Halibut	—	—	—	—
Coastal Pelagics	—	—	—	—
Market Squid	—	—	—	—
D. N. Rockfish	$1,424	$699	$291	41.7%
N. Rockfish	$64,259	$31,544	$12,073	38.3%
Urchin	$608,226	$366,963	$51,923	14.1%
Dungeness Crab	$46,951	$24,201	$4,771	19.7%
Salmon	$77,890	$41,610	$7,564	18.2%
All Fisheries	**$798,750**	**$465,016**	**$76,623**	**16.5%**

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[22] It should be noted that the deeper nearshore rockfish and nearshore rockfish fisheries are combined in the North Coast Study Region as Rockfish (Fixed Gear).