Commercial and recreational fishing grounds and their relative importance off the South Coast of California

Report to the California Marine Life Protection Act Initiative

In partial fulfillment of Contract No. 2008-004M,
Resources Legacy Fund Foundation

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January 28, 2010

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1. Introduction

Ecotrust was retained by the Marine Life Protection Act Initiative (MLPAI) in February of 2008 to collect, compile and analyze fishery data in support of the South Coast Project (see Appendix D for Scope of Work). During the summer and fall of 2008 (June through October), our research team developed and deployed an interactive, custom computer interview instrument to collect geo-referenced information from local fishermen about the extent and relative importance of South Coast Study Region (SCSR) commercial and recreational fisheries. We compiled these data in a geographic information system (GIS) that we delivered to the MLPAI for integration into a central geodatabase. We also analyzed the fishery data in combination with additional data provided to us by the California Department of Fish and Game (CDFG) to estimate first order maximum potential impacts of proposed marine protected area networks developed in the Marine Life Protection Act (MLPA) process.

This report, which details the approach and methods we used to collect, compile and analyze commercial and recreational fisheries data in SCSR, completes our deliverables to the MLPAI under the terms of the contract. It is important to note, however, that the analysis conducted under the scope of this contract is not the sum total of everything that could be done with the MLPAI geodatabase and the information contained therein. Indeed, the analysis conducted to date suggests additional questions and research that we were not able to address under this contract. That said, we hope this project not only makes a useful contribution to the MLPA process but also opens the door to further inquiry that draws on the expert knowledge of fishermen.

Conducting qualitative research in coastal communities is as challenging as it is rewarding. We have learned a tremendous amount from the commercial and recreational fishermen who participated in this study as well as and the countless other community members, stakeholders, and observers of the MLPA process.

We are deeply thankful to the 254 commercial and 119 commercial passenger fishing vessel (CPFV) fishermen who participated in the interviews as well as the 504 recreational fishermen who responded to our online survey—making time in their busy schedules, overcoming sometimes considerable reservations, and sharing their knowledge and experience with us. We thank all the members of the South Coast Regional Stakeholder Group and the MLPAI staff, and are especially grateful to our port liaisons: Joel Greenberg, Diane Pleschner-Steele, Jim Marshall, Thomas Dabney, Peter Halmay, and Dave Rudi.

We believe that this project has made a significant contribution to the knowledge base on the coast—not only by informing marine protected area planning but also by enhancing the public's and decision-makers' understanding of the importance of the coastal ocean to individual commercial and recreational fishermen and to coastal communities and economies.

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In addition to serving as the Principal Investigator on this study, Astrid Scholz is also a member of the Master Plan Science Advisory Team of the Marine Life Protection Act Initiative (http://www.dfg.ca.gov/mlpa/satmain.asp).

2. Background

In California, as elsewhere on the Pacific Coast, commercial and recreational fisheries support coastal communities and economies. These fisheries are prosecuted by vessels of all shapes and sizes using a variety of gear types and fishing strategies and covering a large part of the coastal ocean.

In general, the spatial component of fishing activities is poorly understood. While a variety of data are collected by state and federal agencies to monitor and enforce fishery regulations and to 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 inform intelligent policy decisions.

Basing fisheries management 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 and the 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.

In this project we built on existing approaches to collecting fishermen's expert knowledge about their fishing grounds. The goal was to develop maps of the fishing grounds in the South Coast Study Region (SCSR) and to characterize their relative importance for various fisheries.

In order to conduct an analysis of the relative effects of MPA proposals on commercial and recreational fisheries in the SCSR, we used data layers characterizing the spatial extent and relative stated importance of fishing grounds for target commercial and recreational fisheries. This information was collected during interviews with commercial and recreational fishermen from the SCSR whose individual responses were standardized using a 100-point scale and normalized to the reported fishing grounds for each fishery.

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

3. Methods

In this project, we built on methods developed in previous projects on the coast (Scholz et al. 2004; 2005; 2006a; 2008). More specifically, we used a computer interface to administer a survey, collected information from fishermen, and analyzed the responses in a geographic information system (GIS). As in the Central Coast Study Region (Scholz et al. 2006b) and North Central Coast Study Region (Scholz et al. 2008), a key innovation in this project was working with CDFG staff and regional experts to define the region's fisheries in terms of how they are managed. To that end, we differentiated fisheries in terms of practices and/or species (group)-gear configurations and used port groups to classify participants and design a representative sample.

While the use of GIS technology and analysis in marine and fishery management has expanded steadily over the past decade (Meaden 1996; Kruse et al. 2001; Breman 2002; Valavanis 2002; Fisher and Rahel 2004), its use for socioeconomic research is still somewhat limited. Many of the applications reviewed in the recent literature focus on urban populations or natural resource use in developing countries (Gimblett 2002; Goodchild and Janelle 2004; Anselin et al. 2004). Nevertheless, a growing body of literature has examined GIS-enabled approaches to community-based MPA design (Aswani and Lauer 2006; Hall and Close 2006; St. Martin et al. 2007; Ban et al. 2009) and there are several good examples to build on for improving the spatial specificity of the West Coast knowledge base and data landscape.

Some of the most pertinent applications of GIS technology to socioeconomic questions in fisheries concern the spatial extent of fishing effort and intensity (Caddy and Carocci 1999; Green and King 2003) and use participatory methods similar to the ones employed here (Wedell et al. 2005; St. Martin 2004; 2005; 2006). We built on these approaches and adapted them for the California context, following best practices for the use of participatory GIS in natural resource management (Quan et al. 2001), as described in the remainder of this section.

3.1. Study Region

The study region of this project is congruent with the South Coast Project of the MLPAI, extending from Point Conception in Santa Barbara County to the California/Mexico border in San Diego County, including offshore islands (for details of the South Coast Project, see http://www.dfg.ca.gov/mlpa/southcoast.asp).

Unlike the MLPAI South Coast Project, however, the western extent of our study region is not bounded by the state water boundary. Rather, we considered the entire Exclusive Economic Zone (EEZ) (although in reality most fisheries are confined to within 50 miles offshore). Similarly, we did not impose the southern and northern extent boundaries of the South Coast Project. Methodologically, this means that we did not "cut off" the area for fishermen to consider but asked them to draw their fishing grounds irrespective of political boundaries.

In keeping with the convention adopted by the MLPAI, we stratified our study region for commercial and recreational fisheries, respectively. For commercial and Commercial Passenger Fishing Vessel (CPFV) fisheries, we divided the study region into seven port groups: Santa Barbara, Ventura, Port Hueneme, San Pedro, Dana Point, Oceanside, and San Diego. For recreational fisheries, we divided the study region into five counties: Santa Barbara, Ventura, Los Angeles, Orange, and San Diego.

3.2. Fishery Common Names

In October 2009, the MLPAI Scientific Advisory Team (SAT) requested that all evaluation reports submitted to the SAT use the same common names when referring to SCSR fisheries.

Following the SAT's guidance, all datasets and deliverables we produced from October 2009 onward used these names. However, some of the datasets and deliverables we produced previously used different names. Table 1 (below) shows which species names were changed.

Table 1: Fisheries names used in Ecotrust datasets and deliverables

Name used prior to October 2009	Name used from October 2009 onward
Barracuda	Pacific Barracuda
Bonito	Pacific Bonito
Ca. Halibut	Ca. Halibut
Ca. Scorpionfish	Ca. Scorpionfish (sculpin)
Calico Bass	Kelp Bass (calico bass)
Coastal Pelagics	Coastal Pelagics (includes Northern Anchovy and Pacific Sardine)
Croaker	White Croaker
Lingcod	Lingcod
Live Bait	Live Bait (includes Northern Anchovy and Pacific Sardine)
Lobster	Ca. Spiny Lobster
Mackerel	Jack Mackerel
N. Fishery	N. Fishery (includes Cabezon, Greenlings, and some Rockfishes)
Rock Crab	Rock Crab
Rockfish	Rockfish
Sablefish	Sablefish (blackcod)
Sand Bass	Sand Bass (includes Barred Sand Bass (sand bass) and Spotted Sand Bass (spotted bay bass))
Scallops	Scallops
Sea Cucumber	Sea Cucumber
Shark	Thresher Shark
Sheephead	Ca. Sheephead
Spot Prawn	Spot Prawn
Squid	Market Squid
Surf Perch	Surfperch
Swordfish	Swordfish
Thornyhead	Thornyhead
Urchin	Red Sea Urchin
White Seabass	White Seabass
Whitefish	Ocean Whitefish
Yellowtail	Ca. Yellowtail

3.3. Survey Methods and Summary Statistics

During the summer and fall months of 2008 (June through October), Ecotrust personnel and field staff interviewed 254 commercial and 119 commercial passenger fishing vessel (CPFV). Additionally, 504 recreational fishermen along the Southern California coast responded to the online version of the survey.

In an effort to provide the data we collected to community members, stakeholders, and observers of the MLPA SCSR process in a timely manner, we submitted a report to the MLPAI on March 17, 2009 entitled *Survey Methods and Summary Statistics for Ecotrust's South Coast Study Region Fishery Uses and Values Project*. This report is attached as Appendix A.

The report contains details on our methods for data collection, including sample design, selection of fisheries, identification of commercial and recreational fishermen, interview protocols, and steps for quality assurance and quality control. The report also contains summary statistics highlighting survey findings:

Commercial

- Percentage the sample represents based on ex-vessel revenue (2000–07) for each port-fishery combination
- Survey representation by port grouping—both mean and median (number responding, age, years experience, percentage income from fishing)
- Survey results by gear type and fishery (number sampled, age, gender, years experience, percentage income from specific fishery, vessel length, haul capacity)
- Number of fishermen interviewed for each port-fishery combination (total number interviewed, number actually used)
- List of commercial fishing maps available in MarineMap and hard copy

CPFV

- Mean summary statistics by port and for the SCSR (number of respondents, age, vessel length, number of vessels operated, number of years operating, number of vessels owned, number of years owned, years of experience, days fishing per year, number of passengers, percentage out of state passengers, number of crew)
- CPFV related income and operating costs by port and for the SCSR—both mean and median (percentage income, percentage operating costs, percentage labor costs, percentage fuel costs)
- Percentage of trips associated with major fishing strategies by port and for the SCSR (offshore tuna, coastal freelance, island freelance, rockfish, miscellaneous)
- Trip type and trip length by port and for the SCSR (number of respondents)
- Number of respondents per port and species
- Datasets available in MarineMap and printed hard copy

Recreational

- Number of user group surveys completed per respondent
- Number of surveys by user group

Dive

- Dive survey response statistics—both mean and median (age, years experience, average annual number of days diving to fish, percentage time by dive type, primary mode of diving, primary access method)
- Divers experience level and years of experience (number of respondents, average years experience
- Number of dive respondents by county and species
- Datasets available in MarineMap and printed hard copy and list of the species used in the aggregate maps for each county

Kayak and human powered vessels

- Kayak survey response statistics—both mean and median (age, years experience, average annual number of days kayaking to fish)
- Top kayak launch/access sites (number of respondents for each site-ranking combination)
- Number of kayak angler respondents by county and species
- Datasets available in MarineMap and printed hard copy and list of the species used in the aggregate maps for each county

Pier/shore

- Pier/shore survey response statistics—both mean and median (age, years experience, average annual number of days pier/shore fishing)

Motor powered private vessels

- Private vessel survey response statistics—both mean and median (age, years operating a vessel, years of vessel ownership, vessel length, years experience, average annual number of days fishing)
- Top private vessel launch sites (number of respondents for each site-ranking combination)
- Number of recreational private vessel anglers respondents by county and species
- Datasets available in MarineMap and printed hard copy and list of the species used in the aggregate maps for each county

3.4. Evaluation Methods

In an effort to provide information on the methods we used to asses commercial and recreational fishery impacts in a timely manner, we submitted a report to the MLPAI on March 27, 2009 entitled *Draft Methods Used to Evaluate MPA Proposals in the MLPA South Coast Study Region*. This report is attached as Appendix B.

The report describes how we evaluated and summarized the maximum potential impacts on commercial and recreational fishing grounds associated with each of the MPA proposals (in terms of both total area and value affected) and how we conducted a socioeconomic impact analysis for commercial fisheries. The report details five steps in the socioeconomic impact analysis process:

1. Generate Baseline Estimates of Gross Economic Revenue
2. Generate Gross Economic Revenue for the Various MPA Alternatives
3. Generate Baseline Estimates of Net Economic Revenue
4. Generate Estimates of Net Economic Revenue for the Various MPA Alternatives
5. Generate Estimate of the Potential Primary Economic Impact for the Various MPA Alternatives

Following submission of *Methods Used to Evaluate MPA Proposals in the MLPA South Coast Study Region* report, we were asked to conduct a socioeconomic impact analysis for CPFV fisheries. We were also asked to expand our socioeconomic impact analysis for commercial and CPFV fisheries to include estimates of the potential gross economic impacts. We did this by adding a sixth step to the socioeconomic impact analysis process:

6. Generate Estimate of the Potential Primary Gross Economic Impact for the Various MPA Alternatives

Using the results from the steps 1-5, the potential primary gross economic impact (GEI) of a particular MPA alternative, *a,* on a particular fishery, *f,* can then be calculated as:

$$GEI_f(a) = BGER_f - GER_f(a).$$

The potential primary GEI of any MPA alternative, *a,* on <u>all</u> commercial fisheries ($f \in F$) can then be calculated as:

$$GEI_{TOT}(a) = BGER_{TOT} - GER_{TOT}(a).$$

For the results of these analyses, please see the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region* (Appendix E).

3.4.1. Channel Islands Impacts

The Channel Islands network consists of 11 marine reserves where all harvest and take is prohibited and two marine conservation areas that allow limited take of lobster and/or pelagic fish. The Channel Islands network was originally set to be reconsidered during the marine planning process. However, it was later decided that the Channel Islands MPAs would not be changed. Therefore, the potential impacts of the Channel Islands MPAs will be the <u>same</u> under all the alternative MPA proposals.

On June 17, 2009 we submitted a report to the MLPAI entitled *Summary of potential impacts of the Channel Islands MPAs on commercial and recreational fisheries in the South Coast Study Region*. This report is attached as Appendix C.

The report evaluates the potential impacts of the Channel Islands MPAs on commercial and recreational fishing grounds (in terms of both total area and value affected) and conducts a socioeconomic impact

analysis for the commercial and CPFV fisheries. By subtracting the Channel Islands impacts (Appendix C) from the total impacts in the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region* (Appendix E), stakeholders can more easily compare the various MPA alternatives.

3.4.2. Disproportionate Impacts

We also use the results of our analysis to evaluate whether there are port-fishery combinations that may be disproportionately affected by the four proposals considered.

To assess these impacts, we use a box plot analysis to identify outliers within each fishery (calculated using estimated impact on stated value of total fishing grounds minus the Channel Islands impacts). In a box plot analysis, outliers are defined as extreme values that deviate significantly from the rest of the sample. Box plot analysis results, presented in the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region* (Appendix E), can also inform convergence among MPA proposals within a fishery and relative potential impacts between fisheries.

3.4.3. Individual Impacts

We also evaluate if there are individual fishermen we interviewed who may be disproportionately affected by the four proposals considered.

Similar to our box plot analysis of disproportionate impacts, we conduct a box plot analysis of individual impacts excluding the Channel Islands impacts. We estimate individual impacts as the percentage change in each fisherman's ex-vessel revenue (across all fisheries in which he/she participates) before and after the potential area closures under each proposal. Box plot analysis results are presented in the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region* (Appendix E).

4. Results and Deliverables

To date, there have been two data products and one analytical product resulting from this study, all of which have been forwarded to the MLPAI. The two data products were two sets of maps of the port-fishery specific (including port-user group aggregations) and study region aggregations of the South Coast commercial (79 maps), CPFV (109 maps), and recreational (186 maps) fishing grounds. All commercial and CPFV maps were made available to South Coast Regional Stakeholder Group (RSG) members and external stakeholders through MarineMap in January 2009. All recreational maps were made available in February 2009. The information depicted on the maps was also provided as raster data sets for all fisheries examined at the 250m cell size, and which served as the basis for the impact analysis. All datasets were accompanied by metadata conforming to the Federal Geographic Data Committee (FGDC) standards (http://www.fgdc.gov/standards).

The analytical product was the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region* (see Appendix E).

4.1 Analytical Products

During the summer and fall of 2009, Ecotrust staff conducted a series of analyses on the various MPA proposals under consideration. The goal was to assess the maximum potential impacts of proposals both in terms of the area of fishing grounds affected and the stated importance of those areas. As expected, our analysis showed that not all areas of the ocean are valued equally and that some areas are more important to a fishery or fisheries than other areas. Such a finding suggests that even a small closure could have a large impact on fishermen (expressed in units of stated importance). The summary of our analyses, which was forwarded to the Fish and Game Commission on December 8, 2009, is included as Appendix E.

Ecotrust is committed to keeping in the public domain as much information as possible about the methods and tools we use. Researchers interested in replicating our analysis may contact us to obtain the specific Arc Macro Language (AML) code we used.

As we discuss further in the next section, the products we produced and delivered to the MLPAI under the terms of this contract are not an exhaustive list of products that could be created using the fishing grounds data we collected.

5. Discussion and Conclusion

This section reflects on several methodological and process lessons we learned in the hope of informing future iterations and/or applications of our approach. We also describe some opportunities for further analysis.

5.1. Weighting of Participants' Shapes

In the Central Coast process (Scholz et al. 2006b), each participant's fishing grounds were given equal treatment in the analysis. One of the many suggestions from the fishing community received during and after the Central Coast process was to consider weighting each participant's individual fishing grounds based on some measure of experience or success (e.g., years experience, percentage of income derived from fishing, percentage of income from a particular fishery investigated, ex-vessel revenue from the CDGF landing receipts). We considered all of these potential weights in the North Central Coast. Since the goal of the project was to analyze the gross and net economic impacts for each of the MPA proposals as they were being designed, we then decided that we needed to create a weighted surface across the ocean landscape that characterized a crude estimate of gross revenue.

For the South Coast, we used the same analytical methods as those developed and used in the North Central Coast (Scholz et al. 2008). More specifically, we multiplied the stated importance of each fisherman's fishing grounds by the proportion of his/her average ex-vessel revenue (2000–07) from CDFG landing receipts. Our approach, which has been praised in several reviews, gives greater weight to successful, experienced fishermen with higher revenues. For example, if fisherman A has higher landing receipts than fisherman B, fisherman A's 100 "pennies" are be worth more than fisherman B's in determining the overall value of the fishery.

The time period of 2000–07 was chosen for consistency across all fisheries due to limitations in categorizing CDFG landing receipts prior to 2000 for the nearshore and deep nearshore fisheries[1]. Information for 2008 was not available when the analysis was conducted.

5.2. Timing

Conducting detailed fieldwork and participatory research concurrently with a sometimes contentious policy process is ambitious—especially when the work period coincides with the summer fishing season. Ideally, detailed information about the fishing grounds and their relative importance would be available to decision makers prior to the beginning of the policy process.

Timing is often a constraint in the MLPAI process, especially when trying to gain a statistical representation of the region's fishing fleet. In the case of this project, we were able to collect data in the field, verify our results with the fishing community, and present our analysis to the South Coast Regional Stakeholder Group (RSG) in a timely manner, which assisted them in their process of siting the placement of MPAs.

The exact timing of when data were collected in the field and delivered to the process is outlined below.

- Data collected from commercial fishermen: June – September 2008
- Data collected from recreational fishermen: June – October 2008
- Commercial fishing grounds presented and used by the South Coast RSG: January 2009
- Recreational fishing grounds presented and used by the South Coast RSG: February 2009
- Final proposals developed and presented to the Blue Ribbon Task Force: October and November 2009

[1] The CDFG Nearshore Fisheries Management Plan was designed, drafted, and implemented in 2001–02.

5.3. Scale and Stratification of Fisheries

One notable improvement made to the commercial fisheries sample for the North Central Coast and South Coast processes when compared to the work done in the Central Coast process was to stratify the fisheries by geographical port groups and examine each fishery for each port individually (rather then just for the entire study region). More specifically, for each of the major commercial ports in the region (Santa Barbara, Ventura, Port Hueneme, San Pedro, Dana Point, Oceanside, and San Diego) we used CDFG landing receipts to identify fishermen to interview so that we could create maps of the fishing grounds that characterized the value and spatial extent of each fishery in each port where it occurred. We used these maps to analyze and report the potential economic impacts of the various MPA alternatives for each fishery not only at the study region level but also at each port.

Another improvement to our commercial fisheries sample was to group species based on how they are targeted or managed (where applicable). For example, in the Central Coast, we collected information for specific species that made up the nearshore and deep nearshore fisheries. In the South Coast, we targeted fishermen who held nearshore and/or deep nearshore fishery permits and asked them to provide their fishing grounds for nearshore species and deep nearshore species collectively (rather then for each species individually). This approach was applied to the coastal pelagics and live bait fisheries as well. For a list of which fisheries are included in each species grouping, please see section 3.2.

5.4. Quality Assurance and Quality Control

This project used valuable lessons learned in the Central Coast and North Central Coast related to protection of confidentiality and verification of information collected.

With respect to the issue of confidentiality, we used strict protocols conforming to human subject standards used at the University of California and elsewhere in academic research. Given the sensitive nature of fishing grounds data, we took numerous measures to protect each fisherman's information. These measures included training field staff on confidentiality protocols, masking all names and identifying characteristics of Open OceanMap shapefiles; incorporating new security features into OceanMap; showing draft aggregated maps of each fishery to no one outside the fishing community for review; incorporating information into MarineMap at sufficiently aggregated levels, and displaying our results in a format that maintained their information content without making visible any individual fishermen information. As in the North Central Coast, field staff were instructed to never use actual Open OceanMap shapes for demonstration purposes. Because of these protocols, no breaches of confidentiality were reported in the South Coast.

With respect to data verification, we provided multiple opportunities for fishermen to review the information they provided and verify its accuracy. As field staff collected data from the recreational and commercial fleets, Ecotrust staff edited the data to create "clean" datasets. We then mailed each fisherman a copy of his/her individual fishing grounds, a letter asking him/her to respond if any changes needed to be made, and an addressed, stamped envelope. If a fisherman did not respond after a three week time period, we assumed that the information he/she provided was correct.

Following this process, we created aggregated maps for each port-fishery. We then reviewed these maps for accuracy and discussed intended use at meetings in ports throughout the SCSR with key members of the fishing community in each port as well as South Coast RSG members. Those that could not attend review sessions in person were sent aggregate maps electronically. In many cases, this provided detailed verification and sign-off on the extent and relative importance of the fishing grounds for each fishery. Internally at Ecotrust, we also employed several QA/QC protocols that were designed to catch inconsistencies and other problems with the data. For example, we ran an automated check to make sure each respondent's shapes and weights added up to 100 pennies.

5.5. Further Analysis

We are actively exploring several avenues for further analysis. As we already found in the Central Coast region, fishermen-derived information can be used in other computer-based, decision support systems to explore the range of best options for balancing ecological and socioeconomic objectives of MPA design (Klein et al. 2008a; 2008b).

To understand the effectiveness of MLPAI stakeholder protected area designs, we partnered with the University of Queensland to develop Marxan with Zones. Marxan with Zones is an extension of Marxan that provides land and marine-use zoning options in geographical regions for biodiversity conservation (Watts et al. 2009). In addition to working with the University of Queensland to develop Marxan with Zones, we also performed an assessment were we examined the trade-offs between minimizing impacts to eight commercial fisheries and representing the range of marine ecosystems in the North Central Coast Study Region. We produced a zoning configuration that entailed value losses of less than 9% for every fishery, without compromising conservation goals. We found that a spatial numerical optimization tool that allows for multiple zones outperforms a tool that can identify marine reserves (Marxan) in two ways. First, the overall impact on the fishing industry is reduced. Second, there is a more equitable impact on different fishing sectors (Klein et al. 2009).

We also provided our data to modelers on the MLPA's Science Advisory Team to parameterize the dynamic fleet effort aspect of the bioeconomic models they developed in the South Coast (referred to as the UC Davis and UC Santa Barbara models). The modelers used our data to (1) compare their outputs to our analysis, since both dynamic and static approaches should yield congruent results for the baseline case with no MPAs, and (2) parameterize the fleet effort variables. We plan to continue working with the modelers to provide them access to our datasets from the North Coast Study Region so that they can to further refine their models.

As mentioned earlier, all fishing grounds dataset were made available to the South Coast RSG through MarineMap. Additionally, the RSG had access through MarineMap to MPA level potential impact reports for each port by sector (i.e., commercial, CPFV, and recreational). These reports provided stakeholder with both the potential area and value impacts of each MPA as:

1. Percentage of total fishing grounds affected by the proposed MPA
2. Percentage of fishing grounds within the study region affected by the proposed MPA
3. Percentage of total fishing grounds within the study region

Moving to the North Coast Study Region, we plan to provide more in-depth potential economic impact reports to the RSG through MarineMap, including MPA array level analysis and features that closely resemble the evaluation methods we used in the SCSR (section 3.4).

References

- Anselin, L., R. J. G. M. Florax and S. J. Rey, Eds. 2004. Advances in Spatial Econometrics: Methodology, Tools and Applications. New York: Springer.
- Aswani, S. and M. Lauer. 2006. Incorporating Fishermen's Local Knowledge and Behavior into Geographical Information Systems (GIS) for Designing Marine Protected Areas in Oceania. Human Organization 65(1): 81–102.
- Ban, N. C., C. R. Picard and A. C. J. Vincent. 2009. Comparing and Integrating Community-Based and Science-Based Approaches to Prioritizing Marine Areas for Protection. Conservation Biology 23(4): 899–910.
- Breman, J., Ed. 2002. Marine geography: GIS for the oceans and seas. Redlands: ESRI Press.
- Caddy, J. F. and F. Carocci. 1999. The spatial allocation of fishing intensity by port-based inshore fleets: a GIS application. ICES Journal of Marine Science 56(3): 388–403.
- Fisher, W. L. and F. J. Rahel, Eds. 2004. Geographic Information Systems in Fisheries. Bethesda, MD: American Fisheries Society.
- Gimblett, H. R., Ed. 2002. Integrating geographic information systems and agent-based modeling techniques for simulating social and ecological processes. New York: Oxford University Press.
- Goodchild, M. F. and D. G. Janelle, Eds. 2004. Spatially integrated social science. New York: Oxford University Press.
- Green, D. R. and S. D. King, Eds. 2003. Coastal and Marine Geo-Information Systems: Applying the Technology to the Environment. Dordrecht: Kluwer Academic Publishers.
- Hall, G. B. and C. H. Close. 2006. Local knowledge assessment for a small-scale fishery using geographic information systems. Fisheries Research 83(1): 11–22.
- Klein, C. J., A. Chan, L. Kircher, A. J. Cundiff, N. Gardner, Y. Hrovat, A. J. Scholz, B. Kendall and S. Airame. 2008a. Conservation Biology, OnLine Early Articles (ahead of print publication), http://www.blackwell-synergy.com/doi/abs/10.1111/j.1523-1739.2008.00896.x?journalCode=cbi.
- Klein, C. J., C. Steinback, A. J. Scholz, and H. P. Possingham. 2008b. Effectiveness of marine reserve networks in representing biodiversity and minimizing impact to fishermen: a comparison of two approaches used in California. Conservation Letters 1(1), 44–51.
- Klein, C. J., C. Steinback, M. Watts, A. J. Scholz, and H. P. Possingham. 2009. Spatial marine zoning for fisheries and conservation. Frontiers in Ecology and the Environment doi:10.1890/090047
- Kruse, G. H., N. Bez, A. Booth, M. W. Dorn, S. Hills, R. N. Lipcius, D. Pelletier, C. Roy, S. J. Smith and D. Witherell, Eds. 2001. Spatial processes and management of marine populations. Fairbanks, AK: University of Alaska Sea Grant.
- Meaden, G. J. 1996. Potential for geographical information systems (GIS) in fisheries management. In B. A. Megrey and E. Moksness (Eds.), Computers in Fisheries Research. London: Chapman and Hall, 41–77.
- Quan, J., N. Oudwater, J. Pender and A. Martin. 2001. GIS and Participatory Approaches in Natural Resources Research. Socio-economic Methodologies for Natural Resources Research Best Practice Guidelines. Chatham, UK: Natural Resources Institute.
- Scholz, A. J., C. Steinback, S. Klain and A. Boone. 2006a. Socioeconomic Profile of Fishing Activities and Communities Associated with the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries. Portland, OR: Ecotrust.
- Scholz, A. J., C. Steinback and M. Mertens. 2006b. Commercial fishing grounds and their relative importance off the Central Coast of California. Report submitted to the California Marine Life Protection Act Initiative (May 4).
- Scholz, A. J., C. Steinback, S. Kruse, M. Mertens and M. Weber. 2008. Commercial fishing grounds and their relative importance off the North Central Coast of California. Report submitted to the California Marine Life Protection Act Initiative (June 30).
- Scholz, A. J., M. Mertens and C. Steinback. 2005. The OCEAN Framework: Modeling the Linkages between Marine Ecology, Fishing Economy, and Coastal Communities. In D. Wright and A. J. Scholz (Eds.), Place Matters: Geospatial Tools for Marine Science, Conservation, and Management in the Pacific Northwest. Corvallis, OR: Oregon State University Press.

- Scholz, A. J., K. Bonzon, R. Fujita, N. Benjamin, N. Woodling, P. Black and C. Steinback. 2004. Participatory socioeconomic analysis: drawing on fishermen's knowledge for marine protected area planning in California. Marine Policy 28(4): 335–349.
- St. Martin, K. 2004. GIS in Marine Fisheries Science and Decision Making. In W. L. Fisher and F. J. Rahel (Eds.), Geographic Information Systems in Fisheries. American Fisheries Society, 237–258.
- St. Martin, K. 2005. Mapping Economic Diversity in the First World: The Case of Fisheries. Environment and Planning A 37(6): 959–979.
- St. Martin, K. 2006. The Impact of 'Community' on Fisheries Management in the U.S. Northeast. Geoforum.
- St. Martin, K., B. J. McCay, G. D. Murray, T. R. Johnson and B. Oles. 2007. Communities, Knowledge, and Fisheries of the Future. International Journal of Global Environmental Issues 7(2/3): 221–239.
- Valavanis, V. D., Ed. 2002. Geographic information systems in oceanography and fisheries. New York: Taylor & Francis.
- Wedell, V., D. Revell, L. Anderson and L. Cobb. 2005. Port Orford Ocean Resources Team: Partnering Local and Scientific Knowledge with GIS to Create a Sustainable Community in Southern Oregon. In D. Wright and A. J. Scholz (Eds.), Place Matters: Geospatial Tools for Marine Science, Conservation, and Management in the Pacific Northwest. Corvallis, OR: Oregon State University Press.
- Watts, M. E., I. R. Ball, R. S. Stewart, C. J. Klein, K. Wilson, C. Steinback, R. Lourival, L. Kircher, and H. P. Possingham. 2009. Marxan with Zones: software for optimal conservation based land- and sea use zoning. Environmental Modeling & Software 24(12): 1513–1521.
- Wilen, J. and J. Abbott. 2006. Estimates of the Maximum Potential Economic Impacts of Marine Protected Area Networks in the Central California Coast. A final report submitted to the California MLPA Initiative in partial fulfillment of Contract #2006-0014M (July 17).

Appendices

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Appendix A: Survey Methods and Summary Statistics

Survey Methods and Summary Statistics for Ecotrust's South Coast Study Region Fishery Uses and Values Project

Draft 17 March 2009
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A.1. Background

In California, as elsewhere on the Pacific Coast, commercial and recreational fisheries support coastal communities and economies. Fisheries are prosecuted by vessels of all shapes and sizes, using a variety of gear types and fishing strategies and covering a large part of the coastal ocean. In general, this spatial component of fishing activities is poorly understood.

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 decisions.

Clearly, basing management decisions on the spatial information contained in these existing data sources is problematic. The alternative is to collect new information on the spatial extent of fishing activities and the 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.

In this project, therefore, we built on existing approaches to collect fishermen's expert knowledge about the fishing grounds. The goal was to develop maps of the fishing grounds and characterize their relative importance for various fisheries.

In order to conduct an analysis of the relative effects of MPA proposals on commercial and recreational fisheries that are conducted in the waters in the South Coast Study Region (SCSR), we use data layers characterizing the spatial extent and relative stated importance of fishing grounds for target commercial and recreational fisheries. This information was collected during interviews with commercial and recreational fishermen from the SCSR whose individual responses regarding the relative importance of ocean areas for each fishery were standardized using a 100-point scale and normalized to the reported fishing grounds for each fishery.

The following sections contain detailed descriptions of the survey methods used to redress the spatial information gaps in commercial fisheries in the context of the Marine Life Protection Act (MLPA), and its implementation in the SCSR.

A.2. Methods

In May 2008, before commencing interviews, Ecotrust staff conducted a series of outreach meetings with members of the 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, provided information (i.e., handouts, Frequently Asked Questions (FAQs) and Power Points) for fishing organizations/associations to use at meetings and/or on blogs, websites and discussion boards. The project was also described on a web page, at

http://www.ecotrust.org/mlpa, which included an online form for submitting questions and an FAQ page where submitted questions were answered by Ecotrust staff.

Commercial fishermen were identified based on California Department of Fish and Game (CDFG) data. More specifically, we used CDFG landing statistics to identify fishermen to interview about the fishing grounds for each of the target commercial fisheries. Given the expert nature of the information we were interested in for this project, the use of a random sample was not the most desirable sampling method. Instead, we constructed a purposive, proportional quota sample that was designed to be representative of the fisheries overall. CDFG staff generated a list of fishermen by landings and we inspected this list to identify participants such that, based on the population within the fishery groupings and port-groups, the sample would represent:

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

After commercial fishermen were identified, port liaisons and Ecotrust staff initiated contact with individuals to ask for their participation in the process and to schedule a time for the interview. During the interview process, commercial fishermen were asked if they knew other commercial fishermen who they felt either should be interviewed or would be interested in being interviewed.

In consultation with Marine Life Protection Act Initiative (MLPAI), CDFG staff and fishermen in the region, we selected key commercial fisheries on which to focus our efforts (see Appendix A.1). These are all fisheries that are at least partially 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. That is to say, the best fishery-independent spatial information available for them is contained in the statistical blocks reported in landing receipts. In the case of the SCSR, nine key fisheries were selected (i.e., coastal pelagics - seine, live bait, lobster - trap, nearshore fishery - hook & line, nearshore fishery - trap, rock crab - trap, spot prawn - trap, squid - seine, and urchin - dive), although results also are reported here for 22 other SCSR commercial fisheries.

Recreational fishermen, with the exception of commercial passenger fishing vessel (CPFV) operators, 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. Outreach to CPFV operators was done through a sector liaison who worked with associations, owners and operators to identify and contact individuals participating in this sector. A number of factors, including the unknown overall size of the SCSR 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 using surveymonkey.com or by contacting an Ecotrust staff member.

The interview process varied by sector; commercial fishermen were interviewed in-person using a desktop version of custom-built GIS application known as Open OceanMap[2] as were the CPFV operators. Recreational interviews were done using a web-based version of Open OceanMap.

As mentioned above, recreational fishermen interested in participation were asked to sign up either online or by phone. Sign-up was open both before and during the survey process. An initial email communication was sent in June to individuals already signed up to let them know about the process. This was followed by 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 an FAQ page specific to the web-based tool. Reminder emails were sent to individuals who had not activated or completed their survey by a set date and sector liaisons and key members of the recreational fishing community received periodic updates throughout the process on the number of responses received and the distribution of responses by user groups. Finally, at the request of the fishing community, the survey deadline was extended to accommodate additional participants.

[2] For more information on Open OceanMap, see http://www.ecotrust.org/ocean/OpenOceanMap.html.

Over the course of collecting data, we found that some participants felt the online survey was cumbersome or difficult to complete. Our staff responded quickly to requests for help and/or complaints about the survey. We realize, however, that some participants chose not to complete the survey for various reasons, including complications, connection speed, or the general difficulty of the software among others. Our decision to use the online version was to increase participation. Based on our experience in the North Central Coast Study Region, we felt we had two options: in-person or online interviews. In the North Central Coast Study Regions, the use of in-person resulted in a limited number of recreational respondents. Given the high number of recreational anglers in the SCSR, we felt the online interview option would allow us to reach a greater number of individuals and our results support this decision. We are using feedback received during the SCSR interview process to improve our methods and the online interview tool.

Data were entered into an Open Source GIS using Open OceanMap. Its interface allows field staff or the fisherman to enter fishing grounds directly into a spatially enabled database, and standardize this information across a number of respondents or fisheries. It is programmed to allow fishermen to draw shapes in their natural sizes (polygons) rather than confining responses to a statistical grid and/or political boundaries. 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.

All interviews follow a shared protocol:

1. Maximum extent: Using electronic and paper nautical charts of the area, fishermen are asked to identify, by fishery, the maximum extent north, south, east, and west they would forage or target a species.
2. Scaling: They are 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 distribute over the fishing grounds.
3. Non-spatial information pertaining to demographics and basic operations was also collected.

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

The second step serves to scale respondents’ reporting of the relative importance of the fishing grounds to a common scale. This is important for making inter and intra fishery comparisons. We chose 100 pennies as an intuitive common sum scale for scoring the relative importance of subareas identified within the larger fishing grounds. It also provides us with a convenient accounting unit for aggregating the stated importance per unit area in the intermediary steps of the various analyses performed.

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

Throughout the project we strove to protect the confidentiality of the 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 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 that maintains the information content without making it visible (individual fishermen information), for use in stakeholder group meetings. 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 (QA/QC) involved a four step process:

1. Editing of shapes by Ecotrust staff based on notes from interviews and when required to standardize the data (e.g., clipping a shape to the shoreline);
2. Review by each participant of his/her individual maps and information;
3. Review by the fishing community, though multiple group meetings, to verify aggregated results; and
4. Coordination with fishing community to ensure confidentiality of any publicly displayed information.

A.3. Summary Statistics

During the summer and fall months of 2008 (June through October), Ecotrust personnel and field staff interviewed 254 commercial and 119 commercial passenger fishing vessel (CPFV). Additionally, 504 recreational fishermen along the Southern California coast responded to the online version of the survey. The following sub-sections highlight survey findings.

A.3.1. Commercial

We encountered varying success in achieving a sample that met the criteria outlined above. Priority fisheries are highlighted in bold in the tables below (i.e., coastal pelagics - seine, lobster - trap, nearshore fishery - hook & line, nearshore fishery - trap, rock crab - trap, spot prawn - trap, and squid - seine) and the majority of them exceed the 50% goal (see Table A.1). The live bait fishery is not included in Table A.1 because landings are not tracked for this fishery. These commercial fisheries were considered priority fisheries (highlighted in bold in both Tables A.1 and A.2) in terms of our data collection effort because of their economic value to the study region and they primarily occur inside state waters.

Table A.1 captures the percentage of ex-vessel revenue (2000–07) that our sample represents for each fishery in each port. Of the priority fisheries, the overall representation for the study region was highest for spot prawn - trap (88%), followed by lobster - trap (71%), then nearshore fishery - trap (65%), coastal pelagics - seine (58%), rock crab - trap (58%), urchin - dive (47%), squid - seine (43%), and nearshore fishery - hook & line (38%). The overall representation for the entire study region was 47% of ex-vessel revenue. By port the highest representation was in Oceanside (80%), followed by Dana Point (70%), Santa Barbara (52%), San Pedro (51%), San Diego (47%), Ventura (40%), and Port Hueneme (32%). The percentage representation varies across ports for each fishery, but the consistently high representation overall is a reflection of the number responses captured for the higher value fisheries in the study region (i.e., priority fisheries). It was easier to achieve a greater percentage of the ex-vessel landings in the smaller ports of Oceanside and Dana Point because there are fewer fishermen in these ports.

Table A.2 summarizes the number of fishermen interviewed who landed greater than 10% of their catch per fishery (2000–07) in each port. For example, we interviewed six fishermen who landed lobster in Oceanside, which comprised 81% of the ex-vessel revenue (2000–07) for that fishery in Oceanside, compared to thirty fishermen who landed lobster in San Diego, which comprises 72% of the ex-vessel revenue for that same period. In both cases, we exceeded our sampling criteria, but because there are considerably more landings and fishermen in San Diego, it took a greater number of interviews to reach our target of 50%. In total, we interviewed 254 commercial fishermen. The following fisheries received the highest number of responses: lobster - trap (101), urchin - dive (76), rock crab - trap (47), squid - seine (30), coastal pelagics - seine (25) and nearshore fishery - trap (25). These numbers and those in Table A.2 are not mutually exclusive, in that a fisherman often participates in more than one fishery. In general, this breakdown of fishermen interviewed per fishery matches the overall distribution of fishermen and value of the fisheries in the SCSR, as shown in Appendix A.1.

Table A.1: Percentage the sample represents based on ex-vessel revenue (2000–07)

Fishery	Santa Barbara	Ventura	Port Hueneme	San Pedro	Dana Point	Ocean-side	San Diego	SCSR
California Halibut (Hook & Line)	25%	19%	26%	1%	—	—	—	12%
California Halibut (Set Gillnet)	0%	0%	0%	10%	—	0%	0%	3%
California Halibut (Trawl)	9%	0%	0%	0%	—	—	—	4%
Coastal Pelagics (Seine)	**—**	**—**	**54%**	**59%**	**—**	**—**	**—**	**58%**
Coastal Pelagics (Brail)	—	—	—	54%	—	—	—	53%
Deep Nearshore Fishery (Hook & Line)	22%	12%	47%	17%	—	—	79%	32%
Hagfish (Trap)	0%	0%	0%	25%	—	—	—	10%
Lobster (Trap)	**71%**	**87%**	**77%**	**52%**	**78%**	**81%**	**72%**	**71%**
Nearshore Fishery (Hook & Line)	**49%**	**7%**	**17%**	**12%**	**—**	**—**	**70%**	**38%**
Nearshore Fishery (Trap)	**47%**	**84%**	**34%**	**53%**	**80%**	**68%**	**87%**	**65%**
Bonito (Seine)	—	—	0%	78%	—	—	—	69%
Rock Crab (Trap)	**62%**	**69%**	**45%**	**46%**	**67%**	**22%**	**58%**	**58%**
Sablefish (Longline)	—	—	0%	51%	20%	100%	41%	43%
Salmon (Troll)	19%	51%	0%	0%	—	—	—	20%
Sea Cucumber (Dive)	38%	17%	35%	35%	—	—	44%	33%
Sea Cucumber (Trawl)	3%	0%	0%	0%	—	—	—	2%
Shark (Drift Gillnet)	61%	2%	—	0%	—	—	0%	8%
Shark (Hook & Line)	1%	0%	—	0%	0%	—	19%	4%
Spider Crab (Trap)	1%	0%	3%	5%	0%	—	1%	4%
Spot Prawn (Trap)	**89%**	**83%**	**72%**	**95%**	**85%**	**100%**	**96%**	**88%**
Squid (Brail)	—	—	27%	35%	—	—	—	35%
Squid (Seine)	**11%**	**40%**	**24%**	**57%**	**—**	**—**	**—**	**43%**
Swordfish (Drift Gillnet)	60%	0%	—	4%	—	—	2%	3%
Swordfish (Harpoon or Spear)	—	—	—	9%	52%	14%	18%	23%
Thornyhead (Longline)	—	—	0%	74%	63%	99%	89%	64%
Tuna (Seine)	—	—	—	2%	—	—	—	2%
Urchin (Dive)	**50%**	**—**	**41%**	**44%**	**66%**	**97%**	**53%**	**47%**
Whelk (Trap)	0%	—	—	4%	0%	—	93%	21%
White Seabass (Gillnet)	53%	8%	0%	14%	—	0%	4%	18%
White Seabass (Hook & Line)	0%	0%	67%	0%	—	—	11%	25%
Total[3]	**52%**	**40%**	**32%**	**51%**	**70%**	**80%**	**47%**	**47%**

[3] Based on just the above fisheries.

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

Fishery	Santa Barbara	Ventura	Port Hueneme	San Pedro	Dana Point	Ocean-side	San Diego	SCSR	SCSRU
California Halibut (Hook & Line)	6	2	4	0	—	—	—	9	8
California Halibut (Set Gillnet)	0	0	0	1	—	0	0	1	1
California Halibut (Trawl)	3	0	0	0	—	—	—	3	3
Coastal Pelagics (Seine)	**—**	**—**	**5**	**22**	**—**	**—**	**—**	**25**	**22**
Coastal Pelagics (Brail)	—	—	—	2	—	—	—	4	2
Deep Nearshore Fishery (Hook & Line)	4	0	1	1	—	—	1	7	7
Hagfish (Trap)	0	0	0	2	—	—	—	5	2
Lobster (Trap)	**22**	**7**	**8**	**12**	**23**	**6**	**30**	**101**	**96**
Nearshore Fishery (Hook & Line)	**8**	**0**	**3**	**1**	**—**	**—**	**2**	**14**	**12**
Nearshore Fishery (Trap)	**4**	**3**	**2**	**3**	**3**	**2**	**10**	**25**	**21**
Bonito (Seine)	—	—	0	6	—	—	—	7	6
Rock Crab (Trap)	18	5	3	7	5	3	11	47	45
Sablefish (Longline)	—	—	0	4	3	4	0	4	4
Salmon (Troll)	3	1	0	0	—	—	—	5	5
Sea Cucumber (Dive)	6	2	8	5	—	—	2	22	17
Sea Cucumber (Trawl)	3	0	0	0	—	—	—	4	3
Shark (Drift Gillnet)	2	0	—	0	—	—	0	2	2
Shark (Hook & Line)	1	0	—	0	0	—	2	3	3
Spider Crab (Trap)	1	0	1	2	0	—	1	4	4
Spot Prawn (Trap)	**1**	**1**	**1**	**6**	**4**	**3**	**3**	**16**	**13**
Squid (Brail)	—	—	0	17	—	—	—	22	17
Squid (Seine)	**0**	**16**	**14**	**29**	**—**	**—**	**—**	**30**	30
Swordfish (Drift Gillnet)	1	0	—	1	—	—	2	4	3
Swordfish (Harpoon or Spear)	—	—	—	0	2	0	1	3	3
Thornyhead (Longline)	—	—	0	3	3	4	0	4	4
Tuna (Seine)	—	—	—	2	—	—	—	3	2
Urchin (Dive)	**31**	**—**	**14**	**29**	**3**	**1**	**10**	**76**	**74**
Whelk (Trap)	0	—	—	2	0	—	4	6	4
White Seabass (Gillnet)	3	1	0	3	—	0	1	7	7
White Seabass (Hook & Line)	0	0	1	0	—	—	1	2	2
Live Bait - Coastal Pelagics	**0**	**0**	**0**	**5**	**1**	**1**	**4**	**11**	**11**
Total	**63**	**28**	**47**	**103**	**31**	**12**	**52**	**254**	

For analytical purposes we chose to group fishermen by their port(s) of landing (Table A.2) versus their homeport (Table A.3). We did this because the landings information is limited to where fishermen land their catch, thus making it difficult to estimate the total number of fishermen per home port. We can estimate, however, the total number of fishermen and ex-vessel revenue for each fishery based on landing port, which is what we use to derive our sample. Additionally, when fishermen provide their fishing grounds during the interview, their response not restricted to where they land or what they consider as a homeport, but rather, it is based on the entire extent of their fishing grounds and cumulative fishing experience. During the interview process we ask each fisherman to identify his/her homeport, which is summarized in Table A.3. For example, when comparing the number fishermen per homeport versus landing port, out of the 254 fishermen whose information we used, 23 considered Dana Point to be their homeport, but according to the landings receipts, 31 of the 254 fishermen landed in Dana Point in the

2000–07 period across all fisheries considered.

It should also be noted that not all of the information collected from the 254 respondents was used. There are cases where a fisherman provided information for a particular fishery, but was not detected when compared to the CDFG landing receipts (2000–07). Since ex-vessel value from the CDFG landing receipts form the basis for weighing an individual fisherman's fishing grounds in the aggregated fishing grounds analysis, those without landings information would effectively decrease the value of the aggregated grounds. This difference in total number of fishermen interviewed and those actually used is reflected in Table A.2, Columns SCSR and SCSRU. For example, we interviewed 101 fishermen that provided information for the lobster - trap fishery, but we only consider 96 of them in our analysis due to lack of landings information for five fishermen who provided shapes for this fishery[4].

By port group, San Pedro had the highest number of respondents, with 77 respondents citing it as their homeport. The average respondent was a 50 year old male with 27 years of fishing experience. The majority of respondents (75%) reported 100% of their income comes from fishing. Table A.3 shows a breakdown of respondents by homeport and Table A.4 shows survey responses broken out by gear type and by fishery.

Table A.3: Survey representation by port grouping

	Number responding	Age		Years experience		Income from fishing (%)	
		Mean	Median	Mean	Median	Mean	Median
Santa Barbara	56	52	52	28	30	91%	100%
Ventura	12	48	46	28	25	99%	100%
Port Hueneme	19	53	52	30	30	93%	100%
San Pedro	77	49	49	25	25	89%	100%
Dana Point	23	51	50	27	21	88%	100%
Oceanside	8	49	51	26	30	75%	100%
San Diego	50	49	48	24	26	86%	100%
Outside Study Region	4	49	46	33	31	98%	100%
No Homeport Given	5	—	—	—	—	—	—
SCSR	**254**	**50**	**50**	**26**	**27**	**90%**	**100%**

[4] Exact cause or reason for a given fisherman's information not being present in the CDFG landing receipts is unknown. Possible reasons include that they are retired or have not made landings in the time period we considered, they do not target and/or make landings for a fishery they provided information for, and/or information is misreported in CDFG landings receipts.

Table A.4: Survey results by gear type and fishery

	Number Sampled	Age		Gender		Years experience fishing		Income from fishing (%)		Income from specific fishery (%)		Vessel Length (ft.)		Haul capacity (lbs.)	
		Mean	Median	Male	Female	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Dive	**76**	**52**	**52**	**99%**	**1%**	**28**	**29**	**94%**	**100%**	–	–	**31**	**32**	**7,220**	**5,000**
Sea Cucumber	22	51	53	100%	0%	26	28	91%	100%	31%	23%	34	36	9,193	6,000
Urchin	76	52	52	99%	1%	28	29	95%	100%	85%	100%	31	32	7,076	5,000
Trap	**115**	**49**	**49**	**99%**	**1%**	**24**	**22**	**88%**	**100%**	–	–	**31**	**30**	**8,055**	**2,000**
Hagfish	5	48	49	100%	0%	6	2	67%	100%	46%	40%	36	37	9,000	9,500
Lobster	101	48	49	99%	1%	25	24	88%	100%	–	–	29	29	5,457	2,000
Nearshore Fishery	25	44	46	100%	0%	24	22	96%	100%	17%	10%	33	32	8,729	2,361
Rock Crab	47	48	48	100%	0%	24	22	96%	100%	26%	18%	32	32	7,550	2,132
Spider Crab	4	40	40	100%	0%	19	17	100%	100%	19%	18%	25	25	2,090	1,954
Spot Prawn	16	49	47	100%	0%	27	25	99%	100%	66%	66%	43	42	22,803	7,268
Whelk	6	42	35	100%	0%	15	13	100%	100%	25%	8%	28	25	1,946	1,361
Seine	**43**	**51**	**51**	**100%**	**0%**	**32**	**30**	**97%**	**100%**	–	–	**68**	**69**	**120,072**	**100,000**
Coastal Pelagics	25	52	50	100%	0%	32	30	100%	100%	43%	30%	71	70	155,102	140,000
Pacific Bonito	7	55	54	100%	0%	35	30	100%	100%	–	–	79	81	210,000	195,000
Squid	30	51	50	100%	0%	31	29	98%	100%	63%	70%	67	70	151,655	140,000
Tuna	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Live Bait	11	48	53	100%	0%	32	40	92%	100%	76%	100%	69	60	46,364	40,000
Brail	**24**	**44**	**43**	**100%**	**0%**	**22**	**22**	**70%**	**90%**	–	–	**45**	**44**	**39,636**	**38,000**
Coastal Pelagics	4	40	37	100%	0%	17	20	65%	63%	15%	15%	34	33	21,500	22,000
Squid	22	44	43	100%	0%	22	22	69%	90%	49%	60%	47	47	43,300	40,000
Hook & Line	**32**	**39**	**44**	**100%**	**0%**	**21**	**23**	**94%**	**100%**	–	–	**32**	**32**	**7,413**	**2,066**
California Halibut	9	47	46	100%	0%	26	25	89%	100%	32%	5%	30	27	8,794	1,567
Deep Nearshore Fishery	7	48	48	100%	0%	28	28	100%	100%	18%	10%	36	35	10,995	6,000
Nearshore Fishery	14	43	44	100%	0%	23	24	98%	100%	23%	15%	32	33	5,298	3,768
Sablefish	4	–	–	100%	0%	–	–	100%	100%	25%	25%	–	–	–	–
Shark	3	45	36	100%	0%	26	15	63%	75%	7%	5%	26	26	1,021	1,021
Thornyhead	4	–	–	100%	0%	–	–	100%	100%	75%	75%	–	–	–	–
White Seabass	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Trawl	**5**	**62**	**62**	**100%**	**0%**	**40**	**38**	**97%**	**100%**	–	–	**51**	**52**	**20,800**	**18,000**
California Halibut	3	67	69	100%	0%	45	44	95%	95%	32%	32%	52	52	13,499	18,000
Sea Cucumber	4	62	64	100%	0%	41	41	99%	100%	35%	32%	51	53	21,500	12,247
Gillnet	**10**	**56**	**57**	**100%**	**0%**	**31**	**35**	**87%**	**100%**	–	–	**46**	**45**	**19,398**	**16,000**
California Halibut	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Shark	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Swordfish	4	56	57	100%	0%	26	32	76%	95%	33%	40%	52	50	31,144	19,000
White Seabass	7	58	60	100%	0%	36	36	94%	100%	31%	30%	45	46	15,270	18,000
Troll - Salmon	**5**	**57**	**54**	**100%**	**0%**	**37**	**35**	**89%**	**98%**	18%	20%	**38**	**34**	**10,061**	**8,000**
Harpoon & Spear - Swordfish	**3**	**49**	**53**	**100%**	**0%**	**32**	**30**	**67%**	**50%**	78%	100%	**41**	**42**	**7,667**	**8,000**

By gear type, trap fishermen are the largest group of respondents (109) and represent hagfish, lobster, nearshore fishery, rock crab, spider crab, spot prawn, and whelk fisheries. The trap fishery with the most respondents was lobster, with 101 respondents. Divers are the next largest gear type represented, with a total of 76 divers responding. All dive respondents participate in the urchin fishery and 22 also fish sea cucumber. Trawl respondents have the most experience of any gear type, with an average of 40 years of fishing experience. Most respondents, across all gear types and fisheries reported their entire personal income comes from fishing, with averages between 80–99%. Urchin divers reported the highest average income from a specific fishery—an average of 85% of their fishing related income comes from urchin - dive. Reponses from individuals in gear type/fishery groupings with fewer than three respondents are not shown here, in order to maintain the confidentiality of respondents' information.

A.3.2. Commercial Passenger Fishing Vessel (CPFV)

A total of 119 CPFV operators were interviewed by field staff. When broken out by port, San Diego has the highest percentage of respondents (29%). Additional information on respondents by port is shown below in Table A.5.

Table A.5: CPFV respondents by port

	# of respondents	% of total respondents
Santa Barbara	3	3%
Port Hueneme / Channel Islands Harbor	15	13%
Santa Monica	9	8%
San Pedro (LA Harbor) / Long Beach	24	20%
Newport Beach	15	13%
Dana Point	9	8%
Oceanside	10	8%
San Diego	34	29%
SCSR	**119**	**100%**

The average respondent has 25 years of fishing experience, has been operating two vessels for 16 years and has owned two vessels for 15 years. Across the entire study region, respondents reported fishing an average of 192 days per year. Respondents have an average of 26 passengers per trip and 25% of these passengers, on average, are from out of state. Average responses, by port group, are shown in Table A.6.

Table A.6: Mean summary statistics for CPFV respondents

	Santa Barbara	Port Hueneme	Santa Monica	San Pedro	Newport Beach	Dana Point	Ocean-side	San Diego	SCSR
Age	51	45	49	39	45	38	47	40	42
Vessel Length (ft.)	43	55	60	66	70	61	70	72	66
Number of vessels operated	1	2	1	1	2	2	3	1	2
Number of years operating	20	17	17	15	17	15	17	15	16
Number of vessels owned	1	1	1	1	4	1	4	2	2
Number of years owned	12	14	14	9	17	29	26	14	15
Years of experience	33	31	21	25	25	26	24	24	25
Days fishing per year	145	185	221	199	178	228	212	177	192
Number of passengers	12	20	23	27	32	30	29	26	26
Out of state passengers (%)	33%	18%	18%	11%	16%	31%	32%	38%	25%
Number of crew	2	3	3	3	3	3	4	4	3

Respondents were asked what percentage of their income is CPFV related and of their gross revenue, what percentage goes towards crew or labor and what percentage goes towards fuel. The SCSR average percentage of income that is CPVF related is 85%; however, 66% of the respondents reported that 100% of their income is related to their CPFV operations. On average, 71% of fishermen's gross revenue goes towards operating costs, of which 21% goes towards crew and 30% goes towards fuel. Table A.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.

Table A.7: CPFV related income and operating costs

		% income	Operating costs	Labor costs	Fuel costs
Santa Barbara	Mean	78%	67%	22%	31%
	Median	100%	60%	25%	35%
Port Hueneme / Channel Islands Harbor	Mean	79%	61%	21%	25%
	Median	100%	70%	20%	25%
Santa Monica	Mean	86%	74%	20%	27%
	Median	100%	70%	20%	28%
San Pedro (LA Harbor) / Long Beach	Mean	79%	65%	25%	32%
	Median	100%	70%	23%	25%
Newport Beach	Mean	80%	62%	18%	40%
	Median	90%	60%	20%	40%
Dana Point	Mean	94%	79%	22%	25%
	Median	100%	82%	20%	28%
Oceanside	Mean	80%	62%	18%	27%
	Median	100%	60%	14%	23%
San Diego	Mean	95%	82%	21%	32%
	Median	100%	80%	21%	30%
SCSR	Mean	85%	71%	21%	30%
	Median	100%	75%	20%	26%

Fishermen were also asked what percentage of their trips was associated with each of the following five fishing strategies: offshore tuna, coastal freelance, island freelance, rockfish and miscellaneous. Over the entire study region, costal freelance was the most popular strategy (see Table A.8).

Table A.8: Percentage of trips associated with major fishing strategies

Strategy	Santa Barbara	Port Hueneme	Santa Monica	San Pedro	Newport Beach	Dana Point	Ocean-side	San Diego	SCSR
Offshore Tuna	2%	5%	0%	6%	16%	15%	23%	40%	18%
Coastal Freelance	24%	18%	55%	38%	37%	54%	45%	23%	33%
Island Freelance	22%	37%	11%	26%	27%	11%	4%	14%	21%
Rockfish	39%	34%	31%	24%	11%	9%	14%	16%	21%
Miscellaneous	13%	6%	2%	6%	9%	11%	13%	7%	8%

Respondents were also asked to identify their primary trip type (charter or open party) and typical trip length. The majority of respondents in the SCSR (54%) operate open party trips. Within the SCSR, trip length is split fairly even between 1/2 day (27%), 3/4 day (24%), and overnight/multi-day trips (30%), although the overnight/multi-day trip length is more typically of San Diego CPFV fleet (62%) when compared with other ports in the region. The next closest is half of that, which is Oceanside at 30%. The other, more northern, ports in the region seem to favor 1/2 day and 3/4 day trip length. Additional information on trip type and length is reported in Table A.9.

Table A.9: CPFV trip type and trip length

		Santa Barbara		Port Hueneme		Santa Monica		San Pedro		Newport Beach		Dana Point		Oceanside		San Diego		Total	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Trip Type	Charter	2	67%	9	60%	2	22%	6	25%	2	13%	1	11%	2	20%	13	38%	37	31%
	Open Party	0	0%	5	33%	7	78%	17	71%	8	53%	6	67%	6	60%	15	44%	64	54%
	No response	1	33%	1	7%	0	0%	1	4%	5	33%	2	22%	2	20%	6	18%	18	15%
	Total	**3**	**100%**	**15**	**100%**	**9**	**100%**	**24**	**100%**	**15**	**100%**	**9**	**100%**	**10**	**100%**	**34**	**100%**	**119**	**100%**
Trip Length	1/2 Day	0	0%	1	7%	5	56%	9	38%	6	40%	2	22%	2	20%	7	21%	32	27%
	3/4 Day	1	33%	4	27%	2	22%	7	29%	2	13%	5	56%	3	30%	5	15%	29	24%
	All Day	0	0%	6	40%	0	0%	1	4%	2	13%	1	11%	1	10%	1	3%	12	10%
	Overnight / Multi-day	0	0%	1	7%	0	0%	6	25%	4	27%	1	11%	3	30%	21	62%	36	30%
	No Response	2	67%	3	20%	2	22%	1	4%	1	7%	0	0%	1	10%	0	0%	10	8%
	Total	**3**	**100%**	**15**	**100%**	**9**	**100%**	**24**	**100%**	**15**	**100%**	**9**	**100%**	**10**	**100%**	**34**	**100%**	**119**	**100%**

A.3.3. Recreational

As mentioned previously, recreational fishermen were asked to complete an online survey, which identified them by key user groups. The recreational fishing community was stratified into four key user groups:

- Private boat anglers;
- Kayak-based anglers;
- Dive/Spear anglers; and
- Pier/Shore anglers.

Recreational fishermen had the opportunity to register and complete the survey for multiple user groups (e.g., private vessel and dive), and the 504 respondents generated 806 survey responses. Table A.10 shows the number of user groups completed by each fisherman. The majority of respondents (55%) completed a survey for a single user group, while only 2% of respondents completed the survey for all four user groups.

Table A.10: Number of user groups completed per respondent

#of user group surveys completed	# of respondents	% of respondents
1	279	55%
2	160	32%
3	53	11%
4	12	2%

Participants also were asked to estimate what percentage of their total fishing time they spend in each user group considered in the survey. For example, if someone participates in both kayak angling and dive angling, he might record that he spends 60% of his time kayaking angling and 40% of his time dive angling. The group assigned the largest percentage of each individuals time is considered his/her primary user group. Table A.11 shows the number of completed surveys by user group.

Table A.11: Response statistics

User group	Total surveys	Primary (%of total)[5]
Dive	168	23%
Kayak	170	22%
Pier/shore	174	8%
Private	294	47%
Total	**504**	**—**

Using the 504 fishermen who responded to the surveys, the average recreational fishermen is male, 43 years old, has 19 years of fishing experience and fishes 41 days per year per user group. On average, kayak respondents had the least amount of fishing experience (six years) and pier/shore respondents had the most (29 years). Dive respondents were, on average, younger than those in other user groups (38 years old) and private vessel respondents were the oldest (46 years old). Pier/shore respondents fished the least number of days per year (an average of 20 days) while kayak respondents fished the most (an average of 36 days).

[5] Percentages do not add up to 100% because three respondents did not report a primary user group for one of their fisheries.

A.3.3.1. Dive

Based on responses provided by survey participants, the average dive angler is a 38 year old male, which is slightly younger than the average across all user groups (i.e., 43 years old), has 15 years experience, and dives (to fish) 38 days per year. In addition, the majority of respondents stated that they are shore based free divers who use a private vessel as their primary access method. Additional information on dive respondents is provided in Table A.12.

Table A.12: Dive survey response statistics

Age	Median	39
	Mean	38
Years experience	Median	18
	Mean	15 yrs
Average annual number of days diving (to fish)	Median	43
	Mean	38
% time by dive type	Shore based	70%
	Island based	30%
Primary mode of diving	Free	80%
	Scuba	20%
Primary access method[6]	Swimming	38%
	Private boat	49%
	Kayak	11%
	CPFV	3%

Divers were also asked to qualitatively describe their level of experience. More specifically, they were asked to select one of the following choices: beginner, intermediate, advanced. No description of these choices was provided. Results show that the majority of respondents considered themselves advanced divers. In addition, the average years of experience stated by a diver considering himself/herself "advanced" was 25 years (see Table A.13).

Table A.13: Divers experience level and years of experience

Experience level	# of respondents	% of respondents	Average years experience
Beginner	9	5%	7
Intermediate	69	41%	9
Advanced	90	54%	25

A.3.3.2. Kayak

The average kayak respondent is a 43 year old male who has six years of kayak angling experience and fishes from a kayak 36 days per year. Additional information is shown in Table A.14.

Table A.14: Kayak survey response statistics

Age	Median	43
	Mean	42
Years experience	Median	5
	Mean	6
Average annual number of days kayaking (to fish)	Median	41
	Mean	36

[6] Column may not sum to 100% due to rounding.

Survey participants were asked to list up to four launch ports or access points in order of primary usage. The most popular launch/access site among kayak user group respondents was La Jolla, with 121 respondents (~71%) citing it among their top four. In total, over 40 unique kayak launch/access sites were indicated by respondents. The top launch sites (by total) are shown below in Table A.15. It should be noted that individuals were not required to list the four launch/access sites used most frequently but rather, were given the option of listing up to four. The number of individuals not reporting a second, third or fourth launch/access site is provided as "Did Not Report". It should also be noted that the specific locations provided by respondents were grouped together when presented in Table A.15. For example respondents who indicated, Coral Canyon Beach, Escondido Beach, or Dan Blocker Beach were all grouped together as Malibu. Likewise, if not indicated in Table A.15, the reference to the location is the beaches and shores at or near the location.

Table A.15: Top kayak launch/access sites

Launch/access	1	2	3	4	Total
La Jolla	66	27	12	16	121
Malibu	18	19	21	15	73
Dana Point	17	12	13	7	49
San Diego Bay	5	15	12	6	38
Newport Beach	11	6	5	5	27
Mission Bay	2	8	9	6	25
Long Beach	4	6	3	6	19
Cabrillo Beach	11	3	1	3	18
Redondo Beach	2	5	5	5	17
San Onofre Beach	1	1	6	4	12
Ventura Los Angeles County Line	2	6	1	1	10
All Others	31	39	42	28	140
Did Not Report	–	23	40	68	131

A.3.3.3. Pier/Shore

Based on responses provided by survey participants, the average pier/shore respondent is a 45 year old male who has 29 years of fishing experience and pier/shore fishes 31 days per year (see Table A.16).

Table A.16: Pier/shore survey response statistics

Age	Median	45
	Mean	46
Years experience	Median	29
	Mean	30
Average annual number of days pier/shore fishing	Median	31
	Mean	20

A.3.3.4. Private Vessel

The average respondent for the private vessel user group is a 46 year old male who has operated a vessel for 17 years and owned a vessel for 14 years. On average, private vessel users have 26 years of experience and fish 41 days out of the year (as private vessel anglers). These statistics and additional information on private vessel respondents are found in Table A.17.

Table A.17: Private vessel survey response statistics

Age	Median	46
	Mean	46
Years operating a vessel	Median	17
	Mean	15
Years of vessel ownership	Median	14
	Mean	10
Vessel length (ft.)	Median	25
	Mean	22
Years experience	Median	26
	Mean	25
Average annual number of days fishing	Median	41
	Mean	30

Additionally, nearly all of private vessel respondents operate motor boats. Only two out of the 294 respondents reported using a sailboat. Of private vessel users, 203 reported storing their vessel on a trailer or at home, while 91 reported boat slip storage. The most popular home ports for private vessel owners reporting boat slip storage were San Diego (26), Dana Point (14), Long Beach (9), Newport (9), Huntington (7), Marina Del Rey (5), and Oceanside (4).

Private vessel respondents, like kayak user group respondents, were asked to list up to four launch sites. The most popular launch site among private vessel respondents is Mission Bay, with 145 individuals reporting it as one of their top launch sites. Other launch sites in San Diego, like Shelter Cove (87) and San Diego Bay (73) are also popular sites. Additional popular launch sites include Dana Point (76), Oceanside (50), Long Beach (49), Huntington Beach (27), and Newport Beach (27). In total, over 30 different launch sites were listed by private vessel users. A list of the top launch sites, by total, reported in the survey is found below in Table A.18.

Table A.18: Top private vessel launch sites

Launch/access	1	2	3	4	Total
Mission Bay (San Diego)	45	54	31	15	145
Shelter Island (San Diego)	40	27	15	5	87
Dana Point	22	20	20	14	76
San Diego Bay	19	28	18	8	73
Oceanside	19	7	17	7	50
Long Beach	24	15	6	4	49
Huntington Beach	16	6	4	1	27
Newport Beach	8	7	8	4	27
Marina Del Rey	13	4	3	3	23
Ventura	1	5	4	4	14
Channel Islands Harbor	4	5	4	0	13
Redondo Beach - King Harbor	6	3	1	0	10
Santa Barbara	7	1	1	1	10
All Others	20	19	13	19	71
Did Not Report	50	93	149	209	501

Appendix A.1: Summary of South Coast Study Region commercial fisheries considered

Fishery	% of total SCSR fisheries revenues (2000–07 average)[7]	% of total CA statewide fisheries revenues (2000–07 average)	% of CA statewide fisheries revenues landed in SCSR (2000–07 average)
California Halibut (Hook & Line)	0%	0%	42%
California Halibut (Set Gillnet)	1%	1%	97%
California Halibut (Trawl)	1%	1%	34%
Coastal Pelagics (Seine)[8]	**11%**	**7%**	**74%**
Coastal Pelagics (Brail)	0%	0%	100%
Deep Nearshore Fishery (Hook & Line)	0%	0%	24%
Hagfish (Trap)	0%	0%	45%
Lobster (Trap)	**12%**	**8%**	**100%**
Nearshore Fishery (Hook & Line)	**0%**	**0%**	**14%**
Nearshore Fishery (Trap)	**1%**	**0%**	**61%**
Pacific Bonito (Seine)	0%	0%	100%
Rock Crab (Trap)	**3%**	**2%**	90%
Sablefish (Longline)	1%	0%	19%
Salmon (Troll)	0%	0%	0%
Sea Cucumber (Dive)	1%	1%	99%
Sea Cucumber (Trawl)	0%	0%	100%
Shark (Drift Gillnet)	1%	0%	86%
Shark (Hook & Line)	0%	0%	70%
Spider Crab (Trap)	0%	0%	99%
Spot Prawn (Trap)	**3%**	**2%**	**71%**
Squid (Brail)	1%	1%	100%
Squid (Seine)	**41%**	**28%**	**86%**
Swordfish (Drift Gillnet)	3%	2%	77%
Swordfish (Harpoon or Spear)	1%	1%	100%
Thornyhead (Longline)	2%	1%	79%
Tuna (Seine)	1%	1%	96%
Urchin (Dive)	**14%**	**10%**	**78%**
Whelk (Trap)	0%	0%	99%
White Seabass (Gillnet)	1%	1%	96%
White Seabass (Hook & Line)	0%	0%	54%

Example of how to interpret: From 2000–07, on average, the SCSR lobster - trap fishery accounted for 12% of SCSR fishery related revenues and 8% of total California fishery related revenues. During that same time frame, on average, approximately 100% (99.9%) of all lobster - trap fishery related revenues for the entire state of California came from the SCSR. These percentages and figures are based only on the fisheries considered in the project. Examples of fisheries that occur in Southern California that are not being considered include: tuna - hook & line, trawl fisheries not allowed in state waters, shelf/slope limited entry and open access rockfish (mostly before permits were issued), sablefish - trap, swordfish - hook & line, and shark - set gillnet. The primary reason that these fisheries are not included is that they mostly occur entirely outside of state waters and data were not collect

[7] Percentage of the key SCSR fisheries considered in this report.
[8] Fisheries highlighted in bold are considered priority fisheries for the SCSR.

Appendix A.2: List of SCSR commercial fishing maps available in MarineMap and hard copy

Fishery	Santa Barbara	Ventura	Port Hueneme	San Pedro	Dana Point	Ocean-side	San Diego	SCSR
California Halibut (Hook & Line)	Yes	Conf	Yes	—	—	—	—	Yes
California Halibut (Set Gillnet)	—	—	—	—	—	—	—	—
California Halibut (Trawl)	Yes	—	—	—	—	—	—	—
Coastal Pelagics (Seine)	—	—	Yes	Yes	—	—	—	Yes
Coastal Pelagics (Brail)	—	—	—	Conf	—	—	—	—
Deep Nearshore Fishery (Hook & Line)	Yes	—	Conf	Conf	—	—	Conf	Conf
Hagfish (Trap)	—	—	—	Conf	—	—	—	—
Lobster (Trap)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nearshore Fishery (Hook & Line)	Yes	—	Yes	Yes	—	—	Yes	Yes
Nearshore Fishery (Trap)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pacific Bonito (Seine)	—	—	—	Yes	—	—	—	Yes
Rock Crab (Trap)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sablefish (Longline)	—	—	—	Conf	Conf	Conf	—	Conf
Salmon (Troll)	Yes	Conf	—	—	—	—	—	Yes
Sea Cucumber (Dive)	Yes	Yes	Yes	Yes	—	—	Yes	Yes
Sea Cucumber (Trawl)	Yes	—	—	—	—	—	—	—
Shark (Drift Gillnet)	Conf	—	—	—	—	—	—	—
Shark (Hook & Line)	—	—	—	—	—	—	—	—
Spider Crab (Trap)	—	—	—	—	—	—	—	—
Spot Prawn (Trap)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Squid (Brail)	—	—	—	Yes	—	—	—	Yes
Squid (Seine)	—	Yes	Yes	Yes	—	—	—	Yes
Swordfish (Drift Gillnet)	—	—	—	—	—	—	—	—
Swordfish (Harpoon or Spear)	—	—	—	Yes	Conf	—	—	Yes
Thornyhead (Longline)	—	—	—	Conf	Conf	Conf	—	Conf
Tuna (Seine)	—	—	—	—	—	—	—	—
Urchin (Dive)	Yes	—	Yes	Yes	Yes	Yes	Yes	Yes
Whelk (Trap)	—	—	—	—	—	—	—	—
White Seabass (Gillnet)	Yes	—	—	Yes	—	—	—	Yes
White Seabass (Hook & Line)	—	—	Conf	—	—	—	Conf	—
Live Bait - Coastal Pelagics	—	—	—	Yes	Yes	Yes	Yes	Yes
Number of Datasets	**13**	**6**	**10**	**14**	**6**	**6**	**8**	**16**

Above is a list of maps available for each commercial fishery by port and for the SCSR. A “Yes” value indicates that the fishing grounds are available in MarineMap and printed hard copy and RSG meetings or CDFG offices. A “Conf” value indicates that the dataset exists, but is not available do to confidentially constraints. Most often the constraint is fewer than three fishermen for a given port-fishery combination. In cases where there are fewer than three fishermen and the data are available, it is because the data have been approved to be used and available to the RSG for their Marine Protected Area design process. A null or “—“ value indicates that the data were not collected, that data collected do not adequately represent a given fishing grounds based on the sampling criteria described in section A.3.1, or that the fishery does not exist in that specific port.

Appendix A.3: Number of CPFV respondents per port and species throughout the SCSR and datasets available in MarineMap and printed hard copy

	Santa Barbara	Port Hueneme	San Pedro	Santa Monica	Newport Beach	Dana Point	Oceanside	San Diego	SCSR
Barracuda	3	14	9	23	13	9	10	34	115
Ca. Halibut	3	14	9	24	13	9	10	28	110
Calico Bass	3	15	9	24	13	9	10	34	117
Lingcod	3	15	9	23	12	8	7	32	109
Rockfish	3	15	9	23	12	8	9	34	113
Ca. Scorpionfish	2	14	9	23	13	9	10	32	112
Ca. Sheephead	3	14	8	24	13	8	10	32	112
Sand Bass	1	15	9	20	12	7	10	33	107
Whitefish	3	15	8	23	12	8	8	33	110
White Seabass	3	14	9	22	13	8	9	31	109
Aggregate	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	

Above is the list of all CPFV maps that are available for each port by species and for the SCSR. The number values indicate the number of CPFV captains or operators who provided information for each species in each port. Aggregate maps are also available for each species for the entire study region and across species for a given port.

Appendix A.4: Number of recreational dive respondents by county and species throughout the SCSR and datasets available in MarineMap and printed hard copy

	Santa Barbara County	Ventura County	Los Angeles County	Orange County	San Diego County	SCSR
Barracuda	—	—	—	—	11	14
Bonito	—	—	—	—	9	12
Ca. Halibut	9	8	15	19	32	83
Calico Bass	11	5	15	10	27	68
Croaker	—	—	—	3	8	15
Lobster	10	7	18	23	28	86
Rockfish/Lingcod	5	3	—	3	7	19
Scallops	—	4	3	6	7	21
Ca. Sheephead	—	—	5	5	12	25
Sand Bass	—	—	3	6	8	18
White Seabass	11	8	22	16	33	90
Yellowtail	3	7	15	14	44	83
Aggregate	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Above is a list of the recreational dive fishing ground maps available for each county by species and for the SCSR. Study region maps are only provided for the following species: California halibut, lobster, white seabass, and yellowtail. The study region aggregated map is a composite or combination of the study region species maps previously mentioned. County level maps are provided for each of the species where we have indicated the number of respondents that provided information, in all cases the number of respondents is never less than three for confidentiality purposes. A null or "—" value indicates that either the data were not collected or that what data were collected do not adequately represent a given fishing grounds.

Aggregate maps are also available at the county level, where we combine the top four species in terms of the numbers of responses. The following is a list of the species used in the aggregate maps for each county.

- Santa Barbara County: white seabass, lobster, California halibut, and calico bass
- Ventura County: white seabass, lobster, California halibut, and yellowtail
- Los Angeles County: white seabass, lobster, California halibut, and yellowtail
- Orange County: white seabass, lobster, California halibut, and yellowtail
- San Diego County: white seabass, lobster, California halibut, and yellowtail

Also, note that across mode or sector (dive, kayak, and private vessel) maps are also available for each county. These maps are based on combining the individual aggregate mode maps for each county. In every instance of aggregation each dataset is considered equally, whether combining species for a county for a given mode, combining counties across the study region for a given mode, or across all modes for a given county.

Appendix A.5: Number of recreational kayak angler respondents by county and species throughout the SCSR and datasets available in MarineMap and printed hard copy

	Santa Barbara County	Ventura County	Los Angeles County	Orange County	San Diego County	SCSR
Barracuda	—	—	7	7	15	29
Bonito	—	—	6	6	18	30
Ca. Halibut	5	9	27	22	34	97
Calico Bass	5	7	31	24	38	105
Lobster	—	3	7	12	15	37
Mackerel	—	3	—	3	13	19
Rockfish/Lingcod	—	5	6	4	16	31
Rock Crab	—	—	—	—	4	4
Ca. Sheephead	—	3	—	8	12	23
Sand Bass	—	3	15	15	19	52
Squid	—	—	—	—	10	10
Thresher Shark	—	—	6	7	15	28
White Seabass	—	7	16	17	43	83
Yellowtail	—	—	11	13	52	76
Aggregate	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Above is a list of the recreational kayak fishing ground maps available for each county by species and for the SCSR. Study region maps are only provided for the following species: California halibut, calico bass, white seabass, and yellowtail. The study region aggregated map is a composite or combination of the study region species maps previously mentioned. County level maps are provided for each of the species where we have indicated the number of respondents that provided information, in all cases the number of respondents is never less than three for confidentiality purposes. A null or "—" value indicates that either the data were not collected or that what data were collected do not adequately represent a given fishing grounds.

Aggregate maps are also available at the county level, where we combine the top four species (just two for Santa Barbara) in terms of the numbers of responses. The following is a list of the species used in the aggregate maps for each county.

- Santa Barbara County: California halibut and calico bass
- Ventura County: white seabass, California halibut, calico bass, and rockfish/lingcod
- Los Angeles County: white seabass, California halibut, calico bass, and yellowtail
- Orange County: white seabass, California halibut, calico bass, and yellowtail
- San Diego County: white seabass, California halibut, calico bass, and yellowtail

Also, note that across mode or sector (dive, kayak, and private vessel) maps are also available for each county. These maps are based on combining the individual aggregate mode maps for each county. In every instance of aggregation (combining species for a county for a given mode, combining counties across the study region for a given mode, or across all modes for a given county), each dataset is considered equally.

Appendix A.6: Number of recreational private vessel anglers respondents by county and species throughout the SCSR and datasets available in MarineMap and printed hard copy

	Santa Barbara County	Ventura County	Los Angeles County	Orange County	San Diego County	SCSR
Barracuda	—	4	23	21	44	92
Bonito	—	—	8	20	34	62
Ca. Halibut	9	7	30	33	69	148
Calico Bass	7	6	42	47	91	193
Croaker	—	—	—	5	13	18
Lobster	—	—	16	20	34	70
Mackerel	—	—	5	9	18	32
Rockfish/Lingcod	5	4	13	20	45	87
Ca. Sheephead	—	—	8	—	12	20
Sand Bass	—	—	25	31	47	103
Surfperch	—	—	—	—	6	6
Thresher Shark	—	—	8	13	30	51
White Seabass	6	6	33	43	55	143
Yellowtail	—	5	34	41	83	163
Aggregate	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	

Above is a list of the recreational dive fishing ground maps available for each county by species and for the SCSR. Study region maps are only provided for the following species: California halibut, lobster, white seabass, and yellowtail. The study region aggregated map is a composite or combination of the study region species maps previously mentioned. County level maps are provided for each of the species where we have indicated the number of respondents that provided information, in all cases the number of respondents is never less than three for confidentiality purposes. A null or "—" value indicates that either the data were not collected or that what data were collected do not adequately represent a given fishing grounds.

Aggregate maps are also available at the county level, where we combine the top four species in terms of the numbers of responses. The following is a list of the species used in the aggregate maps for each county.

- Santa Barbara County: white seabass, rockfish/lingcod, California halibut, and calico bass
- Ventura County: white seabass, rockfish/lingcod, California halibut, and calico bass
- Los Angeles County: white seabass, sand bass, California halibut, and calico bass
- Orange County: white seabass, sand bass, California halibut, and calico bass
- San Diego County: white seabass, sand bass, California halibut, and calico bass

Also, note that across mode or sector (dive, kayak, and private vessel), maps are also available for each county. These maps are based on combining the individual aggregated mode maps for each county. In every instance of aggregation (combining species for a county for a given mode, combining counties across the study region for a given mode, or across all modes for a given county), each dataset is considered equally.

Appendix B: Evaluation Methods

Section 12: Commerical and Recreational Fishery Impacts

While fishery impacts are not the focus of the MLPA, they may be considered in designing alternative MPA proposals. The evaluation of maximum potential recreational and commercial fishery impacts utilizes region-specific data collected by MLPA contractor Ecotrust on areas of importance.

To evaluate the potential recreational and commercial fishery impacts, MLPA Initiative staff and contractors do the following:

- Conduct local knowledge interviews with recreational and commercial fishermen, using an interactive, custom computer interface, to collect geo-referenced information about the extent and relative importance of study region commercial and recreational fisheries
- Organize impact analyses by port, fishery and/or user group
- Evaluate and summarize the maximum potential impacts on commercial and recreational fishing grounds both in terms of total area and value affected, with results summarized for both study region fishing grounds and total fishing grounds[9]
- Conduct a socioeconomic impact analysis for commercial fisheries
- Consider or identify "outliers" (i.e., fishermen likely to experience disproportional impacts)
- Assess the effect of existing fishery management area closures and other constraints on fishing grounds

Background

In order to conduct an analysis of the relative effects of MPA proposals on commercial fisheries that are conducted in the South Coast Study Region (SCSR), we use data layers characterizing the spatial extent and relative stated importance of fishing grounds for key commercial fisheries. This information was collected during interviews in the summer of 2008, using a stratified, representative sample of 254 commercial fishermen whose individual responses regarding the relative importance of ocean areas for each fishery were standardized using a 100-point scale and normalized to the reported fishing grounds for each fishery.

In addition, we conduct an assessment of the relative effects of MPA proposals on key recreational fisheries conducted in the waters in the SCSR. In order to complete this analysis we use data layers characterizing the spatial extent and relative stated importance of recreational fishing grounds for key recreational fisheries. Recreational fishermen are also broken out by user group (i.e., commercial passenger fishing vessels, private vessels, kayak, pier/shore, and dive). This information was collected during interviews in the summer of 2008 from 119 commercial passenger fishing vessel (CPFV) operators and 504 recreational fishermen whose individual responses regarding the relative importance of ocean areas for each fishery were standardized using a 100-point scale and normalized to the reported fishing grounds for each fishery.

Using the normalized data described above, we (1) evaluate the potential impacts on the commercial and recreational fishing grounds and (2) conduct a socioeconomic impact analysis on commercial fisheries in order to assess the potential effects of any MPA proposal. Results are reported at both the study region and port group levels for the commercial and CPFV fisheries. Port groups for the commercial fisheries are defined as Santa Barbara, Ventura, Port Hueneme/Channel Islands, San Pedro, Dana Point, Oceanside, and San Diego. Port groups for the CPFV fisheries are defined as Santa Barbara, Port Hueneme/Channel Islands, Santa Monica, San Pedro/Long Beach, Newport Beach, Dana Point, Oceanside, and San Diego. Recreational impacts are reported both by user group and by county (i.e., Santa Barbara, Ventura, Los Angeles, Orange, and San Diego).

[9] Impact analyses represent a "worst case scenario" in which fisherman cannot fish in a different location.

It should be noted that, with respect to the recreational fishery analysis, the use of a stratified solicited sample limits the use of traditional statistical measures (e.g., confidence intervals), meaning they may not deliver their advertised precision. Nevertheless, this approach does allow us to make broad generalizations about preferences of the overall recreational fishing population and the five user groups within the study area, adding increased thematic resolution to the MLPA decision-making process.

Impact on Commercial Fishing Grounds: Methods

Marine protected area (MPA) proposals typically vary according to their spatial extent and the commercial fisheries they affect. More specifically, MPAs often vary by the number and types of fisheries permitted within the boundaries of particular MPAs. Furthermore, study area fisheries themselves vary in spatial extent, and frequently overlap. Many of them are conducted in fishing grounds that extend beyond the state waters of the SCSR, and because of this we report potential impacts both in terms of total fishing grounds and those that fall within the study area (i.e., zero to three nautical miles from shore). Since any one MPA may have different effects on different fisheries, and different fisheries may be affected differently by all MPAs, it is necessary to consider single MPAs and single fishery uses independently. Note that because current fishery closures affect all proposals equally, they have no differential effect.

A key assumption of this analysis is that each of the MPA proposals completely eliminates fishing opportunities in areas closed to specific fisheries and that fishermen are unable to adjust or mitigate in any way. In other words, the analysis assumes that all commercial fishing in an area affected by an MPA would be lost completely, when in reality it is more likely that effort would shift to areas outside the MPA. The effect of such an assumption is most likely an overestimation of the impacts, or a “worst case scenario.”

We conduct an overlay of each MPA with each fishery considered in this study. MPAs are grouped according to level of protection, using the same levels of protection as elsewhere in the SAT evaluations. In other words, for each MPA and protection level within each proposal, we assess the commercial fisheries that would be affected.

We compile results in a series of spreadsheets, summarizing the effects of the various MPA proposals on commercial fisheries, both in terms of the area affected and the relative value lost. We use the same analytical methods as those developed and used in previous iterations of the MLPA process (see Scholz et al. 2006; 2008), creating a weighted surface that represents the stated importance of different areas for each fishery. More specifically, we multiply these stated importance values by the proportion of in-study region landings (by landing port and by fishery). The percentage of area and value affected is calculated based on grounds identified within only the SCSR and not within the whole state of California. These estimates then feed into the economic impact assessment (described in more detail in Appendix B.1).

The percentage change in area and value for each of the commercial fisheries (both for the study region and for each port group) are determined by the intersection of each MPA proposal and the fishing grounds specific to that fishery. Each MPA within a proposal is classified by whether it would affect the fishery or not. If a fishery is affected by an MPA, the area and value are summarized and then divided by the total area and value for the entire fishing grounds as derived from interviews with fishermen, and the total study area. The total percentage of area and value affected for the total fishing grounds and the grounds inside the study area are then summarized for all MPAs affecting each fishery per proposal.

For the commercial fisheries, we evaluate the additional impacts that potentially occur when considering the existing fishery management area closures and/or fishery exclusion zones.

The fishing grounds, as defined by the fishermen through the interview process, represent the total area and value regardless of these existing or potential fishery management closures and/or fishery exclusion zones. In order to evaluate the effect of such closures, the fishing grounds that fall inside those areas are removed, and the value associated with the removed area redistributed to the remaining fishing grounds outside the closed areas. In other words, values are redistributed across only what could be considered the available fishing grounds in proportion to their relative value as derived from the interviews. Using the

same method described above, we determine the percentage change in value by the intersection of each MPA proposal with the total fishing grounds now constrained to areas not inside the closed areas, i.e., the “available fishing grounds”.

We also evaluate if there are individual fishermen who would be disproportionally affected by each MPA proposal (i.e., 100% or a large portion of their grounds are inside a proposed MPA that would restrict fishing). To assess this impact we conduct an analysis that removed the area of each proposed MPA from an individual fisherman’s fishing grounds as derived from interviews. The individual’s SCSR ex-vessel revenue and area of the fishing grounds are then summarized after the removal and percentages are calculated to show any potential losses. The "worst-cast scenario" still applies in that individual fishermen are assumed not to adjust to different fishing grounds. For this analysis the potential impact was calculated for each fishery as well as for all fisheries in which an individual participates.

Commercial Fisheries Economic Impact Assessment

The primary purpose of this analysis is to estimate the socioeconomic impacts to the commercial fishery sector associated with each of the MPA proposals. To accomplish this, we estimate a "worst-case scenario" or maximum potential economic impact of each MPA proposal (for a detailed description of the methods used, please see Scholz et al. 2008, which can be found at http://www.ecotrust.org/mlpa/Ecotrust_FinalReport_NCCSR_080701.pdf). To accomplish this, we use methods similar to those utilized in the Central Coast Study Region process by Wilen and Abbott (2006). The modified analysis in Scholz et al. (2008), however, differs in a very important respect, that is, by having original survey data on fishermen’s operating costs collected through the interview process.

As mentioned previously, this refinement is possible due to new data gathered during the interview process on fishery specific operating costs in the study area. As part of the fishermen interview process, field staff asked several questions related to operating costs, including:

- What percentage of your gross revenue goes towards overall operating costs?
- Of your overall operating costs, what percentage goes towards crew share or labor?
- Of your overall operating costs, what percentage goes towards fuel?

With the opportunity to interview SCSR fishermen directly, information specific to the study region is gained. There is also the opportunity for data resolution regarding types of costs fishermen face. Using data from the fishermen knowledge interviews, two cost categories were created: fixed and variable. Fixed costs include costs that are independent of the number of trips a fishing vessel makes or the duration of these trips. For example, vessel repairs and maintenance, insurance, and mooring and dockage fees are typically considered fixed costs. On the other hand, variable costs include costs that are dependent on the number of trips a vessel makes and the duration of these trips. Variable costs typically include fuel, maintenance, crew share, and gear repair/replacement. For the purpose of this study, variable costs are assumed to be crew wages and fuel costs. All other costs will be considered fixed costs.

The net economic impact (NEI) of each MPA proposal is calculated for each port group, and for the SCSR as a whole. The NEI results are presented as revenue reductions in both dollar terms ($2007) and percentage terms. The starting point for calculating NEI is baseline gross economic revenue (Baseline GER), which is based on an eight-year average (2000–07) converted to 2007 dollars. Baseline GER is gross revenue for the fishery in question absent any MPA proposal. The baseline net economic revenue (Baseline NER) is found by subtracting the fishery-specific fixed and variable costs from the Baseline GER. A similar net economic revenue calculation is performed for each MPA proposal and is then compared with Baseline NER to yield NEI.

Impact on Recreational Fishing Grounds: Methods and Approach

The methods and approach used to assess the impact of the various MPA proposals on recreational fisheries are identical to those used to assess the impact on commercial fisheries (please refer to Appendix B.1 of this document for a description of those methods) with one exception. The commercial fishery impact analysis assesses fishing grounds that are weighted by multiplying stated importance values from the interviews by the proportion of in-study region landings (both by landing port and by fishery), and more specifically, by ex-vessel values for those landings. In contrast, no weighting occurs in the calculation of recreational fishing grounds, but rather, the analysis is done using only stated importance values from the interviews. No weighting occurs for the obvious reason that ex-vessel values do not exist for recreational fishery landings. Again, we report CPFV impacts by the following port/landing groups: Santa Barbara, Port Hueneme/Channel Islands, Santa Monica, San Pedro/Long Beach, Newport Beach, Dana Point, Oceanside, and San Diego. Recreational impacts will be reported both by user group and by county (i.e., Santa Barbara, Ventura, Los Angeles, Orange, and San Diego).

The recreational data presented here should be used with the following caveats:

- The data are not representative of the entire population of recreational fishermen due to the less than desirable (less than statistically significant) sample size (CPFV not included).
- The data should only be considered at the county or port/landing level, not at the entire study region level.
- The data represent interviewees' areas of value, not areas of effort.
- The data represent interviewees' areas that are important to them over their entire recreational fishing experience, not necessarily the areas that are important to them currently.

That said, based on conversations with leaders of the recreational fishing community, we believe that the information and the manner in which it was acquired allows us to produce results that are able to speak broadly to both the preferences of the overall recreational fishing population and also each user group and county or port/landing of anglers.

As in the commercial fisheries impact analysis, the percentage change in area and value for each of the recreational fisheries (only for the county or port/landing) are determined by the intersection of each MPA proposal and the fishing grounds specific to that fishery.

References for Appendix B

- Scholz, A. J., C. Steinback and M. Mertens. 2006. Commercial fishing grounds and their relative importance off the Central Coast of California. Report submitted to the California Marine Life Protection Act Initiative (May 4).
- Scholz, A. J., C. Steinback, S. Kruse, M. Mertens and M. Weber. 2008. Commercial and recreational fishing grounds and their relative importance off the North Central Coast of California. Report submitted to the California Marine Life Protection Act Initiative (June 30).
- Wilen, J. and J. Abbott. 2006. Estimates of the Maximum Potential Economic Impacts of Marine Protected Area Networks in the Central California Coast. Final report submitted to the California MLPA Initiative in partial fulfillment of Contract #2006-0014M (July 17).

Appendix B.1: Socioeconomic Impact Assessment Methods

The primary goal of this analysis is to estimate the socioeconomic impact to the commercial fishery sector associated with each of the MPA proposals. To accomplish this, staff from Ecotrust, contractor to the MLPA Initiative, will estimate the maximum potential economic impact for each of the MPA proposals using methods developed in the Central Coast process (see Wilen and Abbott 2006). This analysis assumes that each of the MPA proposals completely eliminates fishing opportunities in areas closed to specific fisheries and that fishermen are unable to adjust or mitigate in any way (Wilen and Abbott 2006). The results can then be considered by each group (i.e., stakeholders, SAT, BRTF, Initiative staff, FGC) as trade-offs for protections relative to socioeconomic impacts can be weighed in siting and evaluating MPA proposals. The remainder of this paper describes the steps needed to complete the maximum potential economic impact analysis in the South Coast Study Region.

1. Generate Baseline Estimates of Gross Economic Revenue

The first step involves calculating a baseline estimate from which to derive estimates of the socioeconomic impact associated with changes in commercial fisheries that might be induced by each MPA alternative and against which to compare those estimates. The baseline estimate is generated using gross fishing revenues from regional landing receipts. A seven-year average, 2000–07 derived from the California Department of Fish and Game (DFG) landing receipts reported for ports in the South Coast Study Region is used, and then these values are converted into current dollar values (i.e., $2007).

More specifically, to generate baseline estimates of gross economic revenue (GER), for any fishery, *f*, $BGER_f$ is the average ex-vessel value of the fishery in 2007 dollars, where

$BGER_f = \sum_{p \in P} BGER(f, p)$, the sum of the baseline estimates of GER for this fishery over all ports.

Staff also define the fisheries specific to each port, or in other words, create a baseline estimate of gross economic revenue for each port. For a specific port, *p*, being considered in the South Coast Study Region the baseline estimate ($BGER_p$) can be calculated as the sum of the baseline estimates of GER for this port over all fisheries:

$$BGER_p = \sum_{f \in F} BGER(f, p).$$

The baseline gross economic revenue ($BGER_{TOT}$) for <u>all</u> commercial fisheries ($f \in F$) being considered in the South Coast Study Region is therefore:

$BGER_{TOT} = \sum_{f \in F} BGER_f = \sum_{f \in F} \sum_{p \in P} BGER(f, p)$ or equivalently,

$$BGER_{TOT} = \sum_{p \in P} BGER_p = \sum_{p \in P} \sum_{f \in F} BGER(f, p).$$

2. Generate Gross Economic Revenue for the Various MPA Alternatives

The next step involves using results from the Ecotrust mapping exercise, specifically stated importance indices from the fishing grounds, to estimate the socioeconomic impact associated with changes in the commercial fisheries that might be induced by each MPA alternative. For a description of the methods used to create stated importance indices, please see Scholz et al. (2006).

For any fishery, *f*, port, *p*, and any MPA alternative, *a*:

$$GER(f, p, a) = BGER(f, p) - GEI(f, p, a)$$

where $GEI(f, p, a)$ is the estimated gross economic impact on fishery, *f*, at any port, *p*, under any alternative, *a*.

Therefore,

$$GER_f(a) = \sum_{p \in P} GER(f, p, a) \text{ and } GER_p(a) = \sum_{f \in F} GER(f, p, a)$$

as well as

$$GEI_f(a) = \sum_{p \in P} GEI(f, p, a) \text{ and } GEI_p(a) = \sum_{f \in F} GEI(f, p, a).$$

Gross economic revenue under any alternative, *a*, ($GER_{TOT}(a)$), for <u>all</u> commercial fisheries ($f \in F$) being considered in the South Coast Study Region can be calculated as:

$$GER_{TOT}(a) = \sum_{f \in F} GER_f(a) = \sum_{p \in P} GER_p(a) = \sum_{f \in F} \sum_{p \in P} GER(f, p, a) = \sum_{p \in P} \sum_{f \in F} GER(f, p, a)$$

From this it can be said that, for any MPA alternative, *a*,

$$GEI_{TOT}(a) = BGER_{TOT} - GER_{TOT}(a)$$

where GEI_{TOT_a} is defined as the total gross economic impact on all commercial fisheries under any alternative, *a*. Therefore,

$$GEI_{TOT}(a) = \sum_{f \in F} GEI_f(a) = \sum_{p \in P} GEI_p(a) = \sum_{f \in F} \sum_{p \in P} GEI(f, p, a) = \sum_{p \in P} \sum_{f \in F} GEI(f, p, a).$$

3. Generate Baseline Estimates of Net Economic Revenue

In order to compute net economic benefits, staff (1) estimate the share of gross fishing revenues represented by costs and (2) scale the baseline estimate (i.e., gross fishing revenues) calculated in Step 1 using the estimated cost shares. In the Central Coast process, an estimate of 65% was used across all fisheries (Wilen and Abbott 2006). For the South Coast process, several cost related questions are asked during interviews with fishermen in an effort to improve on this estimate as well as allow for the ability to account for cost variability between different fisheries in this analysis. After all interviews are completed, the cost data are broken out by fishery or fisheries. For example, cost data for a fisherman who fished both salmon and crab would be aggregated with only other interviewees participating in both those fisheries. A mean or median cost estimate is then calculated for each category.

Costs will be broken into two categories: fixed costs and variable costs. Fixed costs include costs that are independent of the number of trips a vessel makes or the duration of these trips. For example, vessel repairs and maintenance, insurance, mooring and dockage fees typically considered fixed costs. On the other hand, variable costs include costs that are dependent on the number of trips a vessel makes of the duration of these trips. Variable costs typically include fuel, maintenance, crew share, gear

repair/replacement. For the purpose of this study, variable costs are assumed to be crew wages and fuel costs. All other costs will be considered fixed costs.

For any fishery, *f*, net economic revenue is calculated as:

$$BNER_f = BGER_f - C_{X_f} - C_{V_f}$$

where C_{X_f} is the fixed cost associated with any fishery, *f*, and is set as a fixed dollar value, and C_{V_f} is the variable cost associated with any fishery , *f*, and is a fixed percentage of $BGER_f$.

Baseline net economic revenue ($BNER$) for <u>all</u> commercial fisheries ($f \in F$) being considered in the South Coast Study Region can be calculated as:

$$BNER_{TOT} = \sum_{f \in F} BNER_f$$

4. Generate Estimates of Net Economic Revenue for the Various MPA Alternatives

In order to compute net economic revenue for each of the various MPA alternatives, staff analysis (1) estimates the share of gross fishing revenues represented by costs under each MPA alternative, and (2) scales the estimated gross fishing revenues for that alternative accordingly. Costs will be calculated using the methods described in Step 3.

For any fishery, *f*, and any MPA proposal, *a*,

$$NER_f(a) = GER_f(a) - C_{X_f} - C_{V_f} \ .$$

For any MPA alternative, *a*, net economic revenue for <u>all</u> commercial fisheries ($NER_{TOT}(a)$) can be calculated as:

$$NER_{TOT}(a) = \sum_{f \in F} NER_f(a)$$

5. Generate Estimate of the Potential Primary Economic Impact for the Various MPA Alternatives

Using the results from the previous steps, the potential primary net economic impact (NEI) of a particular MPA alternative, *a,* on a particular fishery, *f,* can then be calculated as:

$$NEI_f(a) = BNER_f - NER_f(a).$$

The potential primary NEI of any MPA alternative, *a,* on <u>all</u> commercial fisheries ($f \in F$) can then be calculated as:

$$NEI_{TOT}(a) = BNER_{TOT} - NER_{TOT}(a).$$

Example of Estimate Costs

For fishery *f*, assume the following proportion of gross economic revenue goes to the following costs:

- 20% = fixed costs
- 20% = crew wages
- 10% = fuel costs → 30% = variable costs

Assume that baseline gross economic revenue equals $10,000.00. Under the baseline, fixed costs equal $2,000 and variable costs equal $3,000, resulting in total costs of $5,000. Assume that under MPA alternative *a,* gross economic revenue now equals $5,000. Under this alternative, fixed costs will still equal $2,000; however, variable costs will be recalculated as:

$5,000 * 0.3 = $1,500

This results in total costs of $3,500 under MPA alternative *a.*

References for Appendix B.1

- Scholz, A. J., C. Steinback and M. Mertens. 2006. Commercial fishing grounds and their relative importance off the Central Coast of California. Report submitted to the California Marine Life Protection Act Initiative (May 4).
- Wilen, J. and J. Abbott. 2006. Estimates of the Maximum Potential Economic Impacts of Marine Protected Area Networks in the Central California Coast. Final report submitted to the California MLPA Initiative in partial fulfillment of Contract #2006-0014M (July 17).

Appendix C: Channel Islands MPAs Impacts

Summary of potential impacts of the Channel Islands MPAs on commercial and recreational fisheries in the South Coast Study Region

Draft 29 June 2009
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C.1. Introduction

This report presents information on the potential impacts of the Channel Islands network of Marine Protected Areas (MPAs) in the South Coast Study Region (SCSR). It is meant to be read in conjunction with the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region* (see Appendix E).

The Channel Islands network, which was established by California Fish and Game Commission (CFGC) in 2002 and expanded by the National Oceanic and Atmospheric Administration (NOAA) in 2006 and 2007, encompasses 241 square nautical miles (or 318 square miles). It consists of 11 marine reserves where all harvest and take is prohibited (Richardson Rock, Harris Point, Carrington Point, Scorpion, Anacapa Island, Footprint, Gulf Island, Skunk Point, South Point, Judith Rock, and Santa Barbara Island) and two marine conservation areas that allow limited take of lobster and/or pelagic fish (Painted Cave and Anacapa Island). It should be noted that our evaluation is not connected in any way with the socioeconomic evaluation done during the establishment of the Channel Islands network, nor should the results presented here be compared to or used in conjunction with that assessment.

The Channel Islands network was originally set to be reconsidered during the marine planning process (i.e., stakeholders would be given the opportunity to propose changes to the siting of the existing MPAs). However, it was later decided that the Channel Islands MPAs would not be changed. Therefore, the potential impacts of the Channel Islands MPAs will be the same under all the alternative MPA proposals and any comparison of the proposals should separate out the impacts of the Channel Islands MPAs.

This report evaluates the potential impacts of the Channel Islands MPAs on commercial, commercial passenger fishing vessel (CPFV), and recreational fishing grounds in terms of both area and value. It also assesses the reduction in net economic revenue (i.e., profit) and gross economic revenue for the commercial and CPFV fisheries. We report commercial and CPFV results by study region. We report recreational results by user group (i.e., dive, kayak, and private vessel) and by county.

By subtracting the Channel Islands impacts presented in this report from the total impacts in the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region* (Appendix E), stakeholders can more easily compare the alternative MPA proposals. For example, if the total impact of a MPA proposal is a 19% reduction in net economic revenue, but 5% of this reduction comes from the Channel Islands MPAs, then stakeholders can only control 14% of the impact (i.e., the minimum impact of their proposal is a 5% reduction in net economic revenue assuming zero impact elsewhere in the SCSR).

The calculations in this analysis are performed the same way as the calculations in the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region*. For detailed information on how the data used in this analysis were collected and/or analyzed, please see Appendix A. For information on the methods used to evaluate these data, please see Appendix B.

The remaining sections of this document summarize the potential impacts. For more detailed statistics, please see the tables in Appendix C.1. In all tables presented, a 'dashed line' represents a fishery that does not occur or a fishery for which insufficient data were collected to merit presentation.

C.2. Results for Commercial Fisheries

We summarize here our analyses of the potential impacts of the Channel Islands MPAs on the 15 commercial fisheries (i.e., Ca. halibut - hook & line, Ca. halibut - trawl, coastal pelagics, lobster, N. fishery - hook & line, N. fishery - trap, rock crab, sablefish, sea cucumber - dive, sea cucumber - trawl, spot prawn, squid, swordfish, thornyhead, and urchin). The commercial fisheries results are broken out by port (i.e., Santa Barbara, Ventura, Port Hueneme, San Pedro, Dana Point, Oceanside, and San Diego).

C.2.1. Potential Impacts on Commercial Fishing Grounds (Area and Value)

As mentioned previously, this report only presents results. Evaluation methods are presented in a separate document. For information on the potential impacts on commercial fishing grounds for the 65 port-fishery combinations considered (both in terms of total area and total value), please see Tables C.1.1–1.2 in Appendix C.1.

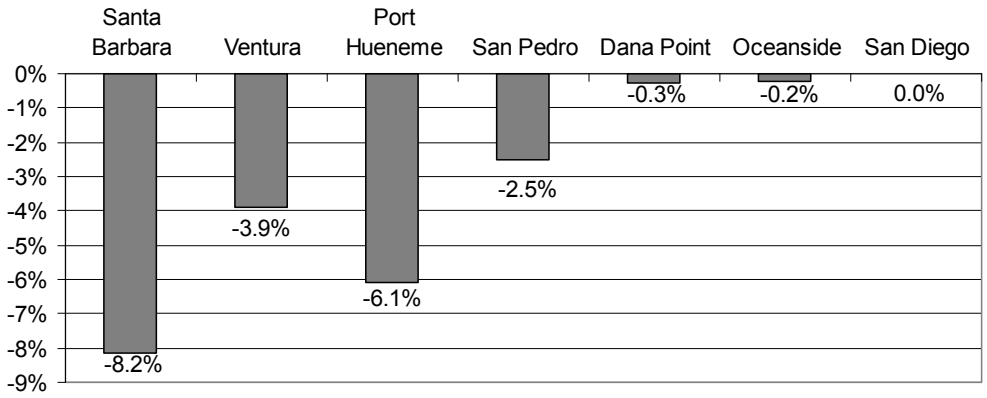
C.2.2. Potential Net Economic Impacts on Commercial Fisheries

A key assumption of this analysis is that the Channel Islands MPAs completely eliminate fishing opportunities in areas closed to specific fisheries and that fishermen are unable to adjust or mitigate in any way. In other words, the analysis assumes that all fishing in an area affected by an MPA is lost completely, when in reality it is more likely that fishermen will shift their efforts areas outside the MPA. The effect of such an assumption is most likely an overestimation of the impacts, or a "worst case scenario."

The potential annual net economic impacts on SCSR commercial fisheries considered are calculated as a percentage reduction in net economic revenue (i.e., profit). The potential impacts are broken out by port in Table C.1 and Figure C.1. Santa Barbara is estimated to see the highest potential net economic impact (as a percentage), while San Diego is estimated to see only minimal impacts. Table C.2 shows potential net economic impact by fishery. Sea cucumber- dive is the fishery estimated to see the highest potential net economic impact while sablefish and thornyhead are not estimated to see any impacts.

Going forward through subsequent MPA evaluation rounds, the impacts of the Channel Islands MPAs will not change; therefore, the net economic impacts in Tables C.1–2 and Figure C.1 are the minimum possible impacts that any of the alternative MPA proposals could have on the SCSR commercial fisheries.

Figure C.1: Estimated annual net economic impact on commercial fisheries by port (% reduction in profit)[10,11]



[10] Please note that the y-axis scales for the figures in this report are different from the y-axis scales for the figures in the *Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region.*

[11] For all economic impacts, the results are the estimated maximum potential economic impact on average annual net revenue from 2000–07 (in $2007).

Table C.1: Estimated annual net economic impact on commercial fisheries by port (reduction in profit)

Port	Baseline GER	Estimated Costs	Baseline NER (Profit)	$ Reduction in Profit	Baseline GER	Estimated Costs	Baseline NER (Profit)	% Reduction in Profit
Santa Barbara	$5,796,804	$2,655,064	$3,141,740	$256,224	100%	48%	52%	8.2%
Ventura	$5,061,321	$2,828,803	$2,232,518	$86,604	100%	56%	44%	3.9%
Port Hueneme	$11,061,000	$6,008,602	$5,052,398	$306,853	100%	54%	46%	6.1%
San Pedro	$20,141,349	$10,989,464	$9,151,885	$227,858	100%	55%	45%	2.5%
Dana Point	$1,860,091	$926,136	$933,955	$2,458	100%	50%	50%	0.3%
Oceanside	$987,326	$481,905	$505,421	$1,146	100%	49%	51%	0.2%
San Diego	$3,093,219	$1,462,682	$1,630,538	$168	100%	47%	53%	0.0%
Study Region[12]	**$48,001,110**	**$25,352,655**	**$22,648,455**	**$881,311**	—	—	—	**3.9%**

Table C.2: Estimated annual net economic impact on commercial fisheries (reduction in profit)

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	$ Reduction in Profit	Baseline GER	Estimated Costs	Baseline NER (Profit)	% Reduction in Profit
Ca. Halibut (Hook & Line)	$108,209	$56,702	$51,508	$4,794	100%	52%	48%	9.3%
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	$5,889,196	$3,275,865	$2,613,331	$21,043	100%	56%	44%	0.8%
Lobster	$6,360,856	$2,921,739	$3,439,117	$55,518	100%	46%	54%	1.6%
N. Fishery (Hook & Line)	$217,200	$112,075	$105,125	$11,668	100%	52%	48%	11.1%
N. Fishery (Trap)	$372,719	$190,306	$182,413	$1,266	100%	51%	49%	0.7%
Rock Crab	$1,469,292	$688,818	$780,474	$31,005	100%	47%	53%	4.0%
Sablefish	$286,809	$161,330	$125,479	$0	100%	56%	44%	0.0%
Sea Cucumber (Dive)	$500,296	$248,147	$252,149	$32,868	100%	50%	50%	13.0%
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	$1,741,435	$848,554	$892,881	$88,006	100%	49%	51%	9.9%
Squid	$22,459,304	$12,870,158	$9,589,146	$357,317	100%	57%	43%	3.7%
Swordfish	$366,725	$242,956	$123,770	$2,626	100%	66%	34%	2.1%
Thornyhead	$648,920	$335,275	$313,645	$0	100%	52%	48%	0.0%
Urchin	$7,580,148	$3,400,730	$4,179,418	$275,201	100%	45%	55%	6.6%
All Fisheries	**$48,001,110**	**$25,352,655**	**$22,648,455**	**$881,311**	—	—	—	**3.9%**

[12] Santa Barbara Ca. halibut - trawl and sea cucumber - trawl are not included in this total.

C.2.3. Potential Gross Economic Impacts on Commercial Fisheries

A key assumption of this analysis is that each of the MPA proposals completely eliminates fishing opportunities in areas closed to specific fisheries and that fishermen are unable to adjust or mitigate in any way. The effect of such an assumption is most likely an overestimation of the impacts, or a "worst case scenario."

Unlike net economic impact, the calculation of potential gross economic impact does not account for fishermen's operating costs. Therefore, the percentage reduction in gross economic revenue (2.5%) on SCSR commercial fisheries considered is less than the percentage reduction in net economic revenue (3.9%); however, the dollar reduction in gross economic revenue ($1,222,527) is greater than the dollar reduction in net economic revenue ($881,311).

The potential impacts are broken down by port in Table C.3 and Figure C.2. Table C.4 shows potential impacts by fishery. Going forward through subsequent MPA evaluation rounds, the impacts of the Channel Islands MPAs will not change; therefore, the gross economic impacts in Tables C.3–4 and Figure C.2 are the minimum possible impacts that any of the alternative MPA proposals could have on the SCSR commercial fisheries.

Figure C.2: Estimated annual gross economic impact on commercial fisheries by port (% reduction in profit)

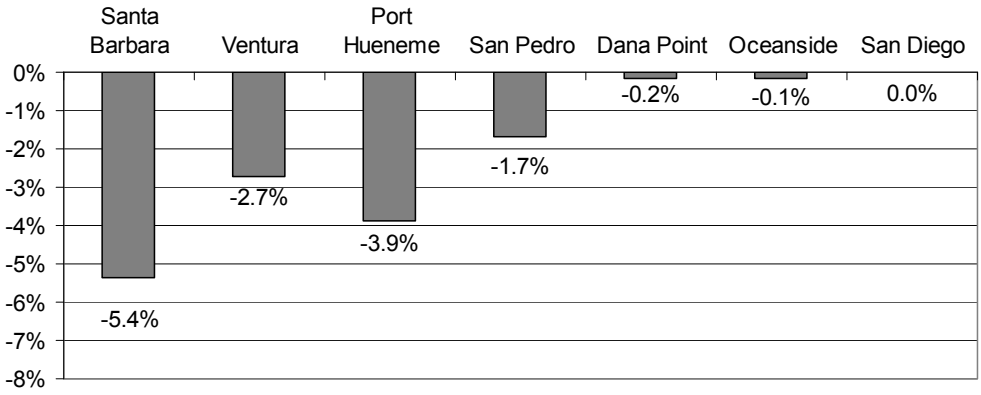


Table C.3: Estimated annual gross economic impact on commercial fisheries by port (reduction in profit)

Port	Baseline GER	$ Reduction in Profit	% Reduction in Profit
Santa Barbara	$5,796,804	$310,585	5.4%
Ventura	$5,061,321	$137,310	2.7%
Port Hueneme	$11,061,000	$431,308	3.9%
San Pedro	$20,141,349	$338,475	1.7%
Dana Point	$1,860,091	$3,227	0.2%
Oceanside	$987,326	$1,402	0.1%
San Diego	$3,093,219	$221	0.0%
Study Region	**$48,001,110**	**$1,222,527**	**2.5%**

Table C.4: Estimated annual gross economic impact on commercial fisheries (reduction in profit)

Fishery	Baseline GER	$ Reduction in Profit	% Reduction in Profit
Ca. Halibut (Hook & Line)	$108,209	$6,399	5.9%
Ca. Halibut (Trawl)	—	—	—
Coastal Pelagics	$5,889,196	$33,056	0.6%
Lobster	$6,360,856	$67,941	1.1%
N. Fishery (Hook & Line)	$217,200	$15,114	7.0%
N. Fishery (Trap)	$372,719	$1,679	0.5%
Rock Crab	$1,469,292	$37,818	2.6%
Sablefish	$286,809	$0	0.0%
Sea Cucumber (Dive)	$500,296	$41,825	8.4%
Sea Cucumber (Trawl)	—	—	—
Spot Prawn	$1,741,435	$111,726	6.4%
Squid	$22,459,304	$573,528	2.6%
Swordfish	$366,725	$3,448	0.9%
Thornyhead	$648,920	$0	0.0%
Urchin	$7,580,148	$329,993	4.4%
All Fisheries[13]	**$48,001,110**	**$1,222,527**	**2.5%**

[13] Santa Barbara Ca. halibut - trawl and sea cucumber - trawl are not included in this total.

C.3. Results for Commercial Passenger Fishing Vessels (CPFV)

We summarize here our analyses of the potential impacts of the Channel Islands MPAs on the 10 CPFV fisheries (i.e., barracuda, Ca. halibut, calico bass, lingcod, rockfish, Ca. scorpionfish, Ca. sheephead, sand bass, whitefish, and white seabass). The results for CPFV fisheries are broken out by port (i.e., Santa Barbara, Port Hueneme/Channel Islands Harbor, Santa Monica, San Pedro/Long Beach, Newport Beach, Dana Point, Oceanside, and San Diego).

C.3.1. Potential Impacts on CPFV Fishing Grounds (Area and Value)

For information on the potential impacts on CPFV fishing grounds for the 80 port-fishery combinations considered in this analysis (both in terms of total area and total value), please see Tables C.1.3–1.4 in Appendix C.1.

C.3.2. Potential Economic Impacts on CPFV Fisheries

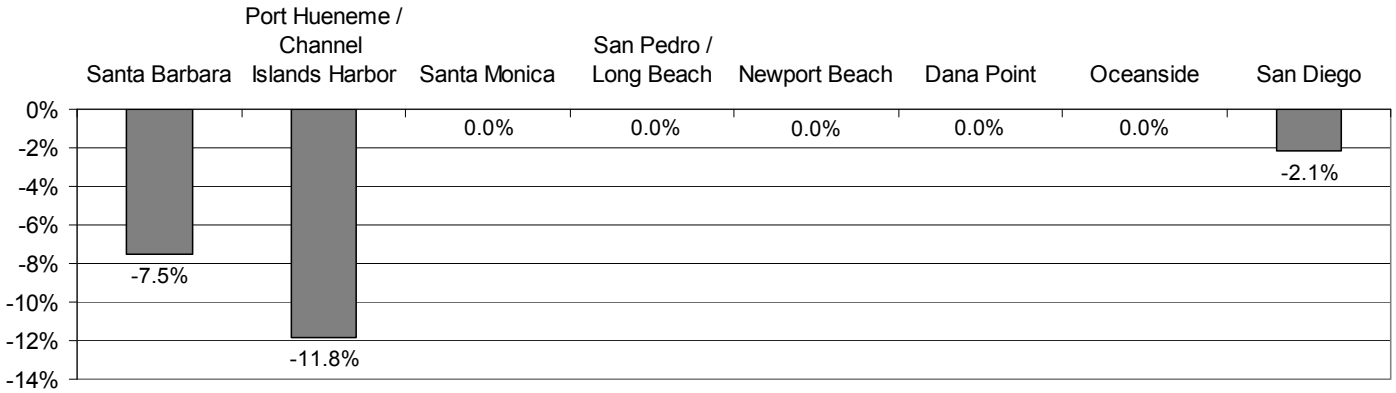
Similar to our analysis of the commercial fisheries, we calculate the potential net economic impact for the CPFV fisheries as the average (i.e., for all 10 species considered) percentage reduction in net economic revenue (i.e., profit). The potential impacts are broken down by port in Table C.5 and Figure C.3. Port Hueneme/Channel Islands Harbor is estimated to see the highest potential net impacts (as a percentage), while Santa Monica, San Pedro/Long Beach, Newport Beach, Dana Point, and Oceanside are not estimated to see any impacts.

Going forward through the subsequent MPA evaluation rounds, the impacts of the Channel Islands MPAs will not change; therefore, the net economic impacts in Table C.5 are the minimum possible impacts that any of the alternative MPA proposals could have on the SCSR CPFV fisheries.

Table C.5: Estimated annual net economic impact on CPFV fisheries by port (reduction in profit)

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	% Reduction in Profit
Santa Barbara	100%	67%	33%	7.5%
Port Hueneme / Channel Islands Harbor	100%	61%	39%	11.8%
Santa Monica	100%	74%	26%	0.0%
San Pedro / Long Beach	100%	65%	35%	0.0%
Newport Beach	100%	62%	38%	0.0%
Dana Point	100%	79%	21%	0.0%
Oceanside	100%	62%	38%	0.0%
San Diego	100%	82%	18%	2.1%
Study Region	—	—	—	**3.0%**

Figure C.3: Estimated annual net economic impact on CPFV fisheries by port (% reduction in profit)



C.4. Results for Recreational Fisheries

We summarize here our analyses of the potential impacts of the Channel Islands MPAs on the 17 recreational fisheries (i.e., barracuda, bonito, Ca. halibut, calico bass, croaker, lobster, mackerel, rockfish, rock crab, scallops, sheephead, sand bass, squid, surf perch, thresher shark, white seabass, and yellowtail). The results for recreational fisheries are broken out by user group (i.e., dive, kayak, and private vessel) and by county (i.e., Santa Barbara, Ventura, Los Angeles, Orange, and San Diego).

C.4.1. Potential Impacts on Recreational Fishing Grounds (Area and Value)

Due to the large number of fisheries, user groups, and counties considered, we present potential impacts on total recreational fishing grounds (both in terms of total area and total value) in Tables C.1.5–1.6 in Appendix C.1.

Appendix C.1: Summary tables of potential impacts

Table C.1.1: Percentage area of total commercial fishing grounds affected by port

	Santa Barbara	Ventura	Port Hueneme / Oxnard	San Pedro / Terminal Island / Redondo	Dana Point / Newport	Oceanside	San Diego
Ca. Halibut (Hook & Line)	3.7%	9.2%	7.1%	—	—	—	—
Ca. Halibut (Trawl)	0.0%	—	—	—	—	—	—
Coastal Pelagics	—	—	3.8%	3.0%	—	—	—
Lobster	5.8%	0.1%	1.0%	0.4%	0.0%	0.5%	0.0%
N. Fishery (Hook & Line)	9.8%	—	7.0%	8.6%	—	—	0.0%
N. Fishery (Trap)	1.6%	10.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Rock Crab	3.9%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
Sablefish	—	—	—	0.0%	0.0%	0.0%	—
Sea Cucumber (Dive)	10.4%	11.7%	9.5%	7.1%	—	—	0.0%
Sea Cucumber (Trawl)	0.0%	—	—	—	—	—	—
Spot Prawn	0.0%	0.0%	25.6%	0.0%	0.0%	0.0%	0.0%
Squid	—	3.1%	4.0%	3.6%	—	—	—
Swordfish	—	—	—	—	0.9%	—	0.1%
Thornyhead	—	—	—	0.0%	0.0%	0.0%	—
Urchin	7.2%	—	5.5%	5.9%	0.0%	0.0%	0.0%

Table C.1.2: Percentage value of total commercial fishing grounds affected by port

	Santa Barbara	Ventura	Port Hueneme / Oxnard	San Pedro / Terminal Island / Redondo	Dana Point / Newport	Oceanside	San Diego
Ca. Halibut (Hook & Line)	5.6%	7.0%	6.2%	—	—	—	—
Ca. Halibut (Trawl)	0.0%	—	—	—	—	—	—
Coastal Pelagics	—	—	0.8%	0.5%	—	—	—
Lobster	3.4%	0.0%	3.1%	0.1%	0.0%	0.4%	0.0%
N. Fishery (Hook & Line)	9.4%	—	0.2%	6.7%	—	—	0.0%
N. Fishery (Trap)	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rock Crab	4.0%	3.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Sablefish	—	—	—	0.0%	0.0%	0.0%	—
Sea Cucumber (Dive)	9.9%	0.3%	14.2%	1.8%	—	—	0.0%
Sea Cucumber (Trawl)	0.0%	—	—	—	—	—	—
Spot Prawn	0.0%	0.0%	26.1%	0.0%	0.0%	0.0%	0.0%
Squid	—	3.0%	2.9%	2.2%	—	—	—
Swordfish	—	—	—	—	1.6%	—	0.1%
Thornyhead	—	—	—	0.0%	0.0%	0.0%	—
Urchin	6.6%	—	3.4%	3.4%	0.0%	0.0%	0.0%

Table C.1.3: Percentage area of total CPFV fishing grounds affected by port

	Santa Barbara	Port Hueneme / Channel Islands	Santa Monica	San Pedro / Long Beach	Newport Beach	Dana Point	Oceanside	San Diego
Barracuda	8.3%	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%
Ca. Halibut	9.5%	14.6%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%
Calico Bass	9.3%	4.5%	0.0%	0.6%	0.0%	0.0%	0.0%	0.2%
Lingcod	7.1%	10.4%	0.0%	0.4%	0.0%	0.0%	0.0%	8.7%
Rockfish	7.2%	11.6%	0.0%	0.3%	0.0%	0.0%	0.0%	9.6%
Ca. Scorpionfish	8.5%	6.9%	0.0%	0.2%	0.0%	0.0%	0.0%	1.2%
Ca. Sheephead	6.6%	5.4%	0.0%	0.1%	0.0%	0.0%	0.0%	1.3%
Sand Bass	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Whitefish	9.2%	10.8%	0.0%	0.2%	0.0%	0.0%	0.0%	3.0%
White Seabass	8.1%	10.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%

Table C.1.4: Percentage value of total CPFV fishing grounds affected by port

	Santa Barbara	Port Hueneme / Channel Islands	Santa Monica	San Pedro / Long Beach	Newport Beach	Dana Point	Oceanside	San Diego
Barracuda	2.7%	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
Ca. Halibut	5.5%	12.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Calico Bass	1.2%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lingcod	4.8%	10.6%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%
Rockfish	3.7%	12.1%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%
Ca. Scorpionfish	3.7%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
Ca. Sheephead	5.3%	7.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Sand Bass	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Whitefish	8.2%	5.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
White Seabass	3.6%	6.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%

Table C.1.5: Percentage area of total recreational fishing grounds affected by county

County	User group	Barracuda	Bonito	Ca. Halibut	Calico Bass	Croaker	Lobster	Mackerels	Rockfish	Rock Crab	Scallops	Sheephead	Sand Bass	Squid	Surf Perch	Thresher Shark	White Seabass	Yellowtail
Santa Barbara	Dive			0.2%	0.0%	0.0%	3.4%		2.8%		1.6%						5.4%	3.7%
	Kayak			0.0%	0.0%		0.0%						0.0%			0.0%		
	Private Vessel	0.0%		1.2%	0.0%		0.0%		10.3%				0.0%			0.2%	0.6%	0.0%
Ventura	Dive	0.0%		14.9%	13.6%		7.2%		0.0%		14.2%	0.0%	0.0%				9.1%	13.3%
	Kayak	0.0%		0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	6.3%	11.9%	7.9%	3.4%	0.0%	7.5%	0.0%	1.6%							0.0%	6.1%	4.7%
Los Angeles	Dive	0.0%	0.0%	0.6%	0.1%	0.0%	0.6%		0.0%		0.0%	0.0%	0.0%				4.4%	1.7%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	4.8%	0.0%
	Private Vessel	0.0%	0.0%	0.1%	0.2%	0.0%	0.0%	0.0%	0.6%			0.5%	0.0%		0.0%	0.0%	0.4%	0.4%
Orange	Dive		0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%				0.0%	0.0%
	Kayak	0.0%	0.0%	0.1%	0.0%		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	0.5%	0.0%
San Diego	Dive	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%				0.0%	0.0%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	0.0%	0.0%

Table C.1.6: Percentage value of total recreational fishing grounds affected by county

County	User group	Barracuda	Bonito	Ca. Halibut	Calico Bass	Croaker	Lobster	Mackerels	Rockfish	Rock Crab	Scallops	Sheephead	Sand Bass	Squid	Surf Perch	Thresher Shark	White Seabass	Yellowtail
Santa Barbara	Dive			0.0%	0.0%	0.0%	0.4%		0.7%		4.3%						0.9%	0.6%
	Kayak			0.0%	0.0%		0.0%						0.0%			0.0%		
	Private Vessel	0.0%		0.4%	0.0%		0.0%		6.7%				0.0%			0.1%	0.2%	0.0%
Ventura	Dive	0.0%		0.2%	0.2%		1.5%		0.0%		3.7%	0.0%	0.0%				1.1%	12.0%
	Kayak	0.0%		0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	6.2%	1.2%	1.0%	2.6%	0.0%	4.6%	0.0%	4.4%							0.0%	2.3%	11.0%
Los Angeles	Dive	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%		0.0%		0.0%	0.0%	0.0%				0.6%	1.0%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	1.5%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%			0.4%	0.0%		0.0%	0.0%	0.1%	0.1%
Orange	Dive		0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%				0.0%	0.0%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	0.1%	0.0%
San Diego	Dive	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%				0.0%	0.0%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	0.0%	0.0%

Appendix D: Scope of Work

Resources Legacy Fund Foundation
MLPA Initiative Professional Services Agreement
Agreement #2008-0004M

This Agreement is made between Ecotrust ("Contractor") and the Resources Legacy Fund Foundation ("RLFF"), this 1st day of February 2008. In consideration of Contractor's retention by RLFF to perform professional services for the MLPA Initiative, the parties agree as follows:

Duties, Term, Compensation

1. *Professional Services.* Contractor agrees to render professional services as an independent contractor to RLFF for the period commencing on the date of this Agreement and concluding on November 30, 2008, unless this Agreement is terminated in accordance with Section 5. This period is called the "Professional Services Period."

2. *Duties.* Contractor's services are described in the Scope of Work specified in Exhibit A. During the Professional Services Period, Contractor shall perform all these duties to the best of its ability, although Contractor is not required to devote all productive time and energies exclusively to the activities described in the Scope of Work.

3. *Assistance to the Task Force.* At all times, Contractor will report to the Executive Director under the MLPA Blue Ribbon Task Force ("Task Force") as described in the memorandum of understanding ("MOU") between the California Resources Agency ("Agency"), California Department of Fish and Game ("Department") and RLFF.

4. *Compensation & Expenses.* Contractor's sole compensation pursuant to this Agreement shall not exceed $468,900, inclusive of all fees, expenses, and direct project costs. Contractor will bill RLFF monthly using the Invoice Template attached as Exhibit B, and will be paid within thirty (30) days of receipt by RLFF, absent any unresolved billing issues. When filling in the invoice, Contractor will record services performed using the hourly rate box. Failure to use the attached template may result in delayed payments.

5. *Termination.* Either party may terminate this Agreement for any reason or no reason upon thirty (30) days' prior written notice, subject to payment by RLFF of invoices for any outstanding work as of the termination date.

Other Obligations Between Parties

6. *Independent Contractor Legal Relationship.* Contractor's relationship with RLFF is solely that of an independent contractor and not in any way that of an employee or agent of RLFF. Contractor is responsible for direct payment of any federal or state taxes on the compensation paid under this Agreement, as well as for any such payments with respect to Contractor's employees or subcontractors. Contractor is not authorized to bind RLFF or make any representations on its behalf in any matter.

7. *Acknowledgement of Ineligibility for Benefits.* Contractor shall not be entitled to, and shall not seek any benefits made available to RLFF employees, including, but not limited to: group health insurance (including dental, vision, and any other enhancements from time to time), disability insurances, group term life insurance, participation in any retirement plan for RLFF employees, a salary reduction plan for certain child care and medical care costs, continuing education reimbursements, or training programs. Contractor shall also be responsible for independently obtaining any professional liability insurance.

8. *Ownership of Property and Work Product.* All documents, records, apparatus, equipment and other physical or intellectual property furnished to Contractor by the State of California acting by and through its agencies departments, and employees or produced by the Contractor or others in connection with this Agreement, shall be and remain the sole property of the State. Contractor shall return any of such property in Contractor's possession, custody or control to the State immediately as and when so requested. Even if the State does not so request, Contractor shall return all such State property upon the termination of this Agreement.

General

9. *No Assignment.* The services to be rendered pursuant to this Agreement are personal in nature, and Contractor may not assign any rights and obligations under this Agreement without written consent of RLFF.

10. *Governing Law.* The services to be rendered shall be governed by the laws of the State of California. Each article shall be independent and separable from all other articles, and the invalidity of an article shall not affect the enforceability of any of the other articles.

11. *No Continuing Waiver.* RLFF's waiver or failure to enforce the terms of this Agreement or any similar agreement in one instance shall not constitute a waiver of its rights hereunder with respect to other violations of this or any other agreement.

12. *Entire Agreement.* This Agreement contains the entire agreement between RLFF and Contractor relating to the subject matter hereof, and supersedes all prior and contemporaneous negotiations, correspondence, understandings and agreements between the parties relating to the subject matter hereof. This Agreement may be modified or amended only by mutual written consent of the parties.

13. *Notice.* Any notice to RLFF required or permitted under this Agreement shall be given in writing at the RLFF office. Any such notice to Contractor shall be given in a like manner and, if mailed, shall be addressed to Contractor at the last known business address then shown in RLFF's files. Notices by personal service are deemed given on the date of delivery; notices by mail are deemed given on the second business day after mailing.

14. *Dispute Resolution.* All disputes arising out of or related to the subject matter of this Agreement will be resolved by arbitration conducted by a private arbitration service under the laws of the State of California. Venue for any arbitration shall be in Sacramento County, California. Any arbitration will be governed by the rules of evidence and procedure then in effect in the Sacramento County Superior Court. The arbitrator will have the power and discretion to permit discovery under the California Code of Civil Procedure and will award reasonable costs and expenses, including attorneys' fees, to the prevailing party. The award of the arbitrator may be entered as a judgment in any court of competent jurisdiction. Pending a final result from this arbitration, either party may apply to the appropriate court for injunctive relief against breaches of this Agreement.

15. *Confidentiality.* At RLFF's sole discretion, Contractor understands and agrees that this Agreement, and any invoice submitted to RLFF by Contractor, may be released to the public without further notice to Contractor. Contractor has no expectation of privacy with respect to this Agreement or any materials, documents, proof of payment, or correspondence associated herewith.

Contractor:
By: _____
Print name: _____
Title: _____
Date: _____

Accepted for the RLFF:
By: _____
Print name: Michael R. Eaton
Title: Executive Director, RLFF
Date: _____

Exhibit A
Scope of Work

According to the separate memorandum of understanding ("MOU") between the Resources Agency ("Agency"), the Department of Fish and Game ("Department") and Resources Legacy Fund Foundation ("RLFF"), RLFF has agreed to fund professional services for the Marine Life Protection Act ("MLPA") Initiative, a public-private partnership between the Agency, the Department, and RLFF.

Professional Services

Ecotrust shall compile knowledge from recreational and commercial fishermen to create a comprehensive picture of fishing patterns in Southern California in support of the MLPA Initiative South Coast Study Region ("SCSR"). Specific activities include:

Component 1—Outreach and Education

1. Meet with select fishing community members from the SCSR to solicit their suggestions and ideas for improving the project.
2. Identify key individuals from the different fishing fleets of interest (to be identified with Department staff).
3. Hold meetings with SCSR fishing groups and partners to discuss and clarify what data are being collected, why it is being collected, and how it will be used in the MLPA Initiative process.
4. Distribute documents that clearly describe the purpose of the project, including: the consent form each fisherman will be asked to sign before their data can be used; and protocol for handling and aggregating data.

Component 2—Fleet Stratification and Sampling Design: Commercial Fleet

1. Work with Department staff and regional experts to define the region's fisheries in terms of how they are managed.
    a. Differentiate in terms of practices and/or species (group)-gear configurations.
    b. Use geographic groups or subgroups as a means of classifying participants and supporting representative sampling.
    c. Identify proportion of in-region landings made by fishermen residing there, elsewhere in the state, and out of state.
2. Once the groupings have been defined, stratify the sample population of fishermen and later evaluate their fishing effort in the region by linking their grounds to landing receipts to ensure that the sample is representative in terms of percentage of fishermen participating in a fishery.
3. Based on the sample population within the fishery groupings and geographic groups or subgroups, use criteria that are consistent with representing:
    a. At least 50% of the total landings and/or ex-vessel revenue from 2003-2006.
    b. At least 5 fishermen, except in cases where the sample population is fewer than 5.
4. Conduct an estimated 250 interviews in the south coast region to satisfy the criteria outlined above. Estimate to be confirmed or revised once the region's fisheries are defined in terms of how they are managed.
5. Using the criteria listed above, clearly document and present results that describe how the sample was defined and what the final classifications represent in terms of:
    a. Total number of fishermen.
    b. Criteria for selection (i.e. how much did they need to land to be associated with a fishery group?).
    c. How many fishermen engage in multiple fisheries.
    d. Are there fishermen that are not captured because they are missing from the landing receipts or have inadequate contact information.
    e. What is their association with the ports in the region (landing vs. home).

Component 3—Fleet Stratification and Sampling Design: Recreational Fleet

To address differing values of fishing grounds between different recreational user groups, stratify the recreational fishing fleet according to user type and geographical region or access areas. An initial phase of the research will determine the recreational consumptive population and an appropriate classification scheme that will provide useful information for stakeholders and decision makers. At a minimum the following primary user types shall be assessed:

a. Kayak and human powered vessels.
b. Motor powered private vessels.
   – Include possible stratification by vessel length.
c. Commercial Passenger Fishing Vessels (including "6-packs").
d. Shore-based anglers.
e. Diving.

Due to the unknown size of the recreational fishing community within the SCSR, the first phase of this research shall be to accurately design a sampling scheme that is representative of the identified user classes and at the same time feasible to conduct under possible time and budgetary constraints.

Component 4—Data Collection: Commercial Fleet

After introductory meetings have been conducted with representatives of the fishing community, field staff shall begin contacting fishermen to set up interviews using one-on-one or small group formats. Field staff will use Open OceanMap to collect shapes representing participants' fishing grounds and other non-spatial attributes, including demographics, basic operations (gear types, crew size/composition, operating costs and revenues), and other descriptive characteristics. Every measure shall be taken to ensure and protect the confidentiality of the information provided by fishermen. This includes new functions in Open OceanMap, obtaining consent of individual participants, and collection and analysis protocols that mask all names and identifying characteristics of an individual's fishing grounds.

1. All interviews will follow a shared protocol for each fishery the interviewee participates in:
   a. Using electronic nautical charts of the area, fishermen are to be asked to identify all areas that 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 distribute over the fishing grounds.
   b. All spatial information shall be collected on a fixed spatial scale, ideally to correspond with those of other maps and GIS layers used by stakeholders to delineate MPA alternatives.
   c. Non-spatial information pertaining to demographics and basic operations shall also be collected.
   d. Additional indicators shall be used to help further define how the participants interpret the question of ranking areas that are of economic importance to them:
      – How far they travel to an area to fish.
      – The type of vessel and gear used.
      – Percentage of household income derived from fishing.
2. To address concerns regarding the protection of a participant's confidentiality during and after the interview, Open OceanMap shall be customized so that once the last shape of the fishing grounds has been captured:
   a. The shapefile is immediately compressed using a password protected zip file.
   b. The original shapefile will be deleted and the secure zip file will be submitted to Ecotrust staff.
   c. Ecotrust staff will be the only ones that will have password access to the files.
   d. Users will not be allowed to add existing or previously created data to Open OceanMap.

Component 5—Data Collection: Recreational Fleet

Data collection for the recreational fleet shall be similar to that of the commercial fleet. The basic interview structure shall be identical in terms of questions asked, however, in many cases it is assumed that face-to-face interviews will not be possible. This assumption is based on the geographic distribution of users

(dispersed over a large area) and the sheer number of interviews required to meet a reasonable and defensible sample size. Due to these factors, a remote (web-based) data collection instrument shall be developed to allow for interviewees to enter shapes into the system via the Internet while talking to the interviewer over the telephone. An openLayers front end shall be used that allows for entry of data through an online, interactive mapping interface. Data shall be stored within a feature server on Ecotrust server infrastructure and eventually exported as a shapefile to be included in the quality assurance/quality control and data analysis processes to facilitate the interviewing process and allow for a broader interview process than otherwise possible.

Component 6—Quality Assurance/Quality Control

1. Modify secure web-based application to facilitate the verification of recreational data as well as commercial data to allow each participant to log-in and verify that their shapes and information are accurate, along with the final characterization of the fishing grounds to which he/she contributed.
    a. Those without access to the Internet will be sent hard copies of their information to verify and provide comment (must provide consent).
    b. Submit final data products to the MLPA Initiative to be used in the stakeholder MPA design and evaluation process.
2. Conduct follow-up meetings with participants and fishing community in each of the ports to verify results.

Component 7—Analysis and Evaluation of the Commercial Fishing Grounds

1. Process participants' raw shapefiles using automated analytical programs created in phase 1 and phase 2 of the MLPA Initiative to generate raster datasets of the fishing grounds.
2. Evaluate measure of weighting.
    a. Proportion of in-sample ex-vessel landings (both by landing port and by fishery).
    b. Summarize data in aggregate form, displaying the relative value based on in-sample landings or a crude measure of spatial distribution of gross value for each fishery as they were defined in Component 2.
    c. Present results for review by MLPA Initiative staff.
3. Evaluate the fishing grounds based on the stratification of the sampled population to determine if results influence or change the fishing footprint. Results shall be used to inform the MLPA Initiative process on the potential impacts to different geographical groups and sectors of the fleet.
4. Stratify the sample population within a fishery based on the following individual criteria or a combination of:
    a. Landings and/or ex-vessel revenues associated with the region (i.e., "highliners" vs. everybody else).
    b. Vessel size.
    c. Home port vs. landing port.
5. Use and document additional information collected in the interviews to further define the stated importance of the participants' fishing grounds by:
    a. Demographics.
    b. Basic operational costs.
    c. How far they travel to an area to fish.
    d. Vessel and gear type.
    e. Percentage of household income derived from fishing, and the proportion attributed to each fishery in which they participate.

Component 8—Analysis and Evaluation of the Recreational Fishing Grounds

Methods used to create the weighted surface of the recreational fishing grounds shall be identical to that used for the commercial fisheries, except that the analysis shall be done using only stated importance values from the interviews instead of by ex-vessel values for the fishery landings.

Component 9—Socioeconomic Impact Analysis: Commercial Fleet

Estimate the "worst-case scenario" or maximum potential economic impact to the commercial fishery sector by combining data generated in this study with other information readily available from other sources to allow stakeholders, the Science Advisory Team (SAT), Task Force, Fish and Game Commission, and MLPA Initiative staff to generate first order estimates of the economic impacts of proposed MPA alternatives.

1. Generate a baseline estimate using gross fishing revenues from the landing receipts in the region, 2000–07.
2. Scale gross base case revenues by factors that represent the share of the costs in gross revenues.
3. Apply the methods used in the North-Central Coast Study Region to compute and compare net economic values for the various MPA package alternatives using weighted stated importance indices from the fishing grounds.
4. Use primary net revenue losses in conjunction ("multiplier effect") with estimated secondary and tertiary effects like net benefits/costs to supporting businesses and consumption service industries to determine total community impacts.
5. Determine induced impacts based on the spending of net benefits in the community. The sum of the local expenditures that the fishermen (i.e. vessel owner and crew) generate in their community.

Component 10—Socioeconomic Impact Analysis: Recreational Fleet

Because detailed economic information pertaining to the recreational fleet is not readily available (e.g., landing receipts), an exhaustive literature review shall be conducted to determine economic gains within port communities attributed to recreational fishing activity and apportion these gains across the fishing grounds in a similar manner as done for the socioeconomic impact analysis of the commercial fleet. If the literature review is unsuccessful, the impact of the various MPA proposals on recreational fisheries shall not be weighted by any sort of value (in-study landings), but rather, using only stated importance values from the interviews.

Component 11—When the Data can be Used by the Stakeholders

Field work shall have begun by May 2008, with the goal of completing interviews by July 2008. After the data has been reviewed by the participants and the fishing community, final data products shall be delivered to MLPA Initiative staff for use by the regional stakeholder group, pending any unforeseen problems. The start and end dates will be adjusted in consultation with the MLPA Initiative staff to suit the SCSR timeline and the progress of the education and outreach efforts.

Component 12—Customize and Automate Outputs to the Needs of the Users

In consultation with MLPA Initiative staff, examine multiple ways in which the data generated from the study could be interpreted and used in the design and evaluation of potential MPA network alternatives. Due to possible resulting multiple formats, data shall be integrated into existing tools (DORIS DST) in order to generate customized and automated reports. For stakeholder deliberations, results shall also be presented in summarized tables that will describe in detail the following measures for both individual MPAs and entire network packages:

1. Stated importance in terms of value, effort, and area.
2. Maximum potential economic impact.
3. Number of fisheries.
4. Number of fishermen.
5. Notable "outliers", e.g., individual or subsets of fishermen disproportionately affected by particular MPA alternatives.

The aim of these outputs is to help inform stakeholders as they begin siting the placement of their MPAs, and also to inform the SAT, BRTF, and MLPA Initiative staff when evaluating the potential socioeconomic

effects of the alternative MPA network proposals through the support of Department staff. Possible examples include:

1. Quantify specific impacts to individual fishermen, select fleets, and ports.
2. Used as a multi-cost layer in MARXAN (Possingham 2002) or MARZONE that can help inform the optimization of solutions where sites are selected to maximize the conservation of physical and biological features and minimize costs to consumptive and non-consumptive users (socio-economic).
3. Support and possibly validate the modeling work done by SAT parallel modeling group, specifically the work being done by Chris Castillo, Carl Waters and Loo Bootsford.

To protect the confidentiality of individual participants and the fishing community and sufficiently support the MLPA Initiative process, Contractor shall work with the Department and MLPA Initiative staff to integrate datasets into the DORIS DST and advise them on how and what can be used in the stakeholder process.

Component 13—Documentation\Dissemination of Methods and Results

All methods and final results pertaining to the project will be clearly documented and submitted to the MLPA Initiative. Additionally, multiple manuscripts will be prepared and submitted to peer-reviewed scientific journals.

Deliverables

Deliverables are broken into three main sections:

1. Spatial datasets and maps depicting areas of relative importance for both recreational and commercial fishers. Metadata describing the bounds of uncertainty and appropriateness of use shall accompany these geospatial products. The geospatial products delivered to the MLPA Initiative shall include aggregate maps of relative importance for each fishery and user group, aggregated from original source data so as to preserve confidentiality and the single interview scale. Aggregate maps with a spatial resolution of 250–100 meters will be the primary product deliverable, however, it may be determined that due to confidentiality issues, coarser resolution products may be preferable. Geospatial data will be provided only to the MLPA SCSR regional stakeholder group, SAT, and MLPA Initiative staff, and shall not be made available to the general public.
2. Reports:
    a. Report documenting statistical sampling methodology to estimate areas of relative importance for both recreational and commercial fishers.
    b. A report documenting methods and results of research effort submitted to the MLPA Initiative.
    c. Presentation of research results to MLPA Initiative regional stakeholder group, SAT, and the Task Force.
    d. Article submitted to peer-reviewed journal describing research methods and results.
3. An analysis of MPA citing alternatives for various recreational user types and commercial fisheries to help inform stakeholders and decision makers in the decision making process. It is anticipated that this type of information will be used in near real-time within the construct of the MLPA regional stakeholder group and SAT.

Due to the often sensitive nature of spatial fishing information, data (i.e., individual responses, high resolution aggregated data) will not be made available to the public. All individual responses shall be kept confidential.

Key Staff

- Charles Steinback, Senior GIS Analyst
- Mike Mertens, Director of Spatial Analysis
- Astrid Scholz, Vice President Knowledge Systems

Point of Contact

Contractor will work at the direction of the MLPA Initiative Executive Director for matters pertaining to services and work products. For matters pertaining to compensation and reimbursement associated with this contract, Contractor will report to Program Analyst Robin Jenkins at 916.442.4880 or rjenkins@resourceslawgroup.com.

Agreement # 2008-0004M

AMENDMENT TO CONTRACTOR SERVICES AGREEMENT

This Amendment modifies the Professional Services Agreement ("Agreement") entered into by the Resources Legacy Fund Foundation ("RLFF") and Ecotrust ("Contractor") on February 1, 2008 for professional services for the Marine Life Protection Act ("MLPA") Initiative, a public-private partnership between the Resources Agency, the Department of Fish and Game, and RLFF. The Agreement is amended as follows:

1. The cap for total compensation for services and reimbursable expenses shall be increased $58,350, from an amount not to exceed $468,900 as provided for in the original Agreement, to an amount not to exceed $527,250.

2. The additional compensation shall be used to expand on the current activities contained in Exhibit A, Component 2.4, of the original Agreement by increasing the number of commercial and recreational fishermen interviews from 250 to 400. The compensation shall also provide for ancillary tasks associated with the increased number of interviews, including: outreach and coordination; in-house quality control; external review with the fishermen; administrative support; purchase of a laptop computer; and written work products that will be used in the South Coast MLPA Initiative process.

3. All other terms and conditions of the Agreement shall remain in effect.

CONTRACTOR: Adam Fare, CFO — DATE: 10/13/08

ACCEPTED FOR RLFF: — DATE:

Michael R. Eaton, Executive Director — 10/20/08

Appendix E: Summary Report

Summary of potential impacts of the Integrated Preferred Alternative and the Round 3 Revised South Coast Regional Stakeholder Group Proposals on commercial and recreational fisheries in the South Coast Study Region

Draft 8 December 2009
Astrid Scholz, ajscholz@ecotrust.org, Sarah Kruse, Charles Steinback,
Jon Bonkoski, and Sonya Hetrick

E.1. Introduction

The purpose of this project is to analyze the relative effects of four MPA proposals on commercial and recreational fisheries in the South Coast Study Region (SCSR). For detailed information on how data were collected and/or analyzed, please see our *Draft Survey Methods and Summary Statistics for Ecotrust's South Coast Study Region Fishery Uses and Values Project* (presented to the RSG on 4/28/2009). For information on the methods used to evaluate these data, please see Section 12 of the *SAT Draft Methods Used to Evaluate Marine Protected Area Proposals for the MLPA South Coast Region* (presented to the RSG on 4/28/09). Additional proposal-specific information on potential fishery-specific impacts (to total area and total value at the study region level) for any given MPA is available in the series of Excel files provided to the RSG.

To analyze the SCSR fisheries, we used data layers characterizing the spatial extent and relative importance of fishing grounds for 15 commercial fisheries, ten commercial passenger fishing vessel (CPFV) fisheries, and 17 recreational fisheries. We collected this information during the summer and fall of 2008 using a stratified, representative sample of 254 commercial fishermen and a stratified, solicited sample[14] of 119 CPFV and 504 recreational fishermen. Individual responses regarding the relative importance of ocean areas for each fishery were standardized using a 100-point scale and normalized to the reported fishing grounds.

Based on these data, we evaluate the potential economic impacts on the commercial, CPFV, and recreational fishing grounds under each of the four MPA proposals (i.e., Round 3 Revised SCRSG Proposal 1 (P1R), Round 3 Revised SCRSG Proposal 2 (P2R), Round 3 Revised SCRSG Proposal 3 (P3R), and the MLPA South Coast Integrated Preferred Alternative (IPA)). We also conduct a socioeconomic impact analysis and a disproportionate impact analysis on the commercial and CPFV fisheries. We report commercial and CPFV results by port. We report recreational results by user group (i.e., dive, kayak, and private vessel) and by county.

The remaining sections of this document summarize the potential impacts. For more detailed statistics, please see the tables in the Appendix.

In all tables presented, a 'dashed line' represents a fishery that does not occur or a fishery for which insufficient data were collected to merit presentation.

[14] The use of a solicited sample may cause traditional statistical measures (e.g., confidence intervals) to be less precise. Nevertheless, it does allow us to make generalizations about preferences of the overall recreational fishing population and about the three user groups within the study area. We feel that this adds thematic resolution to the MLPA marine planning process.

E.2. Impact of the Channel Islands (C.I.) MPAs

This report also presents the potential impacts of the Channel Islands MPAs on commercial, CPFV, and recreational fishing grounds. We calculate these impacts the same way that we calculate the impacts of each MPA proposal (as described in the Introduction). For more information on this analysis, please see our *Summary of potential impacts of the Channel Islands MPAs on commercial and recreational fisheries in the South Coast Study Region* (presented to the RSG on 6/29/2009).

The Channel Islands network, which was established by California Fish and Game Commission (CFGC) in 2002 and expanded by the National Oceanic and Atmospheric Administration (NOAA) in 2006 and 2007, encompasses 241 square nautical miles (or 318 square miles). It consists of 11 marine reserves where all harvest and take is prohibited (Richardson Rock, Harris Point, Carrington Point, Scorpion, Anacapa Island, Footprint, Gulf Island, Skunk Point, South Point, Judith Rock, and Santa Barbara Island) and two marine conservation areas that allow limited take of Ca. Spiny Lobster and/or Coastal Pelagics (Painted Cave and Anacapa Island). The Channel Islands network was originally set to be reconsidered during the marine planning process (i.e., stakeholders would be given the opportunity to propose changes to the siting of the existing MPAs); however, it was later decided that the Channel Islands MPAs would not be changed.

Therefore, because all proposals must include the Channel Islands MPAs, the potential impacts of the Channel Islands (C.I.) MPAs will be the same under all the alternative MPA proposals and any comparison of the proposals should separate out these impacts.

By subtracting the estimated C.I. MPAs impacts from the estimated total impacts, stakeholders can more easily assess the potential impacts of MPAs that can be changed. For example, if the total impact of a MPA proposal is a 19% reduction in net economic revenue, but 5% of this reduction comes from the Channel Islands MPAs, then stakeholders can only potentially affect 14% of the impact (i.e., the minimum impact of their proposal is a 5% reduction in net economic revenue assuming zero impact elsewhere in the SCSR).

E.3. Comparison across Sectors

On average, the potential net economic impacts on the commercial and CPFV fisheries are lowest under P2R and highest under P3R. The potential impacts on the stated value of recreational fishing grounds are lowest under P2R and highest under P3R.

Table E.1: Highest/lowest estimated impacts fishing grounds across the SCSR

	MPA Proposal(s) with highest potential impact		MPA Proposal(s) with lowest potential impact	
		Net economic value		
Commercial	P3R	19.0%	P2R	10.3%
CPFV	P3R	20.4%	P2R	12.6%
		Stated value		
Recreational	P3R		P2R	

E.4. Results for Commercial Fisheries

We summarize here our analyses of the potential impacts on the 15 commercial fisheries (i.e., Ca. halibut - hook & line, Ca. halibut - trawl, coastal pelagics, Ca. spiny lobster, N. fishery - hook & line, N. fishery - trap, rock crab, sablefish (blackcod), sea cucumber - dive, sea cucumber - trawl, spot prawn, market squid, swordfish, thornyhead, and red sea urchin). The coastal pelagics fishery includes both Northern anchovy and Pacific sardine. The N. fishery includes cabezon, greenling, and rockfish. The results for commercial fisheries are broken out by port (i.e., Santa Barbara, Ventura, Port Hueneme, San Pedro, Dana Point, Oceanside, and San Diego).

E.4.1. Potential Impacts on Commercial Fishing Grounds (Area and Stated Value)

MPA proposals vary considerably in their effects, both between and across fisheries. As mentioned previously, this report only presents results. Evaluation methods are presented in a separate document.

Each proposal affects the commercial fishing grounds differently. P2R generally has the lowest potential impacts in terms of both total area and total stated value, while P3R generally has the highest potential impacts and the IPA generally has the second lowest potential impacts. For information on the potential impacts on commercial fishing grounds for the 65 port-fishery combinations considered, please see Tables E.1.1–1.2 in Appendix E.1.

E.4.2. Potential Net Economic Impacts on Commercial Fisheries

A key assumption of our analysis is that each of the MPA proposals completely eliminates fishing opportunities in areas closed to specific fisheries and that fishermen are unable to adjust or mitigate in any way. In other words, we assume that all fishing in an area affected by an MPA is lost completely, when in reality it is more likely that fishermen will shift their efforts areas outside the MPA. The effect of such an assumption is most likely an overestimation of the impact, or a "worst case scenario."

Figure E.1 and Table E.2 summarize the MPA proposals with the estimated highest and lowest potential net economic impact (NEI), calculated as a percentage reduction in annual net economic revenue (i.e., profit) (for associated values, see Table E.3). On average, P2R is estimated to have the lowest potential NEI across the study region, while P3R is estimated to have the highest potential impact.

In terms of potential net economic impact across the SCSR for the top six commercial species based on percentage contribution to overall SCSR ex-vessel values (i.e., market squid, red sea urchin, Ca. spiny lobster, coastal pelagics, spot prawn, and rock crab), several patterns emerge from the analysis of the four proposals:

- The rock crab fishery sees the lowest range of potential impacts (in dollars). P3R has the highest potential impact on the rock crab fishery ($99,356), while P2R has the lowest potential impact ($80,740).
- The market squid fishery sees the highest range of potential impacts (in dollars). P3R has the highest potential impact on the market squid fishery ($1,870,588), while P2R has the lowest potential impact ($645,132).
- The coastal pelagics fishery sees the lowest range of potential impacts (as a percentage). P3R has the highest potential impact on the coastal pelagics fishery (11.7%), while P2R has the lowest potential impact (4.1%).
- The spot prawn and Ca. spiny lobster fisheries see the highest range of potential impacts (as a percentage). P3R has the highest potential impact on the Ca. spiny lobster fishery (21.2%), while P2R has the lowest potential impact on the spot prawn fishery (17.1%).

Figure E.1: Estimated annual net economic impact on commercial fisheries (% reduction in profit)

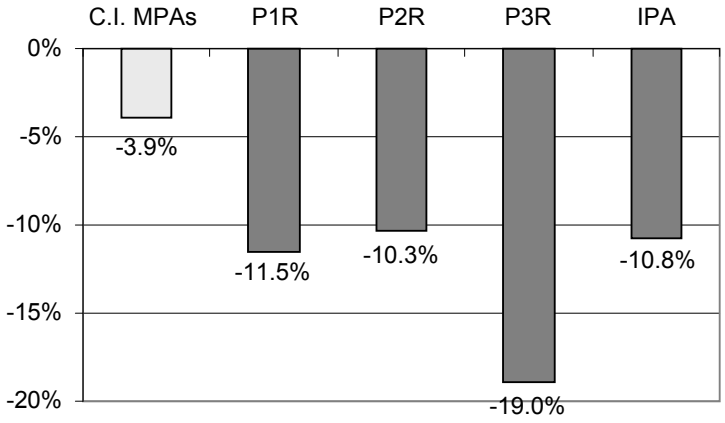
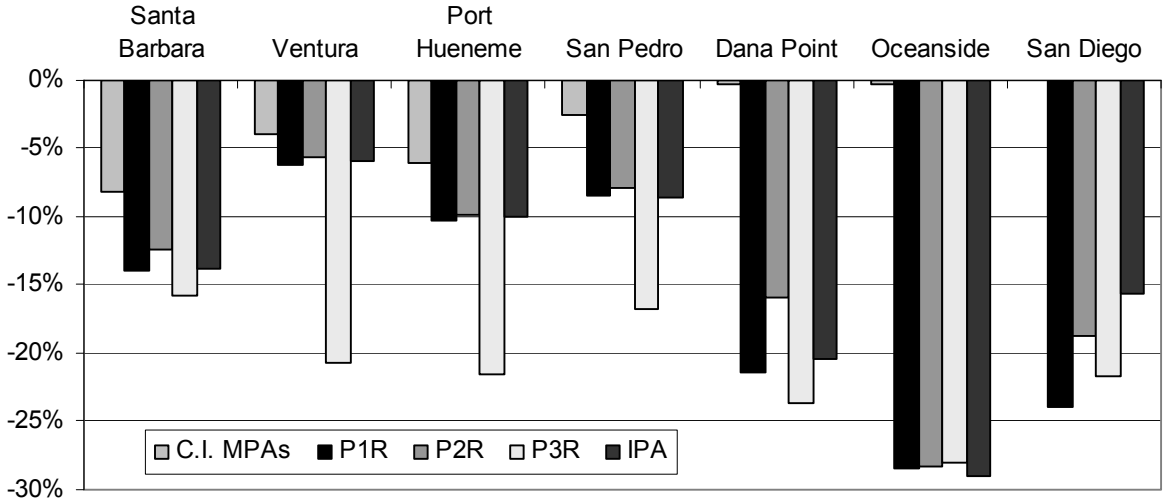


Table E.2: Highest/lowest estimated annual net economic impact on commercial fisheries by port (% reduction in profit)[15]

Port	MPA Proposal(s) with highest potential impact		MPA Proposal(s) with lowest potential impact	
Santa Barbara	P3R	15.8%	P2R	12.4%
Ventura	P3R	20.7%	P2R	5.6%
Port Hueneme	P3R	21.5%	P2R	9.8%
San Pedro	P3R	16.7%	P2R	7.9%
Dana Point	P3R	23.6%	P2R	15.9%
Oceanside	IPA	29.1%	P3R	28.1%
San Diego	P1R	24.0%	IPA	18.7%
Study Region	**P3R**	**19.0%**	**P2R**	**10.3%**

The potential impacts from each proposal are broken down by port in Figure E.2 and Table E.3. On average, Ventura is the port estimated to see the lowest potential net economic impacts (as a percentage), while Oceanside is estimated to see the highest potential impacts.

Figure E.2: Estimated annual net economic impact on commercial fisheries by port (% reduction in profit)



[15] Unless otherwise specified, economic impact is reported as the estimated maximum potential economic impact on average annual net revenue from 2000–07 (in $2007).

Table E.3: Estimated annual net economic impact on commercial fisheries by port (reduction in profit)

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Santa Barbara	$5,796,804	$2,655,064	$3,141,740	$256,224	$439,340	$390,779	$497,798	$434,196
Ventura	$5,061,321	$2,828,803	$2,232,518	$86,604	$139,310	$126,082	$462,778	$132,819
Port Hueneme	$11,061,000	$6,008,602	$5,052,398	$306,853	$516,859	$497,327	$1,085,988	$508,064
San Pedro	$20,141,349	$10,989,464	$9,151,885	$227,858	$768,227	$725,720	$1,530,420	$781,031
Dana Point	$1,860,091	$926,136	$933,955	$2,458	$200,210	$148,315	$220,869	$190,135
Oceanside	$987,326	$481,905	$505,421	$1,146	$143,690	$143,044	$141,856	$146,852
San Diego	$3,093,219	$1,462,682	$1,630,538	$168	$391,505	$305,068	$353,248	$254,981
Study Region[16]	**$48,001,110**	**$25,352,655**	**$22,648,455**	**$881,311**	**$2,599,140**	**$2,336,335**	**$4,292,958**	**$2,448,079**
Study Region Excluding Sablefish & Thornyhead[17]	**$47,065,381**	**$24,856,049**	**$22,209,332**	**$881,311**	**$2,346,080**	**$2,048,640**	**$4,065,685**	**$2,161,841**
					% Reduction in Profit			
Santa Barbara	100%	46%	54%	8.2%	14.0%	12.4%	15.8%	13.8%
Ventura	100%	56%	44%	3.9%	6.2%	5.6%	20.7%	5.9%
Port Hueneme	100%	54%	46%	6.1%	10.2%	9.8%	21.5%	10.1%
San Pedro	100%	55%	45%	2.5%	8.4%	7.9%	16.7%	8.5%
Dana Point	100%	50%	50%	0.3%	21.4%	15.9%	23.6%	20.4%
Oceanside	100%	49%	51%	0.2%	28.4%	28.3%	28.1%	29.1%
San Diego	100%	47%	53%	0.0%	24.0%	18.7%	21.7%	15.6%
Study Region	**—**	**—**	**—**	**3.9%**	**11.5%**	**10.3%**	**19.0%**	**10.8%**
Study Region Excluding Sablefish & Thornyhead	**—**	**—**	**—**	**4.0%**	**10.6%**	**9.2%**	**18.3%**	**9.7%**

Tables E.4–11 show potential net economic impacts by fishery for each port and for the SCSR.[18]

[16] Santa Barbara Ca. halibut - trawl and sea cucumber - trawl are not included in this total. Please see Table E.4 for estimated impacts on these two fisheries.

[17] The sablefish and thornyhead - trap fisheries data collected in this study indicated where those fisheries occur only inside state waters. These fisheries actually occur primarily outside of state waters and, because of this, the stated potential impacts may be overestimated throughout the study region. For this reason, we include estimates of potential net economic impact for commercial fisheries with and without these fisheries.

[18] For an explanation of why net economic impact can exceed 100%, please see Appendix E.1.

Table E.4: Estimated annual net economic impact for Santa Barbara

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Ca. Halibut (Hook & Line)	$70,658	$37,025	$33,633	$2,938	$7,777	$6,840	$11,519	$8,010
Ca. Halibut (Trawl)	$200,567	$65,184	$135,383	$0	$11,754	$12,052	$19,193	$11,035
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	$1,558,845	$716,026	$842,819	$43,055	$128,401	$96,810	$151,330	$124,070
N. Fishery (Hook & Line)	$150,237	$77,523	$72,715	$10,879	$14,799	$14,938	$16,782	$15,019
N. Fishery (Trap)	$39,144	$19,986	$19,157	$1,266	$2,819	$2,087	$4,451	$2,757
Rock Crab	$845,105	$396,193	$448,912	$27,368	$73,166	$66,168	$73,512	$70,810
Sablefish (blackcod)	—	—	—	—	—	—	—	—
Sea Cucumber (Dive)	$19,874	$9,858	$10,017	$1,538	$1,948	$1,835	$3,091	$1,974
Sea Cucumber (Trawl)	$163,088	$40,772	$122,316	$0	$4,795	$4,138	$6,307	$4,281
Spot Prawn	$48,537	$23,651	$24,886	$0	$4,706	$4,810	$4,810	$4,810
Market Squid	—	—	—	—	—	—	—	—
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—	—	—
Red Sea Urchin	$3,064,404	$1,374,803	$1,689,601	$169,180	$205,725	$197,291	$232,303	$206,747
All Fisheries	**$6,160,459**	**$2,761,020**	**$3,399,438**	**$256,224**	**$455,889**	**$406,969**	**$523,298**	**$449,512**
					% Reduction in Profit			
Ca. Halibut (Hook & Line)	100%	52%	48%	8.7%	23.1%	20.3%	34.3%	23.8%
Ca. Halibut (Trawl)	100%	33%	68%	0.0%	8.7%	8.9%	14.2%	8.2%
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	100%	46%	54%	5.1%	15.2%	11.5%	18.0%	14.7%
N. Fishery (Hook & Line)	100%	52%	48%	15.0%	20.4%	20.5%	23.1%	20.7%
N. Fishery (Trap)	100%	51%	49%	6.6%	14.7%	10.9%	23.2%	14.4%
Rock Crab	100%	47%	53%	6.1%	16.3%	14.7%	16.4%	15.8%
Sablefish (blackcod)	—	—	—	—	—	—	—	—
Sea Cucumber (Dive)	100%	50%	50%	15.4%	19.4%	18.3%	30.9%	19.7%
Sea Cucumber (Trawl)	100%	25%	75%	0.0%	3.9%	3.4%	5.2%	3.5%
Spot Prawn	100%	49%	51%	0.0%	18.9%	19.3%	19.3%	19.3%
Market Squid	—	—	—	—	—	—	—	—
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—	—	—
Red Sea Urchin	100%	45%	55%	10.0%	12.2%	11.7%	13.7%	12.2%
All Fisheries	**—**	**—**	**—**	**7.5%**	**13.4%**	**12.0%**	**15.4%**	**13.2%**

Table E.5: Estimated annual net economic impact for Ventura

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Ca. Halibut (Hook & Line)	$18,178	$9,525	$8,653	$952	$1,288	$1,205	$1,343	$1,306
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	$371,161	$170,486	$200,675	$0	$4,034	$4,458	$65,482	$4,034
N. Fishery (Hook & Line)	—	—	—	—	—	—	—	—
N. Fishery (Trap)	$35,207	$17,976	$17,231	$0	$0	$0	$4,338	$0
Rock Crab	$126,384	$59,250	$67,134	$3,637	$3,637	$3,637	$5,015	$3,637
Sablefish (blackcod)	—	—	—	—	—	—	—	—
Sea Cucumber (Dive)	$49,076	$24,342	$24,734	$116	$5,604	$4,238	$7,208	$5,604
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	$108,471	$52,855	$55,616	$0	$0	$0	$0	$0
Market Squid	$4,352,843	$2,494,369	$1,858,475	$81,899	$124,747	$112,543	$379,393	$118,238
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—	—	—
Red Sea Urchin	—	—	—	—	—	—	—	—
All Fisheries	**$5,061,321**	**$2,828,803**	**$2,232,518**	**$86,604**	**$139,310**	**$126,082**	**$462,778**	**$132,819**
					% Reduction in Profit			
Ca. Halibut (Hook & Line)	100%	52%	48%	11.0%	14.9%	13.9%	15.5%	15.1%
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	100%	46%	54%	0.0%	2.0%	2.2%	32.6%	2.0%
N. Fishery (Hook & Line)	—	—	—	—	—	—	—	—
N. Fishery (Trap)	100%	51%	49%	0.0%	0.0%	0.0%	25.2%	0.0%
Rock Crab	100%	47%	53%	5.4%	5.4%	5.4%	7.5%	5.4%
Sablefish (blackcod)	—	—	—	—	—	—	—	—
Sea Cucumber (Dive)	100%	50%	50%	0.5%	22.7%	17.1%	29.1%	22.7%
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	100%	49%	51%	0.0%	0.0%	0.0%	0.0%	0.0%
Market Squid	100%	57%	43%	4.4%	6.7%	6.1%	20.4%	6.4%
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—	—	—
Red Sea Urchin	—	—	—	—	—	—	—	—
All Fisheries	**—**	**—**	**—**	**3.9%**	**6.2%**	**5.6%**	**20.7%**	**5.9%**

Table E.6: Estimated annual net economic impact for Port Hueneme

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Ca. Halibut (Hook & Line)	$19,373	$10,152	$9,222	$904	$1,209	$1,167	$1,354	$1,227
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	$767,935	427163.8736	$340,771	$3,764	$14,666	$12,075	$28,647	$16,963
Ca. Spiny Lobster	$420,552	$193,172	$227,379	$10,516	$16,014	$16,770	$51,617	$16,049
N. Fishery (Hook & Line)	$49,637	$25,613	$24,024	$65	$7,817	$7,656	$9,453	$7,955
N. Fishery (Trap)	$61,447	$31,374	$30,073	$0	$602	$769	$769	$602
Rock Crab	$131,803	$61,790	$70,012	$0	$11	$11	$13,270	$11
Sablefish (blackcod)	—	—	—	—	—	—	—	—
Sea Cucumber (Dive)	$258,699	$128,315	$130,384	$28,868	$34,418	$33,849	$48,140	$34,438
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	$427,903	$208,506	$219,398	$88,006	$88,006	$88,006	$88,006	$88,006
Market Squid	$7,387,374	$4,233,286	$3,154,088	$131,170	$254,055	$242,089	$687,145	$243,009
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—	—	—
Red Sea Urchin	$1,536,277	$689,230	$847,047	$43,561	$100,061	$94,936	$157,587	$99,805
All Fisheries	**$11,061,000**	**$6,008,602**	**$5,052,398**	**$306,853**	**$516,859**	**$497,327**	**$1,085,988**	**$508,064**
					% Reduction in Profit			
Ca. Halibut (Hook & Line)	100%	52%	48%	9.8%	13.1%	12.7%	14.7%	13.3%
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	100%	56%	44%	1.1%	4.3%	3.5%	8.4%	5.0%
Ca. Spiny Lobster	100%	46%	54%	4.6%	7.0%	7.4%	22.7%	7.1%
N. Fishery (Hook & Line)	100%	52%	48%	0.3%	32.5%	31.9%	39.3%	33.1%
N. Fishery (Trap)	100%	51%	49%	0.0%	2.0%	2.6%	2.6%	2.0%
Rock Crab	100%	47%	53%	0.0%	0.0%	0.0%	19.0%	0.0%
Sablefish (blackcod)	—	—	—	—	—	—	—	—
Sea Cucumber (Dive)	100%	50%	50%	22.1%	26.4%	26.0%	36.9%	26.4%
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	100%	49%	51%	40.1%	40.1%	40.1%	40.1%	40.1%
Market Squid	100%	57%	43%	4.2%	8.1%	7.7%	21.8%	7.7%
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—	—	—
Red Sea Urchin	100%	45%	55%	5.1%	11.8%	11.2%	18.6%	11.8%
All Fisheries	**—**	**—**	**—**	**6.1%**	**10.2%**	**9.8%**	**21.5%**	**10.1%**

Table E.7: Estimated annual net economic impact for San Pedro

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Ca. Halibut (Hook & Line)	—	—	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	$5,121,261	$2,848,701	$2,272,559	$17,278	$111,169	$94,216	$276,455	$132,359
Ca. Spiny Lobster	$980,389	$450,323	$530,066	$801	$51,032	$46,626	$73,303	$47,667
N. Fishery (Hook & Line)	$14,034	$7,242	$6,793	$724	$1,356	$1,271	$2,005	$1,380
N. Fishery (Trap)	$76,447	$39,033	$37,414	$0	$3,539	$2,675	$9,482	$4,127
Rock Crab	$136,953	$64,205	$72,748	$0	$56	$34	$90	$45
Sablefish (blackcod)	$68,707	$38,647	$30,059	$0	$13,487	$18,571	$12,481	$15,595
Sea Cucumber (Dive)	$164,935	$81,808	$83,127	$2,346	$12,832	$12,326	$17,368	$13,117
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	$389,257	$189,674	$199,583	$0	$5,274	$3,557	$16,496	$4,109
Market Squid	$10,719,087	$6,142,503	$4,576,584	$144,248	$319,216	$290,500	$804,050	$295,174
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	$280,325	$144,835	$135,490	$0	$80,964	$88,653	$72,318	$91,216
Red Sea Urchin	$2,189,956	$982,494	$1,207,462	$62,461	$169,301	$167,292	$246,373	$176,241
All Fisheries	**$20,141,349**	**$10,989,464**	**$9,151,885**	**$227,858**	**$768,227**	**$725,720**	**$1,530,420**	**$781,031**
					% Reduction in Profit			
Ca. Halibut (Hook & Line)	—	—	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	100%	56%	44%	0.8%	4.9%	4.1%	12.2%	5.8%
Ca. Spiny Lobster	100%	46%	54%	0.2%	9.6%	8.8%	13.8%	9.0%
N. Fishery (Hook & Line)	100%	52%	48%	10.7%	20.0%	18.7%	29.5%	20.3%
N. Fishery (Trap)	100%	51%	49%	0.0%	9.5%	7.1%	25.3%	11.0%
Rock Crab	100%	47%	53%	0.0%	0.1%	0.0%	0.1%	0.1%
Sablefish (blackcod)	100%	56%	44%	0.0%	44.9%	61.8%	41.5%	51.9%
Sea Cucumber (Dive)	100%	50%	50%	2.8%	15.4%	14.8%	20.9%	15.8%
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	100%	49%	51%	0.0%	2.6%	1.8%	8.3%	2.1%
Market Squid	100%	57%	43%	3.2%	7.0%	6.3%	17.6%	6.4%
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	100%	52%	48%	0.0%	59.8%	65.4%	53.4%	67.3%
Red Sea Urchin	100%	45%	55%	5.2%	14.0%	13.9%	20.4%	14.6%
All Fisheries	**—**	**—**	**—**	**2.5%**	**8.4%**	**7.9%**	**16.7%**	**8.5%**

Table E.8: Estimated annual net economic impact for Dana Point

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Ca. Halibut (Hook & Line)	—	—	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	$914,095	$419,872	$494,223	$0	$66,927	$38,319	$100,690	$63,641
N. Fishery (Hook & Line)	—	—	—	—	—	—	—	—
N. Fishery (Trap)	$31,345	$16,004	$15,341	$0	$6,932	$527	$6,977	$6,608
Rock Crab	$38,375	$17,991	$20,384	$0	$3,149	$488	$3,030	$3,058
Sablefish (blackcod)	$127,274	$71,591	$55,682	$0	$24,984	$34,401	$23,119	$28,889
Sea Cucumber (Dive)	—	—	—	—	—	—	—	—
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	$300,792	$146,568	$154,224	$0	$23,101	$9,477	$15,377	$16,017
Market Squid	—	—	—	—	—	—	—	—
Swordfish	$196,774	$130,362	$66,411	$2,458	$20,996	$11,090	$22,450	$12,244
Thornyhead	$160,858	$83,110	$77,748	$0	$51,204	$53,378	$45,449	$57,419
Red Sea Urchin	$90,579	$40,637	$49,942	$0	$2,916	$635	$3,777	$2,259
All Fisheries	**$1,860,091**	**$926,136**	**$933,955**	**$2,458**	**$200,210**	**$148,315**	**$220,869**	**$190,135**
					% Reduction in Profit			
Ca. Halibut (Hook & Line)	—	—	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	100%	46%	54%	0.0%	13.5%	7.8%	20.4%	12.9%
N. Fishery (Hook & Line)	—	—	—	—	—	—	—	—
N. Fishery (Trap)	100%	51%	49%	0.0%	45.2%	3.4%	45.5%	43.1%
Rock Crab	100%	47%	53%	0.0%	15.4%	2.4%	14.9%	15.0%
Sablefish (blackcod)	100%	56%	44%	0.0%	44.9%	61.8%	41.5%	51.9%
Sea Cucumber (Dive)	—	—	—	—	—	—	—	—
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	100%	49%	51%	0.0%	15.0%	6.1%	10.0%	10.4%
Market Squid	—	—	—	—	—	—	—	—
Swordfish	100%	66%	34%	3.7%	31.6%	16.7%	33.8%	18.4%
Thornyhead	100%	52%	48%	0.0%	65.9%	68.7%	58.5%	73.9%
Red Sea Urchin	100%	45%	55%	0.0%	5.8%	1.3%	7.6%	4.5%
All Fisheries	**—**	**—**	**—**	**0.3%**	**21.4%**	**15.9%**	**23.6%**	**20.4%**

Table E.9: Estimated annual net economic impact for Oceanside

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Ca. Halibut (Hook & Line)	—	—	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	$400,696	$184,052	$216,644	$1,146	$29,305	$22,200	$45,185	$31,008
N. Fishery (Hook & Line)	—	—	—	—	—	—	—	—
N. Fishery (Trap)	$21,205	$10,827	$10,378	$0	$198	$144	$379	$355
Rock Crab	$35,177	$16,491	$18,686	$0	$12	$0	$29	$14
Sablefish (blackcod)	$90,829	$51,091	$39,738	$0	$17,830	$24,550	$16,499	$20,617
Sea Cucumber (Dive)	—	—	—	—	—	—	—	—
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	$211,491	$103,054	$108,437	$0	$21,490	$21,490	$21,490	$21,490
Market Squid	—	—	—	—	—	—	—	—
Swordfish	—	—	—	—	—	—	—	—
Thornyhead	$207,737	$107,331	$100,406	$0	$64,591	$68,141	$57,407	$72,501
Red Sea Urchin	$20,191	$9,058	$11,132	$0	$10,265	$6,518	$867	$867
All Fisheries	**$987,326**	**$481,905**	**$505,421**	**$1,146**	**$143,690**	**$143,044**	**$141,856**	**$146,852**
					% Reduction in Profit			
Ca. Halibut (Hook & Line)	—	—	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	100%	46%	54%	0.5%	13.5%	10.2%	20.9%	14.3%
N. Fishery (Hook & Line)	—	—	—	—	—	—	—	—
N. Fishery (Trap)	100%	51%	49%	0.0%	1.9%	1.4%	3.7%	3.4%
Rock Crab	100%	47%	53%	0.0%	0.1%	0.0%	0.2%	0.1%
Sablefish (blackcod)	100%	56%	44%	0.0%	44.9%	61.8%	41.5%	51.9%
Sea Cucumber (Dive)	—	—	—	—	—	—	—	—
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	100%	49%	51%	0.0%	19.8%	19.8%	19.8%	19.8%
Market Squid	—	—	—	—	—	—	—	—
Swordfish	100%	66%	34%	—	—	—	—	—
Thornyhead	100%	52%	48%	0.0%	64.3%	67.9%	57.2%	72.2%
Red Sea Urchin	100%	45%	55%	0.0%	92.2%	58.6%	7.8%	7.8%
All Fisheries	**—**	**—**	**—**	**0.2%**	**28.4%**	**28.3%**	**28.1%**	**29.1%**

Table E.10: Estimated annual net economic impact for San Diego

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Ca. Halibut (Hook & Line)	—	—	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	$1,715,118	$787,807	$927,311	$0	$276,239	$220,038	$241,341	$169,023
N. Fishery (Hook & Line)	$3,291	$1,698	$1,593	$0	$325	$355	$264	$203
N. Fishery (Trap)	$107,924	$55,105	$52,819	$0	$14,681	$10,034	$12,622	$9,806
Rock Crab	$155,496	$72,898	$82,598	$0	$11,499	$10,403	$4,411	$3,914
Sablefish (blackcod)	—	—	—	—	—	—	—	—
Sea Cucumber (Dive)	$7,712	$3,825	$3,887	$0	$1,505	$1,367	$501	$176
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	$254,984	$124,247	$130,737	$0	$24,684	$25,046	$26,050	$25,548
Market Squid	—	—	—	—	—	—	—	—
Swordfish	$169,952	$112,593	$57,359	$168	$1,100	$919	$1,152	$971
Thornyhead	—	—	—	—	—	—	—	—
Red Sea Urchin	$678,742	$304,508	$374,234	$0	$61,472	$36,906	$66,906	$45,340
All Fisheries	**$3,093,219**	**$1,462,682**	**$1,630,538**	**$168**	**$391,505**	**$305,068**	**$353,248**	**$254,981**
					% Reduction in Profit			
Ca. Halibut (Hook & Line)	—	—	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—	—	—
Ca. Spiny Lobster	100%	46%	54%	0.0%	29.8%	23.7%	26.0%	18.2%
N. Fishery (Hook & Line)	100%	52%	48%	0.0%	20.4%	22.3%	16.6%	12.7%
N. Fishery (Trap)	100%	51%	49%	0.0%	27.8%	19.0%	23.9%	18.6%
Rock Crab	100%	47%	53%	0.0%	13.9%	12.6%	5.3%	4.7%
Sablefish (blackcod)	—	—	—	—	—	—	—	—
Sea Cucumber (Dive)	100%	50%	50%	0.0%	38.7%	35.2%	12.9%	4.5%
Sea Cucumber (Trawl)	100%	25%	75%	—	—	—	—	—
Spot Prawn	100%	49%	51%	0.0%	18.9%	19.2%	19.9%	19.5%
Market Squid	—	—	—	—	—	—	—	—
Swordfish	100%	66%	34%	0.3%	1.9%	1.6%	2.0%	1.7%
Thornyhead	—	—	—	—	—	—	—	—
Red Sea Urchin	100%	45%	55%	0.0%	16.4%	9.9%	17.9%	12.1%
All Fisheries	**—**	**—**	**—**	**0.0%**	**24.0%**	**18.7%**	**21.7%**	**15.6%**

Table E.11: Estimated annual net economic impact for the SCSR

	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				$ Reduction in Profit				
Ca. Halibut (Hook & Line)	$108,209	$56,702	$51,508	$4,794	$10,274	$9,212	$14,217	$10,542
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	$5,889,196	$3,275,865	$2,613,331	$21,043	$125,834	$106,291	$305,102	$149,322
Ca. Spiny Lobster	$6,360,856	$2,921,739	$3,439,117	$55,518	$571,952	$445,222	$728,948	$455,491
N. Fishery (Hook & Line)	$217,200	$112,075	$105,125	$11,668	$24,297	$24,220	$28,505	$24,557
N. Fishery (Trap)	$372,719	$190,306	$182,413	$1,266	$28,772	$16,236	$39,018	$24,256
Rock Crab	$1,469,292	$688,818	$780,474	$31,005	$91,529	$80,740	$99,356	$81,489
Sablefish (blackcod)	$286,809	$161,330	$125,479	$0	$56,302	$77,522	$52,099	$65,101
Sea Cucumber (Dive)	$500,296	$248,147	$252,149	$32,868	$56,305	$53,615	$76,308	$55,309
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	$1,741,435	$848,554	$892,881	$88,006	$167,261	$152,385	$172,229	$159,979
Market Squid	$22,459,304	$12,870,158	$9,589,146	$357,317	$698,018	$645,132	$1,870,588	$656,422
Swordfish	$366,725	$242,956	$123,770	$2,626	$22,097	$12,009	$23,602	$13,215
Thornyhead	$648,920	$335,275	$313,645	$0	$196,759	$210,172	$175,173	$221,136
Red Sea Urchin	$7,580,148	$3,400,730	$4,179,418	$275,201	$549,740	$503,579	$707,813	$531,259
All Fisheries[19]	**$48,001,110**	**$25,352,655**	**$22,648,455**	**$881,311**	**$2,599,140**	**$2,336,335**	**$4,292,958**	**$2,448,079**
Excluding Sablefish & Thornyhead[20]	**$47,065,381**	**$24,856,049**	**$22,209,332**	**$881,311**	**$2,346,080**	**$2,048,640**	**$4,065,685**	**$2,161,841**
					% Reduction in Profit			
Ca. Halibut (Hook & Line)	100%	52%	48%	9.3%	19.9%	17.9%	27.6%	20.5%
Ca. Halibut (Trawl)	—	—	—	—	—	—	—	—
Coastal Pelagics	100%	56%	44%	0.8%	4.8%	4.1%	11.7%	5.7%
Ca. Spiny Lobster	100%	46%	54%	1.6%	16.6%	12.9%	21.2%	13.2%
N. Fishery (Hook & Line)	100%	52%	48%	11.1%	23.1%	23.0%	27.1%	23.4%
N. Fishery (Trap)	100%	51%	49%	0.7%	15.8%	8.9%	21.4%	13.3%
Rock Crab	100%	47%	53%	4.0%	11.7%	10.3%	12.7%	10.4%
Sablefish (blackcod)	100%	56%	44%	0.0%	44.9%	61.8%	41.5%	51.9%
Sea Cucumber (Dive)	100%	50%	50%	13.0%	22.3%	21.3%	30.3%	21.9%
Sea Cucumber (Trawl)	—	—	—	—	—	—	—	—
Spot Prawn	100%	49%	51%	9.9%	18.7%	17.1%	19.3%	17.9%
Market Squid	100%	57%	43%	3.7%	7.3%	6.7%	19.5%	6.8%
Swordfish	100%	66%	34%	2.1%	17.9%	9.7%	19.1%	10.7%
Thornyhead	100%	52%	48%	0.0%	62.7%	67.0%	55.9%	70.5%
Red Sea Urchin	100%	45%	55%	6.6%	13.2%	12.0%	16.9%	12.7%
All Fisheries	**—**	**—**	**—**	**3.9%**	**11.5%**	**10.3%**	**19.0%**	**10.8%**
Excluding Sablefish & Thornyhead	**—**	**—**	**—**	**4.0%**	**10.6%**	**9.2%**	**18.3%**	**9.7%**

[19] Santa Barbara Ca. halibut - trawl and sea cucumber - trawl are not included in this total. Please see Table E.4 for estimated impacts on these two fisheries.

[20] The sablefish and thornyhead - trap fisheries data collected in this study indicated where those fisheries occur only inside state waters. These fisheries actually occur primarily outside of state waters and, because of this, the stated potential impacts may be overestimated throughout the study region. For this reason, we include estimates of potential net economic impact for commercial fisheries with and without these fisheries.

E.4.3. Potential Gross Economic Impacts on Commercial Fisheries

A key assumption of our analysis is that each MPA proposal completely eliminates fishing opportunities in areas closed to specific fisheries and that fishermen are unable to adjust or mitigate in any way. In other words, we assume that all fishing in an area affected by an MPA is lost completely, when in reality it is more likely that fishermen will shift their efforts areas outside the MPA. The effect of this assumption is most likely an overestimation of the impacts, or a "worst case scenario."

Gross economic impact (GEI) is calculated as a percentage reduction in annual gross economic revenue. Unlike net economic impact (NEI), GEI does not account for fishermen's operating costs. Therefore, the percentage reduction in gross economic revenue is less than the percentage reduction in net economic revenue (i.e., profit). However, the dollar reduction in gross economic revenue is greater than the dollar reduction in net economic revenue.

Figures E.3–4 compare the potential annual GEI with the potential annual NEI on SCSR commercial fisheries considered. The rank order of the proposals remains the same; all that changes is the magnitude of the potential impacts. On average, P2R is estimated to have the lowest potential GEI across the study region, while P3R is estimated to have the highest potential impact.

Figure E.3: Estimated annual GEI (% reduction in revenue) and NEI (% reduction in profit) on commercial fisheries

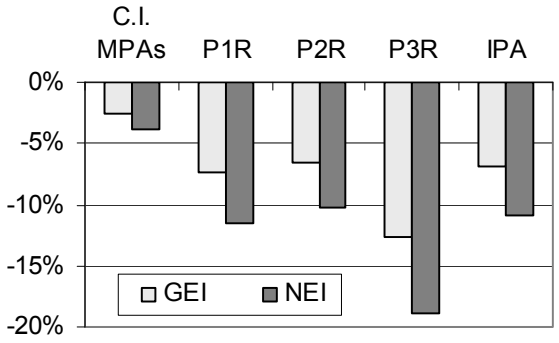
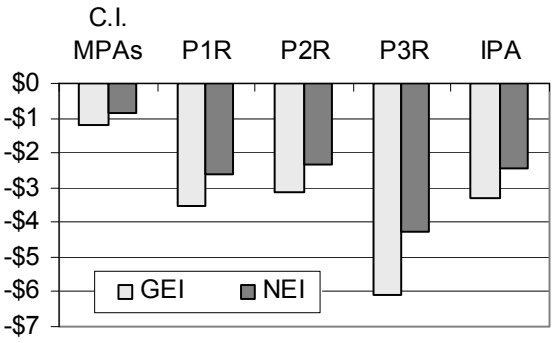


Figure E.4: Estimated annual GEI ($ reduction in revenue) and NEI ($ reduction in profit) on commercial fisheries (in millions)



In terms of potential gross economic impact across the SCSR for the top six commercial species (based on percentage contribution to overall SCSR ex-vessel values), several patterns emerge from the analysis of the four proposals:

- The rock crab fishery sees the lowest range of potential impacts (in dollars). P3R has the highest potential impact on the rock crab fishery ($121,188), while P2R has the lowest potential impact ($98,481).
- The market squid fishery sees the highest range of potential impacts (in dollars). P3R has the highest potential impact on the market squid fishery ($3,002,476), while P2R has the lowest potential impact ($1,035,499).
- The coastal pelagics fishery sees the lowest range of potential impacts (as a percentage). P3R has the highest potential impact on the coastal pelagics fishery (8.1%), while P2R has the lowest potential impact (2.8%).
- The Ca. spiny lobster and spot prawn fisheries see the highest range of potential impacts (as a percentage). P3R has the highest potential impact on the Ca. spiny lobster fishery (14.0%), while P2R has the lowest potential impact on the spot prawn fishery (11.1%).
- These results are essentially the same as those in section 4.2; however, the magnitude of the impacts differs.

The potential impacts from each proposal are broken down by port in Figure E.5 and Table E.12. On average, Ventura is the port estimated to see the lowest potential gross economic impacts (as a percentage), while Oceanside is estimated to see the highest potential impacts (as a percentage).

Figure E.5: Estimated annual gross economic impact on commercial fisheries by port (% reduction in revenue)

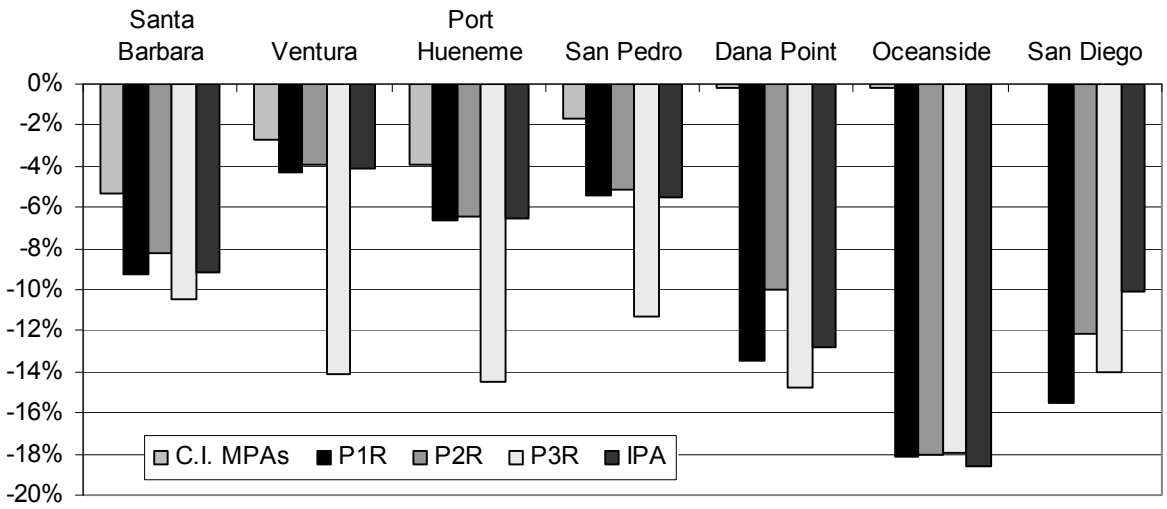


Table E.12: Estimated annual gross economic impact on commercial fisheries by port (reduction in revenue)

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Santa Barbara	$5,796,804	$310,585	$534,801	$475,440	$606,467	$528,532
Ventura	$5,061,321	$137,310	$218,454	$197,537	$711,931	$208,030
Port Hueneme	$11,061,000	$431,308	$738,477	$709,212	$1,604,309	$724,319
San Pedro	$20,141,349	$338,475	$1,100,514	$1,031,833	$2,274,701	$1,114,597
Dana Point	$1,860,091	$3,227	$250,601	$185,179	$275,425	$237,406
Oceanside	$987,326	$1,402	$179,002	$178,496	$176,747	$183,422
San Diego	$3,093,219	$221	$480,374	$374,726	$433,254	$313,185
Study Region[21]	**$48,001,110**	**$1,222,527**	**$3,502,221**	**$3,152,424**	**$6,082,834**	**$3,309,491**
			% Reduction in Revenue			
Santa Barbara	100%	5.4%	9.2%	8.2%	10.5%	9.1%
Ventura	100%	2.7%	4.3%	3.9%	14.1%	4.1%
Port Hueneme	100%	3.9%	6.7%	6.4%	14.5%	6.5%
San Pedro	100%	1.7%	5.5%	5.1%	11.3%	5.5%
Dana Point	100%	0.2%	13.5%	10.0%	14.8%	12.8%
Oceanside	100%	0.1%	18.1%	18.1%	17.9%	18.6%
San Diego	100%	0.0%	15.5%	12.1%	14.0%	10.1%
All Fisheries	**—**	**2.5%**	**7.3%**	**6.6%**	**12.7%**	**6.9%**

Tables E.13–20 show potential gross economic impacts by fishery for each port and for the SCSR.

[21] Santa Barbara Ca. halibut - trawl and sea cucumber - trawl are not included in this total. Please see Table E.13 for estimated impacts on these two fisheries.

Table E.13: Estimated annual gross economic impact for Santa Barbara

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Ca. Halibut (Hook & Line)	$70,658	$3,922	$10,380	$9,129	$15,375	$10,691
Ca. Halibut (Trawl)	$200,567	$0	$13,438	$13,779	$21,942	$12,616
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	$1,558,845	$52,689	$157,132	$118,472	$185,191	$151,831
N. Fishery (Hook & Line)	$150,237	$14,092	$19,170	$19,351	$21,739	$19,456
N. Fishery (Trap)	$39,144	$1,679	$3,738	$2,767	$5,903	$3,656
Rock Crab	$845,105	$33,382	$89,243	$80,708	$89,666	$86,370
Sablefish (blackcod)	—	—	—	—	—	—
Sea Cucumber (Dive)	$19,874	$1,958	$2,478	$2,335	$3,933	$2,512
Sea Cucumber (Trawl)	$163,088	$0	$5,480	$4,730	$7,208	$4,893
Spot Prawn	$48,537	$0	$5,975	$6,106	$6,106	$6,106
Market Squid	—	—	—	—	—	—
Swordfish	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—
Red Sea Urchin	$3,064,404	$202,864	$246,685	$236,572	$278,554	$247,910
All Fisheries	**$6,160,459**	**$310,585**	**$553,718**	**$493,948**	**$635,618**	**$546,040**
			% Reduction in Revenue			
Ca. Halibut (Hook & Line)	100%	5.6%	14.7%	12.9%	21.8%	15.1%
Ca. Halibut (Trawl)	100%	0.0%	6.7%	6.9%	10.9%	6.3%
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	100%	3.4%	10.1%	7.6%	11.9%	9.7%
N. Fishery (Hook & Line)	100%	9.4%	12.8%	12.9%	14.5%	13.0%
N. Fishery (Trap)	100%	4.3%	9.6%	7.1%	15.1%	9.3%
Rock Crab	100%	4.0%	10.6%	9.6%	10.6%	10.2%
Sablefish (blackcod)	—	—	—	—	—	—
Sea Cucumber (Dive)	100%	9.9%	12.5%	11.8%	19.8%	12.6%
Sea Cucumber (Trawl)	100%	0.0%	3.4%	2.9%	4.4%	3.0%
Spot Prawn	100%	0.0%	12.3%	12.6%	12.6%	12.6%
Market Squid	—	—	—	—	—	—
Swordfish	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—
Red Sea Urchin	100%	6.6%	8.1%	7.7%	9.1%	8.1%
All Fisheries	**—**	**5.0%**	**9.0%**	**8.0%**	**10.3%**	**8.9%**

Table E.14: Estimated annual gross economic impact for Ventura

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Ca. Halibut (Hook & Line)	$18,178	$1,271	$1,720	$1,609	$1,792	$1,743
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	$371,161	$0	$4,936	$5,456	$80,134	$4,936
N. Fishery (Hook & Line)	—	—	—	—	—	—
N. Fishery (Trap)	$35,207	$0	$0	$0	$5,753	$0
Rock Crab	$126,384	$4,436	$4,436	$4,436	$6,117	$4,436
Sablefish (blackcod)	—	—	—	—	—	—
Sea Cucumber (Dive)	$49,076	$147	$7,131	$5,393	$9,172	$7,131
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	$108,471	$0	$0	$0	$0	$0
Market Squid	$4,352,843	$131,456	$200,231	$180,643	$608,963	$189,784
Swordfish	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—
Red Sea Urchin	—	—	—	—	—	—
All Fisheries	**$5,061,321**	**$137,310**	**$218,454**	**$197,537**	**$711,931**	**$208,030**
			% Reduction in Revenue			
Ca. Halibut (Hook & Line)	100%	7.0%	9.5%	8.9%	9.9%	9.6%
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	100%	0.0%	1.3%	1.5%	21.6%	1.3%
N. Fishery (Hook & Line)	—	—	—	—	—	—
N. Fishery (Trap)	100%	0.0%	0.0%	0.0%	16.3%	0.0%
Rock Crab	100%	3.5%	3.5%	3.5%	4.8%	3.5%
Sablefish (blackcod)	—	—	—	—	—	—
Sea Cucumber (Dive)	100%	0.3%	14.5%	11.0%	18.7%	14.5%
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	100%	0.0%	0.0%	0.0%	0.0%	0.0%
Market Squid	100%	3.0%	4.6%	4.2%	14.0%	4.4%
Swordfish	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—
Red Sea Urchin	—	—	—	—	—	—
All Fisheries	**—**	**2.7%**	**4.3%**	**3.9%**	**14.1%**	**4.1%**

Table E.15: Estimated annual gross economic impact for Port Hueneme

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Ca. Halibut (Hook & Line)	$19,373	$1,207	$1,614	$1,558	$1,808	$1,637
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	$767,935	$5,913	$23,038	$18,968	$45,001	$26,647
Ca. Spiny Lobster	$420,552	$12,869	$19,598	$20,523	$63,167	$19,640
N. Fishery (Hook & Line)	$49,637	$84	$10,126	$9,918	$12,245	$10,305
N. Fishery (Trap)	$61,447	$0	$799	$1,020	$1,020	$799
Rock Crab	$131,803	$0	$13	$13	$16,185	$13
Sablefish (blackcod)	—	—	—	—	—	—
Sea Cucumber (Dive)	$258,699	$36,735	$43,798	$43,073	$61,260	$43,824
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	$427,903	$111,726	$111,726	$111,726	$111,726	$111,726
Market Squid	$7,387,374	$210,540	$407,783	$388,576	$1,102,935	$390,053
Swordfish	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—
Red Sea Urchin	$1,536,277	$52,233	$119,983	$113,838	$188,962	$119,676
All Fisheries	**$11,061,000**	**$431,308**	**$738,477**	**$709,212**	**$1,604,309**	**$724,319**
			% Reduction in Revenue			
Ca. Halibut (Hook & Line)	100%	6.2%	8.3%	8.0%	9.3%	8.5%
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	100%	0.8%	3.0%	2.5%	5.9%	3.5%
Ca. Spiny Lobster	100%	3.1%	4.7%	4.9%	15.0%	4.7%
N. Fishery (Hook & Line)	100%	0.2%	20.4%	20.0%	24.7%	20.8%
N. Fishery (Trap)	100%	0.0%	1.3%	1.7%	1.7%	1.3%
Rock Crab	100%	0.0%	0.0%	0.0%	12.3%	0.0%
Sablefish (blackcod)	—	—	—	—	—	—
Sea Cucumber (Dive)	100%	14.2%	16.9%	16.7%	23.7%	16.9%
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	100%	26.1%	26.1%	26.1%	26.1%	26.1%
Market Squid	100%	2.9%	5.5%	5.3%	14.9%	5.3%
Swordfish	—	—	—	—	—	—
Thornyhead	—	—	—	—	—	—
Red Sea Urchin	100%	3.4%	7.8%	7.4%	12.3%	7.8%
All Fisheries	**—**	**3.9%**	**6.7%**	**6.4%**	**14.5%**	**6.5%**

Table E.16: Estimated annual gross economic impact for San Pedro

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Ca. Halibut (Hook & Line)	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	$5,121,261	$27,143	$174,635	$148,004	$434,283	$207,923
Ca. Spiny Lobster	$980,389	$980	$62,451	$57,059	$89,706	$58,333
N. Fishery (Hook & Line)	$14,034	$937	$1,757	$1,646	$2,598	$1,788
N. Fishery (Trap)	$76,447	$0	$4,694	$3,547	$12,576	$5,474
Rock Crab	$136,953	$0	$68	$41	$110	$55
Sablefish (blackcod)	$68,707	$0	$16,661	$22,941	$15,418	$19,265
Sea Cucumber (Dive)	$164,935	$2,985	$16,329	$15,685	$22,101	$16,691
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	$389,257	$0	$6,695	$4,515	$20,942	$5,216
Market Squid	$10,719,087	$231,532	$512,372	$466,280	$1,290,578	$473,784
Swordfish	—	—	—	—	—	—
Thornyhead	$280,325	$0	$101,842	$111,513	$90,965	$114,737
Red Sea Urchin	$2,189,956	$74,896	$203,009	$200,600	$295,425	$211,331
All Fisheries	**$20,141,349**	**$338,475**	**$1,100,514**	**$1,031,833**	**$2,274,701**	**$1,114,597**
			% Reduction in Revenue			
Ca. Halibut (Hook & Line)	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	100%	0.5%	3.4%	2.9%	8.5%	4.1%
Ca. Spiny Lobster	100%	0.1%	6.4%	5.8%	9.2%	6.0%
N. Fishery (Hook & Line)	100%	6.7%	12.5%	11.7%	18.5%	12.7%
N. Fishery (Trap)	100%	0.0%	6.1%	4.6%	16.5%	7.2%
Rock Crab	100%	0.0%	0.1%	0.0%	0.1%	0.0%
Sablefish (blackcod)	100%	0.0%	24.3%	33.4%	22.4%	28.0%
Sea Cucumber (Dive)	100%	1.8%	9.9%	9.5%	13.4%	10.1%
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	100%	0.0%	1.7%	1.2%	5.4%	1.3%
Market Squid	100%	2.2%	4.8%	4.4%	12.0%	4.4%
Swordfish	—	—	—	—	—	—
Thornyhead	100%	0.0%	36.3%	39.8%	32.5%	40.9%
Red Sea Urchin	100%	3.4%	9.3%	9.2%	13.5%	9.7%
All Fisheries	**—**	**1.7%**	**5.5%**	**5.1%**	**11.3%**	**5.5%**

Table E.17: Estimated annual gross economic impact for Dana Point

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Ca. Halibut (Hook & Line)	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	$914,095	$0	$81,903	$46,893	$123,220	$77,881
N. Fishery (Hook & Line)	—	—	—	—	—	—
N. Fishery (Trap)	$31,345	$0	$9,194	$699	$9,253	$8,764
Rock Crab	$38,375	$0	$3,841	$595	$3,696	$3,730
Sablefish (blackcod)	$127,274	$0	$30,864	$42,497	$28,560	$35,688
Sea Cucumber (Dive)	—	—	—	—	—	—
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	$300,792	$0	$29,327	$12,032	$19,521	$20,334
Market Squid	—	—	—	—	—	—
Swordfish	$196,774	$3,227	$27,568	$14,561	$29,477	$16,076
Thornyhead	$160,858	$0	$64,407	$67,142	$57,169	$72,225
Red Sea Urchin	$90,579	$0	$3,496	$761	$4,529	$2,708
All Fisheries	**$1,860,091**	**$3,227**	**$250,601**	**$185,179**	**$275,425**	**$237,406**
			% Reduction in Revenue			
Ca. Halibut (Hook & Line)	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	100%	0.0%	9.0%	5.1%	13.5%	8.5%
N. Fishery (Hook & Line)	—	—	—	—	—	—
N. Fishery (Trap)	100%	0.0%	29.3%	2.2%	29.5%	28.0%
Rock Crab	100%	0.0%	10.0%	1.6%	9.6%	9.7%
Sablefish (blackcod)	100%	0.0%	24.3%	33.4%	22.4%	28.0%
Sea Cucumber (Dive)	—	—	—	—	—	—
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	100%	0.0%	9.8%	4.0%	6.5%	6.8%
Market Squid	—	—	—	—	—	—
Swordfish	100%	1.6%	14.0%	7.4%	15.0%	8.2%
Thornyhead	100%	0.0%	40.0%	41.7%	35.5%	44.9%
Red Sea Urchin	100%	0.0%	3.9%	0.8%	5.0%	3.0%
All Fisheries	**—**	**0.2%**	**13.5%**	**10.0%**	**14.8%**	**12.8%**

Table E.18: Estimated annual gross economic impact for Oceanside

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Ca. Halibut (Hook & Line)	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	$400,696	$1,402	$35,862	$27,167	$55,296	$37,946
N. Fishery (Hook & Line)	—	—	—	—	—	—
N. Fishery (Trap)	$21,205	$0	$263	$191	$503	$471
Rock Crab	$35,177	$0	$14	$0	$35	$18
Sablefish (blackcod)	$90,829	$0	$22,026	$30,328	$20,382	$25,468
Sea Cucumber (Dive)	—	—	—	—	—	—
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	$211,491	$0	$27,282	$27,282	$27,282	$27,282
Market Squid	—	—	—	—	—	—
Swordfish	—	—	—	—	—	—
Thornyhead	$207,737	$0	$81,246	$85,712	$72,209	$91,197
Red Sea Urchin	$20,191	$0	$12,308	$7,816	$1,040	$1,040
All Fisheries	**$987,326**	**$1,402**	**$179,002**	**$178,496**	**$176,747**	**$183,422**
			% Reduction in Revenue			
Ca. Halibut (Hook & Line)	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	100%	0.4%	9.0%	6.8%	13.8%	9.5%
N. Fishery (Hook & Line)	—	—	—	—	—	—
N. Fishery (Trap)	100%	0.0%	1.2%	0.9%	2.4%	2.2%
Rock Crab	100%	0.0%	0.0%	0.0%	0.1%	0.1%
Sablefish (blackcod)	100%	0.0%	24.3%	33.4%	22.4%	28.0%
Sea Cucumber (Dive)	—	—	—	—	—	—
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	100%	0.0%	12.9%	12.9%	12.9%	12.9%
Market Squid	—	—	—	—	—	—
Swordfish	100%	—	—	—	—	—
Thornyhead	100%	0.0%	39.1%	41.3%	34.8%	43.9%
Red Sea Urchin	100%	0.0%	61.0%	38.7%	5.2%	5.2%
All Fisheries	**—**	**0.1%**	**18.1%**	**18.1%**	**17.9%**	**18.6%**

Table E.19: Estimated annual gross economic impact for San Diego

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Ca. Halibut (Hook & Line)	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	$1,715,118	$0	$338,050	$269,274	$295,343	$206,843
N. Fishery (Hook & Line)	$3,291	$0	$421	$460	$343	$263
N. Fishery (Trap)	$107,924	$0	$19,470	$13,307	$16,739	$13,005
Rock Crab	$155,496	$0	$14,026	$12,688	$5,380	$4,774
Sablefish (blackcod)	—	—	—	—	—	—
Sea Cucumber (Dive)	$7,712	$0	$1,915	$1,740	$638	$224
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	$254,984	$0	$31,338	$31,797	$33,071	$32,434
Market Squid	—	—	—	—	—	—
Swordfish	$169,952	$221	$1,445	$1,207	$1,513	$1,275
Thornyhead	—	—	—	—	—	—
Red Sea Urchin	$678,742	$0	$73,711	$44,254	$80,227	$54,367
All Fisheries	**$3,093,219**	**$221**	**$480,374**	**$374,726**	**$433,254**	**$313,185**
			% Reduction in Revenue			
Ca. Halibut (Hook & Line)	—	—	—	—	—	—
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	—	—	—	—	—	—
Ca. Spiny Lobster	100%	0.0%	19.7%	15.7%	17.2%	12.1%
N. Fishery (Hook & Line)	100%	0.0%	12.8%	14.0%	10.4%	8.0%
N. Fishery (Trap)	100%	0.0%	18.0%	12.3%	15.5%	12.1%
Rock Crab	100%	0.0%	9.0%	8.2%	3.5%	3.1%
Sablefish (blackcod)	—	—	—	—	—	—
Sea Cucumber (Dive)	100%	0.0%	24.8%	22.6%	8.3%	2.9%
Sea Cucumber (Trawl)	100%	—	—	—	—	—
Spot Prawn	100%	0.0%	12.3%	12.5%	13.0%	12.7%
Market Squid	—	—	—	—	—	—
Swordfish	100%	0.1%	0.9%	0.7%	0.9%	0.8%
Thornyhead	—	—	—	—	—	—
Red Sea Urchin	100%	0.0%	10.9%	6.5%	11.8%	8.0%
All Fisheries	**—**	**0.0%**	**15.5%**	**12.1%**	**14.0%**	**10.1%**

Table E.20: Estimated annual gross economic impact for the SCSR

	Baseline GER	C.I. MPAs	P1R	P2R	P3R	IPA
		$ Reduction in Revenue				
Ca. Halibut (Hook & Line)	$108,209	$6,399	$13,713	$12,295	$18,975	$14,071
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	$5,889,196	$33,056	$197,673	$166,972	$479,284	$234,571
Ca. Spiny Lobster	$6,360,856	$67,941	$699,932	$544,844	$892,056	$557,411
N. Fishery (Hook & Line)	$217,200	$15,114	$31,474	$31,375	$36,925	$31,811
N. Fishery (Trap)	$372,719	$1,679	$38,157	$21,532	$51,746	$32,168
Rock Crab	$1,469,292	$37,818	$111,642	$98,481	$121,188	$99,395
Sablefish (blackcod)	$286,809	$0	$69,551	$95,766	$64,360	$80,421
Sea Cucumber (Dive)	$500,296	$41,825	$71,650	$68,227	$97,104	$70,382
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	$1,741,435	$111,726	$212,343	$193,457	$218,649	$203,097
Market Squid	$22,459,304	$573,528	$1,120,386	$1,035,499	$3,002,476	$1,053,621
Swordfish	$366,725	$3,448	$29,013	$15,768	$30,989	$17,351
Thornyhead	$648,920	$0	$247,495	$264,368	$220,344	$278,159
Red Sea Urchin	$7,580,148	$329,993	$659,193	$603,841	$848,737	$637,032
All Fisheries[22]	**$48,001,110**	**$1,222,527**	**$3,502,221**	**$3,152,424**	**$6,082,834**	**$3,309,491**
			% Reduction in Revenue			
Ca. Halibut (Hook & Line)	100%	5.9%	12.7%	11.4%	17.5%	13.0%
Ca. Halibut (Trawl)	—	—	—	—	—	—
Coastal Pelagics	100%	0.6%	3.4%	2.8%	8.1%	4.0%
Ca. Spiny Lobster	100%	1.1%	11.0%	8.6%	14.0%	8.8%
N. Fishery (Hook & Line)	100%	7.0%	14.5%	14.4%	17.0%	14.6%
N. Fishery (Trap)	100%	0.5%	10.2%	5.8%	13.9%	8.6%
Rock Crab	100%	2.6%	7.6%	6.7%	8.2%	6.8%
Sablefish (blackcod)	100%	0.0%	24.3%	33.4%	22.4%	28.0%
Sea Cucumber (Dive)	100%	8.4%	14.3%	13.6%	19.4%	14.1%
Sea Cucumber (Trawl)	—	—	—	—	—	—
Spot Prawn	100%	6.4%	12.2%	11.1%	12.6%	11.7%
Market Squid	100%	2.6%	5.0%	4.6%	13.4%	4.7%
Swordfish	100%	0.9%	7.9%	4.3%	8.5%	4.7%
Thornyhead	100%	0.0%	38.1%	40.7%	34.0%	42.9%
Red Sea Urchin	100%	4.4%	8.7%	8.0%	11.2%	8.4%
All Fisheries	**—**	**2.5%**	**7.3%**	**6.6%**	**12.7%**	**6.9%**

[22] Santa Barbara Ca. halibut - trawl and sea cucumber - trawl are not included in this total. Please see Table E.13 for estimated impacts on these two fisheries.

E.4.4. Disproportionate Impacts on Commercial Fisheries

We also use the results of our analysis to evaluate whether there are port-fishery combinations that may be disproportionately affected by the four proposals considered.

To assess these impacts, we use a box plot analysis (Figure E.1.1 in Appendix E.1) to identify outliers within each fishery (calculated using estimated impacts on the stated value of total fishing grounds minus the Channel Islands impacts). In a box plot analysis, outliers are defined as extreme values that deviate significantly from the rest of the sample. Box plot analysis results (Table E.21) can also inform convergence among MPA proposals within a fishery and/or relative potential impacts between fisheries.

It should be noted that while only one port-fishery combination is identified as a statistically significant outlier (i.e., Oceanside red sea urchin under P1R and P2R), practically speaking, the other port-fishery combinations highlighted in Table E.21 may be disproportionately impacted given their relative proximity to the statistically significant port-fishery combinations on the box plot.

Table E.21: Disproportionately impacted commercial fisheries

Port	Fishery	Proposal(s)	Estimated Impact on Stated Value of Total Fishing Grounds
Oceanside	Red Sea Urchin	P1R	60.9%
		P2R	38.7%
Dana Point	N. Fishery (Trap)	P1R	29.3%
		P3R	29.5%
		IPA	28.0%
Santa Barbara	Ca. Halibut (Hook & Line)	P3R	16.2%

E.4.5. Disproportionate Impacts on Individuals

We also evaluate if there are individual fishermen we interviewed who may be disproportionately affected by the four proposals considered. To assess these impacts, we first overlay each fisherman's fishing grounds weighted by ex-vessel revenue (for each fishery in which the individual participates) with those areas being considered for closure under each proposal. We then summarize the potential impact on each fisherman's ex-vessel revenue across all fisheries in which the individual participates. It should be noted that the "worst case scenario" still applies in that individual fishermen are assumed not to adjust to different fishing grounds and the estimates presented here **do not** include impacts from Channel Islands MPAs.

We then use a box plot analysis (Figure E.1.3 in Appendix E.1) to identify individual outliers. In a box plot analysis, outliers are defined as extreme values that deviate significantly from the rest of the sample. This analysis not only identifies individual outliers, but is able also to describe the relative impacts of proposals on individual fishermen (Table E.24).

Table E.22 shows the number of individuals identified in the box plot analysis as being disproportionately impacted by four, three, two, and one proposal(s). It should be noted that the combination of proposal(s) under which each individual is disproportionately impacted may vary.

Table E.22: Number of individuals disproportionately impacted

4 Proposals	3 Proposals	2 Proposals	1 Proposal
3	2	12	8

Table E.23 shows the highest and lowest disproportionate impacts (i.e., outliers) by proposal. The range of outliers is widest for P3R (32.4%) and narrowest for P2R (18.1%).

Table E.23: Range of outliers by proposal

Proposal	Highest disproportionate impact	Lowest disproportionate impact
P1R	55.0%	34.6%
P2R	47.3%	29.2%
P3R	77.0%	44.6%
IPA	57.2%	32.2%

Table E.24 shows the distribution of individual impacts by proposal. We use quartiles to divide the individual impacts under each proposal into four equal parts such that each quartile contains 25% of the data. For example, under P1R, 25% of individual fishermen as estimated to be impacted less than or equal to 1.0% across all fisheries in which they participate, 50% are estimated to be impacted less than or equal to 5.6%, and 75% are estimated to be impacted less than or equal to 14.3%.

Based on these results, P2R generally performs the best, followed by the IPA and P1R, while P3R generally performs the worst. Under P3R, 50% of fishermen are estimated to lose up to 12.1% of their ex-vessel revenue, another 25% of fishermen are estimated to lose between 12.1%–18.6% of their ex-vessel revenue, and the remaining 25% are estimated to lose more than 18.6% of their ex-vessel revenue.

Table E.24: Distribution of individual impacts by proposal

	P1R	P2R	P3R	IPA
1st quartile	1.0%	0.3%	4.3%	1.0%
Median (2nd quartile)	5.6%	3.3%	12.1%	4.7%
3rd quartile	14.3%	11.3%	18.6%	12.9%

E.5. Results for Commercial Passenger Fishing Vessels (CPFV)

We summarize here our analyses of the potential impacts on the ten CPFV fisheries (i.e., Pacific barracuda, Ca. halibut, kelp bass (calico bass), lingcod, rockfish, Ca. scorpionfish (sculpin), Ca. sheephead, sand bass, ocean whitefish, and white seabass). The sand bass fishery includes both barred sand bass (sand bass) and spotted sand bass (spotted bay bass). The results for CPFV fisheries are broken out by port (i.e., Santa Barbara, Port Hueneme/Channel Islands Harbor, Santa Monica, San Pedro/Long Beach, Newport Beach, Dana Point, Oceanside, and San Diego).

E.5.1. Potential Impacts on CPFV Fishing Grounds (Area and Stated Value)

MPA proposals vary considerably in their effects, both between and across fisheries. As mentioned previously, this report only presents results. Evaluation methods are presented in a separate document.

Each proposal affects the CPFV fishing grounds differently. For information on the potential impacts on CPFV fishing grounds for the 80 port-fishery combinations considered (both in terms of total area and total value), please see Tables E.1.3–1.4 in Appendix E.1.

E.5.2. Potential Net Economic Impacts on CPFV Fisheries

A key assumption of this analysis is that each of the MPA proposals completely eliminates fishing opportunities in areas closed to specific fisheries and that fishermen are unable to adjust or mitigate in any way. In other words, the analysis assumes that all fishing in an area affected by an MPA is lost completely, when in reality it is more likely that fishermen will shift their efforts areas outside the MPA. The effect of such an assumption is most likely an overestimation of the impacts, or a "worst case scenario."

Similar to our analysis of the commercial fisheries, we calculate the potential net economic impact for the CPFV fisheries as the average percentage reduction in net economic revenue (i.e., profit) for all ten species considered.

Figure E.6 and Table E.25 summarize the MPA proposals with the estimated highest and lowest potential annual net economic impact by port (for associated values, see Table E.26). On average, P2R is estimated to have the lowest potential net economic impact across the study region, while P3R is estimated to have the highest potential impact.

Figure E.6: Estimated annual net economic impact on CPFV fisheries (% reduction in profit)

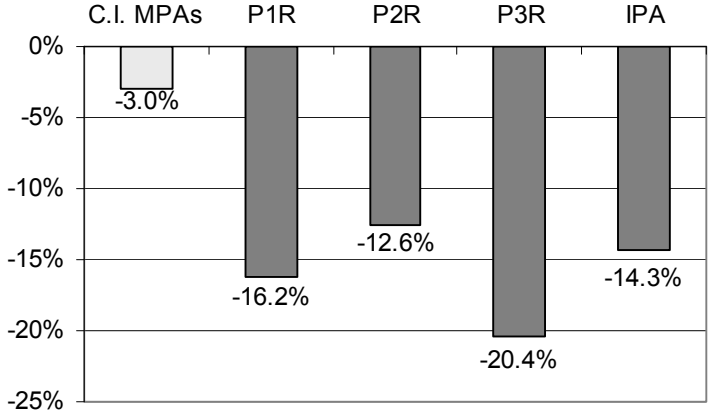


Table E.25: Highest/lowest estimated annual net economic impact on CPFV fisheries by port (% reduction in profit)

Port	MPA Proposal(s) with highest potential impact		MPA Proposal(s) with lowest potential impact	
Santa Barbara	P3R	19.8%	P2R	13.7%
Port Hueneme / Channel Islands Harbor	P3R	28.3%	P1R	24.1%
Santa Monica	P3R	16.5%	P2R	2.7%
San Pedro / Long Beach	P3R	9.5%	P2R	4.7%
Newport Beach	P3R	19.0%	P2R	5.9%
Dana Point	P3R	32.4%	P2R	9.4%
Oceanside	P1R	15.7%	IPA	12.0%
San Diego	P1R	39.6%	P2R	27.2%
Study Region	**P3R**	**20.4%**	**P2R**	**12.6%**

The potential impacts from each proposal are broken down by port in Figure E.7 and Table E.26. On average, San Pedro/Long Beach is the port estimated to see the lowest potential net economic impacts (as a percentage), while San Diego is estimated to see the highest potential impacts.

Figure E.7: Estimated annual net economic impact on CPFV fisheries by port (% reduction in profit)

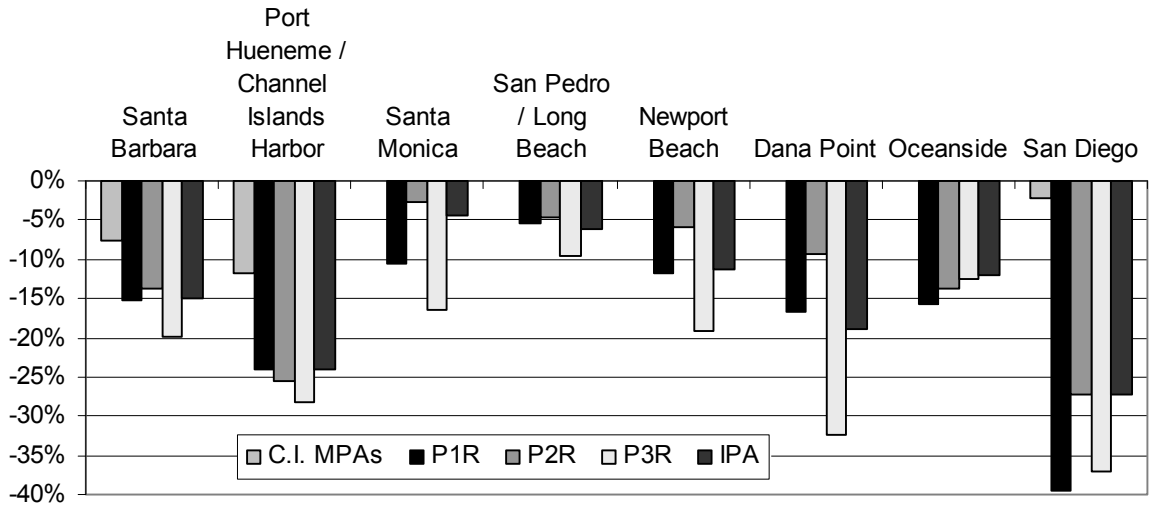


Table E.26: Estimated annual net economic impact on CPFV fisheries by port (% reduction in profit)

Port	Baseline GER	Estimated Costs	Baseline NER (Profit)	C.I. MPAs	P1R	P2R	P3R	IPA
				% Reduction in Profit				
Santa Barbara	100%	67%	33%	7.5%	15.3%	13.7%	19.8%	14.9%
Port Hueneme / Channel Islands Harbor	100%	61%	39%	11.8%	24.1%	25.5%	28.3%	24.2%
Santa Monica	100%	74%	26%	0.0%	10.4%	2.7%	16.5%	4.4%
San Pedro / Long Beach	100%	65%	35%	0.0%	5.4%	4.7%	9.5%	6.1%
Newport Beach	100%	62%	38%	0.0%	11.7%	5.9%	19.0%	11.3%
Dana Point	100%	79%	21%	0.0%	16.8%	9.4%	32.4%	18.8%
Oceanside	100%	62%	38%	0.0%	15.7%	13.8%	12.5%	12.0%
San Diego	100%	82%	18%	2.1%	39.6%	27.2%	37.0%	27.4%
Study Region	—	—	—	**3.0%**	**16.2%**	**12.6%**	**20.4%**	**14.3%**

E.5.3. Disproportionate Impacts on CPFV Fisheries

For a discussion of the methods we use to identify whether there are port-fishery combinations that could be disproportionately affected by the MPA proposals considered, please see section E.4.4.

Figure E.1.2 in Appendix E.1 presents box plot analysis for the CPFV fisheries (calculated using estimated impacts on the stated value of total fishing grounds minus the Channel Islands impacts). Table E.27 presents box plot analysis results.

Table E.27: Disproportionately impacted CPFV fisheries

Port	Fishery	Proposal(s)	Estimated Impact on Stated Value of Total Fishing Grounds
		P1R	16.1%
		P3R	22.3%
Newport Beach	Lingcod	IPA	15.9%
Newport Beach	White Seabass	P3R	19.3%

E.6. Results for Recreational Fisheries

We summarize here our analyses of the potential impacts on the 17 recreational fisheries (i.e., Pacific barracuda, Pacific bonito, Ca. halibut, kelp bass (calico bass), white croaker, Ca. spiny lobster, jack mackerel, rockfish, rock crab, scallops, Ca. sheephead, sand bass, market squid, surfperch, thresher shark, white seabass, and Ca. yellowtail). The sand bass fishery includes both barred sand bass (sand bass) and spotted sand bass (spotted bay bass). The results for recreational fisheries are broken out by user group (i.e., dive, kayak, and private vessel) and by county (i.e., Santa Barbara, Ventura, Los Angeles, Orange, and San Diego).

E.6.1. Potential Impacts on Recreational Fishing Grounds (Area and Stated Value)

Each proposal impacts the stated value of the recreational fishing grounds differently. Table E.28 presents the number of county-user group-recreational fishery combinations that are most and least impacted under each proposal (for associated values, see Tables E.1.5–1.14 in Appendix E.1). For example, out of the eight fisheries considered for Santa Barbara divers, P1R has the highest potential impact on two fisheries and the lowest potential impact on one fishery.

Overall, across all county-user group-recreational fishery combinations, P2R generally has the lowest potential impacts, while P3R generally has the highest potential impacts.

Table E.28: Number of county-user group-recreational fishery combinations that are most and least impacted

			Greatest potential impact				Least potential impact			
County	**Sector**	**# of fisheries considered**	**P1R**	**P2R**	**P3R**	**IPA**	**P1R**	**P2R**	**P3R**	**IPA**
Santa Barbara	Dive	8	2	1	7	1	1	3	2	7
	Kayak	5	0	0	5	1	2	4	0	1
	Private Vessel	9	1	0	7	0	0	8	1	1
Ventura	Dive	10	0	0	9	0	0	9	0	0
	Kayak	13	0	0	13	0	2	11	0	2
	Private Vessel	11	2	1	9	2	3	7	1	2
Los Angeles	Dive	12	0	0	12	0	3	9	0	2
	Kayak	14	0	0	13	0	0	10	0	7
	Private Vessel	14	0	0	13	1	2	11	1	2
Orange	Dive	11	0	0	11	0	0	11	0	0
	Kayak	13	1	0	10	1	0	12	0	0
	Private Vessel	14	0	0	12	1	1	11	0	2
San Diego	Dive	12	2	0	10	0	0	12	0	0
	Kayak	14	0	0	14	0	0	14	0	0
	Private Vessel	14	4	1	9	0	0	9	0	5
SCSR	Dive	53	4	1	49	1	4	44	2	9
	Kayak	59	1	0	55	2	4	51	0	10
	Private Vessel	62	7	2	50	4	6	46	3	12
All Sectors		**174**	**12**	**3**	**154**	**7**	**14**	**141**	**5**	**31**

Appendix E.1: Summary Tables of Potential Impacts

Table E.1.1: Percentage area of total commercial fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
Santa Barbara	Ca. Halibut (Hook & Line)	3.7%	9.0%	8.7%	19.5%	9.1%
	Ca. Halibut (Trawl)	0.0%	3.3%	3.5%	4.9%	3.1%
	Coastal Pelagics	—	—	—	—	—
	Live Bait	—	—	—	—	—
	Ca. Spiny Lobster	5.8%	9.9%	9.6%	17.9%	9.8%
	N. Fishery (Hook & Line)	9.8%	14.2%	13.6%	16.9%	14.4%
	N. Fishery (Trap)	1.6%	7.8%	6.7%	16.7%	7.7%
	Rock Crab	3.9%	9.7%	9.4%	11.9%	9.5%
	Sablefish (blackcod)	—	—	—	—	—
	Sea Cucumber (Dive)	10.4%	15.7%	14.1%	19.7%	15.9%
	Sea Cucumber (Trawl)	0.0%	2.2%	2.3%	3.8%	2.0%
	Spot Prawn	0.0%	13.2%	12.9%	12.9%	12.9%
	Market Squid	—	—	—	—	—
	Swordfish	—	—	—	—	—
	Thornyhead	—	—	—	—	—
	Red Sea Urchin	7.2%	13.2%	11.8%	20.2%	13.3%
Ventura	Ca. Halibut (Hook & Line)	9.2%	13.8%	12.7%	14.5%	14.0%
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	—	—	—	—	—
	Live Bait	—	—	—	—	—
	Ca. Spiny Lobster	0.1%	1.8%	1.7%	14.6%	1.8%
	N. Fishery (Hook & Line)	—	—	—	—	—
	N. Fishery (Trap)	10.5%	12.6%	12.3%	16.7%	12.8%
	Rock Crab	1.8%	1.8%	1.8%	3.1%	1.8%
	Sablefish (blackcod)	—	—	—	—	—
	Sea Cucumber (Dive)	11.7%	14.6%	13.7%	19.2%	14.6%
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	0.0%	0.0%	0.0%	0.0%
	Market Squid	3.1%	8.1%	7.2%	11.6%	7.7%
	Swordfish	—	—	—	—	—
	Thornyhead	—	—	—	—	—
	Red Sea Urchin	—	—	—	—	—

Table E.1.1 (continued): Percentage area of total commercial fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
Port Hueneme	Ca. Halibut (Hook & Line)	7.1%	12.2%	12.0%	15.5%	12.4%
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	3.8%	7.3%	6.8%	9.2%	7.2%
	Live Bait	—	—	—	—	—
	Ca. Spiny Lobster	1.0%	3.5%	3.4%	11.7%	3.5%
	N. Fishery (Hook & Line)	7.0%	15.5%	15.4%	19.2%	15.7%
	N. Fishery (Trap)	0.0%	6.3%	8.1%	8.1%	6.3%
	Rock Crab	0.0%	1.3%	1.5%	8.3%	1.3%
	Sablefish (blackcod)	—	—	—	—	—
	Sea Cucumber (Dive)	9.5%	15.5%	13.9%	19.4%	15.8%
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	25.6%	25.6%	25.6%	25.6%	25.6%
	Market Squid	4.0%	9.6%	8.9%	13.1%	9.4%
	Swordfish	—	—	—	—	—
	Thornyhead	—	—	—	—	—
	Red Sea Urchin	5.5%	7.5%	7.1%	11.3%	7.5%
San Pedro / Terminal Island	Ca. Halibut (Hook & Line)	—	—	—	—	—
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	3.0%	7.8%	7.1%	9.6%	7.4%
	Live Bait	0.0%	2.5%	0.9%	7.4%	2.5%
	Ca. Spiny Lobster	0.4%	6.1%	5.4%	8.0%	5.9%
	N. Fishery (Hook & Line)	8.6%	14.4%	13.6%	17.9%	14.6%
	N. Fishery (Trap)	0.0%	5.4%	5.5%	14.5%	5.9%
	Rock Crab	0.0%	2.0%	0.7%	2.1%	1.5%
	Sablefish (blackcod)	0.0%	38.9%	46.0%	29.7%	47.0%
	Sea Cucumber (Dive)	7.1%	14.6%	13.2%	19.6%	15.1%
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	5.8%	3.9%	7.3%	4.2%
	Market Squid	3.6%	8.7%	7.9%	11.9%	8.3%
	Swordfish	—	—	—	—	—
	Thornyhead	0.0%	38.9%	46.0%	29.7%	47.0%
	Red Sea Urchin	5.9%	8.8%	8.3%	11.0%	8.8%
Dana Point	Ca. Halibut (Hook & Line)	—	—	—	—	—
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	—	—	—	—	—
	Live Bait	0.0%	1.7%	0.0%	5.4%	5.1%
	Ca. Spiny Lobster	0.0%	4.7%	3.2%	10.8%	4.6%
	N. Fishery (Hook & Line)	—	—	—	—	—
	N. Fishery (Trap)	0.0%	14.7%	2.3%	14.8%	14.1%
	Rock Crab	0.0%	11.7%	2.3%	9.9%	10.8%
	Sablefish (blackcod)	0.0%	38.9%	46.0%	29.7%	47.0%
	Sea Cucumber (Dive)	—	—	—	—	—
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	12.7%	7.2%	11.3%	9.6%
	Market Squid	—	—	—	—	—
	Swordfish	0.9%	1.9%	1.7%	2.1%	1.7%
	Thornyhead	0.0%	38.9%	46.0%	29.7%	47.0%
	Red Sea Urchin	0.0%	4.5%	2.8%	5.3%	4.3%

Table E.1.1 (continued): Percentage area of total commercial fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
Oceanside	Ca. Halibut (Hook & Line)	—	—	—	—	—
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	—	—	—	—	—
	Live Bait	0.0%	13.1%	14.3%	3.0%	3.0%
	Ca. Spiny Lobster	0.5%	11.0%	10.3%	9.3%	7.3%
	N. Fishery (Hook & Line)	—	—	—	—	—
	N. Fishery (Trap)	0.0%	10.3%	7.8%	8.1%	7.1%
	Rock Crab	0.0%	1.6%	0.0%	4.6%	4.5%
	Sablefish (blackcod)	0.0%	38.9%	46.0%	29.7%	47.0%
	Sea Cucumber (Dive)	—	—	—	—	—
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	8.5%	8.5%	8.5%	8.5%
	Market Squid	—	—	—	—	—
	Swordfish	—	—	—	—	—
	Thornyhead	0.0%	38.9%	46.0%	29.7%	47.0%
	Red Sea Urchin	0.0%	34.7%	26.0%	19.3%	19.3%
San Diego	Ca. Halibut (Hook & Line)	—	—	—	—	—
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	—	—	—	—	—
	Live Bait	0.0%	0.0%	0.0%	5.4%	2.5%
	Ca. Spiny Lobster	0.0%	7.8%	6.9%	9.6%	5.9%
	N. Fishery (Hook & Line)	0.0%	6.1%	6.4%	5.5%	4.8%
	N. Fishery (Trap)	0.0%	7.7%	5.8%	9.4%	5.9%
	Rock Crab	0.0%	12.4%	9.6%	10.4%	8.3%
	Sablefish (blackcod)	—	—	—	—	—
	Sea Cucumber (Dive)	0.0%	26.0%	23.9%	11.1%	6.4%
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	12.0%	12.1%	12.9%	12.2%
	Market Squid	—	—	—	—	—
	Swordfish	0.1%	0.9%	0.7%	0.9%	0.8%
	Thornyhead	—	—	—	—	—
	Red Sea Urchin	0.0%	16.9%	10.1%	17.6%	13.2%

Table E.1.2: Percentage value of total commercial fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
Santa Barbara	Ca. Halibut (Hook & Line)	5.6%	14.7%	12.9%	21.8%	15.1%
	Ca. Halibut (Trawl)	0.0%	6.7%	6.9%	10.9%	6.3%
	Coastal Pelagics	—	—	—	—	—
	Live Bait	—	—	—	—	—
	Ca. Spiny Lobster	3.4%	10.1%	7.6%	11.9%	9.7%
	N. Fishery (Hook & Line)	9.4%	12.8%	12.9%	14.5%	13.0%
	N. Fishery (Trap)	4.3%	9.6%	7.1%	15.1%	9.3%
	Rock Crab	4.0%	10.6%	9.6%	10.6%	10.2%
	Sablefish (blackcod)	—	—	—	—	—
	Sea Cucumber (Dive)	9.9%	12.5%	11.8%	19.8%	12.6%
	Sea Cucumber (Trawl)	0.0%	3.4%	2.9%	4.4%	3.0%
	Spot Prawn	0.0%	12.3%	12.6%	12.6%	12.6%
	Market Squid	—	—	—	—	—
	Swordfish	—	—	—	—	—
	Thornyhead	—	—	—	—	—
	Red Sea Urchin	6.6%	8.1%	7.7%	9.1%	8.1%
Ventura	Ca. Halibut (Hook & Line)	7.0%	9.5%	8.9%	9.9%	9.6%
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	—	—	—	—	—
	Live Bait	—	—	—	—	—
	Ca. Spiny Lobster	0.0%	1.3%	1.5%	21.6%	1.3%
	N. Fishery (Hook & Line)	—	—	—	—	—
	N. Fishery (Trap)	0.0%	0.0%	0.0%	16.3%	0.0%
	Rock Crab	3.5%	3.5%	3.5%	4.8%	3.5%
	Sablefish (blackcod)	—	—	—	—	—
	Sea Cucumber (Dive)	0.3%	14.5%	11.0%	18.7%	14.5%
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	0.0%	0.0%	0.0%	0.0%
	Market Squid	3.0%	4.6%	4.2%	14.0%	4.4%
	Swordfish	—	—	—	—	—
	Thornyhead	—	—	—	—	—
	Red Sea Urchin	—	—	—	—	—
Port Hueneme	Ca. Halibut (Hook & Line)	6.2%	8.3%	8.0%	9.3%	8.5%
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	0.8%	3.0%	2.5%	5.9%	3.5%
	Live Bait	—	—	—	—	—
	Ca. Spiny Lobster	3.1%	4.7%	4.9%	15.0%	4.7%
	N. Fishery (Hook & Line)	0.2%	20.4%	20.0%	24.7%	20.8%
	N. Fishery (Trap)	0.0%	1.3%	1.7%	1.7%	1.3%
	Rock Crab	0.0%	0.0%	0.0%	12.3%	0.0%
	Sablefish (blackcod)	—	—	—	—	—
	Sea Cucumber (Dive)	14.2%	16.9%	16.7%	23.7%	16.9%
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	26.1%	26.1%	26.1%	26.1%	26.1%
	Market Squid	2.9%	5.5%	5.3%	14.9%	5.3%
	Swordfish	—	—	—	—	—
	Thornyhead	—	—	—	—	—
	Red Sea Urchin	3.4%	7.8%	7.4%	12.3%	7.8%

Table E.1.2 (continued): Percentage value of total commercial fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
San Pedro / Terminal Island	Ca. Halibut (Hook & Line)	—	—	—	—	—
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	0.5%	3.4%	2.9%	8.5%	4.1%
	Live Bait	0.0%	1.3%	0.4%	3.9%	1.2%
	Ca. Spiny Lobster	0.1%	6.4%	5.8%	9.2%	6.0%
	N. Fishery (Hook & Line)	6.7%	12.5%	11.7%	18.5%	12.7%
	N. Fishery (Trap)	0.0%	6.1%	4.6%	16.5%	7.2%
	Rock Crab	0.0%	0.1%	0.0%	0.1%	0.0%
	Sablefish (blackcod)	0.0%	24.3%	33.4%	22.4%	28.0%
	Sea Cucumber (Dive)	1.8%	9.9%	9.5%	13.4%	10.1%
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	1.7%	1.2%	5.4%	1.3%
	Market Squid	2.2%	4.8%	4.4%	12.0%	4.4%
	Swordfish	—	—	—	—	—
	Thornyhead	0.0%	36.3%	39.8%	32.5%	40.9%
	Red Sea Urchin	3.4%	9.3%	9.2%	13.5%	9.7%
Dana Point	Ca. Halibut (Hook & Line)	—	—	—	—	—
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	—	—	—	—	—
	Live Bait	0.0%	1.8%	0.0%	6.8%	6.3%
	Ca. Spiny Lobster	0.0%	9.0%	5.1%	13.5%	8.5%
	N. Fishery (Hook & Line)	—	—	—	—	—
	N. Fishery (Trap)	0.0%	29.3%	2.2%	29.5%	28.0%
	Rock Crab	0.0%	10.0%	1.6%	9.6%	9.7%
	Sablefish (blackcod)	0.0%	24.3%	33.4%	22.4%	28.0%
	Sea Cucumber (Dive)	—	—	—	—	—
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	9.8%	4.0%	6.5%	6.8%
	Market Squid	—	—	—	—	—
	Swordfish	1.6%	14.0%	7.4%	15.0%	8.2%
	Thornyhead	0.0%	40.0%	41.7%	35.5%	44.9%
	Red Sea Urchin	0.0%	3.9%	0.8%	5.0%	3.0%
Oceanside	Ca. Halibut (Hook & Line)	—	—	—	—	—
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	—	—	—	—	—
	Live Bait	0.0%	1.4%	1.5%	0.3%	0.3%
	Ca. Spiny Lobster	0.4%	9.0%	6.8%	13.8%	9.5%
	N. Fishery (Hook & Line)	—	—	—	—	—
	N. Fishery (Trap)	0.0%	1.2%	0.9%	2.4%	2.2%
	Rock Crab	0.0%	0.0%	0.0%	0.1%	0.1%
	Sablefish (blackcod)	0.0%	24.3%	33.4%	22.4%	28.0%
	Sea Cucumber (Dive)	—	—	—	—	—
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	12.9%	12.9%	12.9%	12.9%
	Market Squid	—	—	—	—	—
	Swordfish	—	—	—	—	—
	Thornyhead	0.0%	39.1%	41.3%	34.8%	43.9%
	Red Sea Urchin	0.0%	61.0%	38.7%	5.2%	5.2%

Table E.1.2 (continued): Percentage value of total commercial fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
San Diego	Ca. Halibut (Hook & Line)	—	—	—	—	—
	Ca. Halibut (Trawl)	—	—	—	—	—
	Coastal Pelagics	—	—	—	—	—
	Live Bait	0.0%	0.0%	0.0%	5.7%	2.7%
	Ca. Spiny Lobster	0.0%	19.7%	15.7%	17.2%	12.1%
	N. Fishery (Hook & Line)	0.0%	12.8%	14.0%	10.4%	8.0%
	N. Fishery (Trap)	0.0%	18.0%	12.3%	15.5%	12.1%
	Rock Crab	0.0%	9.0%	8.2%	3.5%	3.1%
	Sablefish (blackcod)	—	—	—	—	—
	Sea Cucumber (Dive)	0.0%	24.8%	22.6%	8.3%	2.9%
	Sea Cucumber (Trawl)	—	—	—	—	—
	Spot Prawn	0.0%	12.3%	12.5%	13.0%	12.7%
	Market Squid	—	—	—	—	—
	Swordfish	0.1%	0.9%	0.7%	0.9%	0.8%
	Thornyhead	—	—	—	—	—
	Red Sea Urchin	0.0%	10.9%	6.5%	11.8%	8.0%

Table E.1.3: Percentage area of total CPFV fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
Santa Barbara	Pacific Barracuda	8.3%	8.9%	8.3%	11.7%	8.7%
	Ca. Halibut	9.5%	12.3%	11.7%	19.0%	12.2%
	Kelp Bass (calico bass)	9.3%	12.8%	12.5%	18.5%	12.7%
	Lingcod	7.1%	11.0%	10.9%	13.6%	10.8%
	Rockfish	7.2%	10.8%	10.7%	13.5%	10.6%
	Ca. Scorpionfish (sculpin)	8.5%	9.4%	8.7%	13.6%	9.1%
	Ca. Sheephead	6.6%	12.2%	12.1%	15.7%	11.9%
	Sand Bass	0.0%	5.7%	3.0%	19.9%	5.5%
	Ocean Whitefish	9.2%	11.3%	10.6%	13.3%	11.1%
	White Seabass	8.1%	12.0%	11.8%	15.8%	11.7%
Port Hueneme / Channel Islands Harbor	Pacific Barracuda	5.9%	6.9%	8.0%	13.1%	6.9%
	Ca. Halibut	14.6%	18.5%	18.2%	21.7%	18.5%
	Kelp Bass (calico bass)	4.5%	7.7%	7.3%	12.7%	7.7%
	Lingcod	10.4%	11.4%	11.4%	13.5%	11.4%
	Rockfish	11.6%	12.5%	12.5%	13.3%	12.5%
	Ca. Scorpionfish (sculpin)	6.9%	9.0%	9.0%	10.8%	9.0%
	Ca. Sheephead	5.4%	7.5%	7.5%	11.1%	7.5%
	Sand Bass	0.0%	3.4%	3.2%	10.2%	3.4%
	Ocean Whitefish	10.8%	13.7%	13.5%	16.7%	13.7%
	White Seabass	10.1%	14.6%	14.5%	15.2%	14.6%
Santa Monica	Pacific Barracuda	0.0%	3.4%	1.8%	7.2%	2.7%
	Ca. Halibut	0.0%	3.9%	2.1%	6.1%	3.5%
	Kelp Bass (calico bass)	0.0%	4.5%	3.4%	6.3%	4.5%
	Lingcod	0.0%	6.9%	5.0%	8.4%	5.7%
	Rockfish	0.0%	8.8%	6.5%	10.4%	7.1%
	Ca. Scorpionfish (sculpin)	0.0%	3.0%	1.8%	4.8%	2.4%
	Ca. Sheephead	0.0%	7.5%	5.9%	9.7%	6.8%
	Sand Bass	0.0%	1.5%	1.0%	2.4%	1.5%
	Ocean Whitefish	0.0%	2.2%	1.1%	6.9%	2.1%
	White Seabass	0.0%	5.5%	4.3%	6.9%	4.9%
San Pedro / Long Beach	Pacific Barracuda	0.0%	4.4%	3.2%	7.7%	3.7%
	Ca. Halibut	0.0%	2.4%	2.3%	4.2%	2.8%
	Kelp Bass (calico bass)	0.6%	4.8%	4.3%	7.0%	5.1%
	Lingcod	0.4%	11.1%	10.8%	11.6%	10.8%
	Rockfish	0.3%	10.4%	9.6%	8.7%	10.1%
	Ca. Scorpionfish (sculpin)	0.2%	4.2%	3.3%	7.2%	4.1%
	Ca. Sheephead	0.1%	6.7%	4.4%	9.0%	6.3%
	Sand Bass	0.0%	0.7%	1.1%	1.5%	1.1%
	Ocean Whitefish	0.2%	5.4%	4.3%	7.6%	5.0%
	White Seabass	0.0%	5.6%	4.2%	8.6%	5.2%

Table E.1.3 (continued): Percentage area of total CPFV fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
Newport Beach	Pacific Barracuda	0.0%	3.6%	2.4%	8.6%	3.6%
	Ca. Halibut	0.0%	2.2%	0.9%	5.4%	2.2%
	Kelp Bass (calico bass)	0.0%	3.7%	2.1%	7.0%	3.6%
	Lingcod	0.0%	9.5%	6.6%	13.1%	9.2%
	Rockfish	0.0%	9.4%	6.5%	11.7%	9.1%
	Ca. Scorpionfish (sculpin)	0.0%	3.6%	1.8%	7.3%	3.4%
	Ca. Sheephead	0.0%	9.6%	3.2%	10.0%	8.9%
	Sand Bass	0.0%	1.9%	0.9%	4.6%	1.9%
	Ocean Whitefish	0.0%	4.0%	2.2%	7.5%	3.8%
	White Seabass	0.0%	7.2%	4.3%	9.8%	5.9%
Dana Point	Pacific Barracuda	0.0%	4.7%	2.9%	8.4%	4.6%
	Ca. Halibut	0.0%	4.2%	1.7%	10.5%	4.4%
	Kelp Bass (calico bass)	0.0%	7.4%	4.7%	14.1%	7.4%
	Lingcod	0.0%	9.6%	7.6%	13.7%	9.9%
	Rockfish	0.0%	14.1%	11.8%	17.0%	14.3%
	Ca. Scorpionfish (sculpin)	0.0%	11.4%	8.5%	15.6%	11.3%
	Ca. Sheephead	0.0%	10.2%	3.4%	10.8%	10.0%
	Sand Bass	0.0%	3.5%	1.7%	8.4%	3.6%
	Ocean Whitefish	0.0%	15.3%	12.8%	22.6%	18.4%
	White Seabass	0.0%	3.0%	0.8%	9.1%	3.5%
Oceanside	Pacific Barracuda	0.0%	7.5%	6.6%	7.0%	5.1%
	Ca. Halibut	0.0%	6.9%	6.6%	5.0%	4.9%
	Kelp Bass (calico bass)	0.0%	7.5%	6.0%	6.5%	5.5%
	Lingcod	0.0%	6.9%	6.8%	5.7%	5.6%
	Rockfish	0.0%	7.8%	8.1%	6.9%	6.9%
	Ca. Scorpionfish (sculpin)	0.0%	7.6%	6.1%	6.3%	5.1%
	Ca. Sheephead	0.0%	8.8%	6.7%	7.2%	6.3%
	Sand Bass	0.0%	7.2%	6.7%	6.1%	5.1%
	Ocean Whitefish	0.0%	9.4%	8.6%	7.1%	6.7%
	White Seabass	0.0%	9.3%	6.4%	10.6%	7.0%
San Diego	Pacific Barracuda	2.7%	8.2%	7.6%	8.0%	6.7%
	Ca. Halibut	1.5%	9.6%	7.4%	8.9%	7.5%
	Kelp Bass (calico bass)	0.2%	9.1%	7.1%	10.3%	7.7%
	Lingcod	8.7%	13.2%	12.4%	12.6%	12.0%
	Rockfish	9.6%	12.8%	12.6%	12.2%	12.0%
	Ca. Scorpionfish (sculpin)	1.2%	8.1%	6.8%	7.4%	6.5%
	Ca. Sheephead	1.3%	8.2%	6.6%	7.9%	6.5%
	Sand Bass	0.0%	9.4%	7.6%	9.4%	7.7%
	Ocean Whitefish	3.0%	13.7%	10.6%	12.8%	10.6%
	White Seabass	1.8%	13.0%	10.1%	14.2%	10.6%

Table E.1.4: Percentage value of total CPFV fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
Santa Barbara	Pacific Barracuda	2.7%	3.2%	2.7%	9.8%	3.0%
	Ca. Halibut	5.5%	11.4%	10.2%	13.9%	11.3%
	Kelp Bass (calico bass)	1.2%	7.8%	6.2%	9.7%	7.8%
	Lingcod	4.8%	10.3%	10.1%	12.0%	10.0%
	Rockfish	3.7%	7.9%	7.9%	9.6%	7.6%
	Ca. Scorpionfish (sculpin)	3.7%	4.2%	3.7%	4.6%	4.0%
	Ca. Sheephead	5.3%	10.0%	9.6%	11.7%	9.7%
	Sand Bass	0.0%	5.8%	3.2%	8.3%	5.8%
	Ocean Whitefish	8.2%	9.9%	9.2%	11.6%	9.7%
	White Seabass	3.6%	8.2%	7.5%	10.2%	8.0%
Port Hueneme / Channel Islands Harbor	Pacific Barracuda	3.4%	5.1%	10.2%	14.7%	5.2%
	Ca. Halibut	12.0%	22.1%	22.5%	23.5%	22.1%
	Kelp Bass (calico bass)	3.3%	14.8%	14.8%	18.1%	14.8%
	Lingcod	10.6%	14.0%	14.2%	14.6%	14.0%
	Rockfish	12.1%	14.6%	14.8%	15.0%	14.6%
	Ca. Scorpionfish (sculpin)	4.3%	12.9%	13.2%	14.6%	12.9%
	Ca. Sheephead	7.0%	14.8%	15.1%	16.7%	14.8%
	Sand Bass	0.0%	3.2%	3.3%	4.2%	3.2%
	Ocean Whitefish	5.2%	14.8%	15.2%	16.7%	14.8%
	White Seabass	6.6%	15.5%	15.8%	16.7%	15.5%
Santa Monica	Pacific Barracuda	0.0%	4.6%	1.0%	7.5%	1.3%
	Ca. Halibut	0.0%	2.9%	1.3%	4.3%	2.5%
	Kelp Bass (calico bass)	0.0%	6.2%	2.3%	9.5%	3.5%
	Lingcod	0.0%	3.9%	0.6%	6.5%	0.7%
	Rockfish	0.0%	3.8%	0.5%	6.7%	0.7%
	Ca. Scorpionfish (sculpin)	0.0%	2.2%	0.6%	4.0%	0.7%
	Ca. Sheephead	0.0%	5.7%	1.6%	9.3%	2.5%
	Sand Bass	0.0%	2.4%	0.2%	2.6%	0.5%
	Ocean Whitefish	0.0%	4.7%	1.5%	7.5%	2.6%
	White Seabass	0.0%	5.5%	1.2%	8.4%	2.5%
San Pedro / Long Beach	Pacific Barracuda	0.0%	1.2%	1.5%	2.5%	1.6%
	Ca. Halibut	0.0%	1.2%	0.9%	3.1%	1.6%
	Kelp Bass (calico bass)	0.0%	3.3%	2.7%	5.9%	3.8%
	Lingcod	0.0%	5.2%	4.9%	8.7%	5.6%
	Rockfish	0.0%	5.0%	4.6%	6.2%	4.8%
	Ca. Scorpionfish (sculpin)	0.0%	2.4%	2.8%	3.5%	2.9%
	Ca. Sheephead	0.0%	3.8%	3.3%	6.3%	4.5%
	Sand Bass	0.0%	0.1%	0.4%	0.5%	0.4%
	Ocean Whitefish	0.0%	1.8%	1.8%	3.7%	2.4%
	White Seabass	0.0%	6.1%	3.5%	13.2%	6.5%

Table E.1.4 (continued): Percentage value of total CPFV fishing grounds affected by port

Port	Fishery	C.I. MPAs	P1R	P2R	P3R	IPA
Newport Beach	Pacific Barracuda	0.0%	2.7%	1.4%	5.6%	2.4%
	Ca. Halibut	0.0%	3.2%	1.5%	8.0%	3.2%
	Kelp Bass (calico bass)	0.0%	6.9%	3.9%	15.1%	6.6%
	Lingcod	0.0%	16.1%	13.1%	22.3%	15.9%
	Rockfish	0.0%	6.8%	4.5%	9.2%	6.6%
	Ca. Scorpionfish (sculpin)	0.0%	1.1%	0.6%	2.3%	1.1%
	Ca. Sheephead	0.0%	17.4%	3.6%	17.8%	16.9%
	Sand Bass	0.0%	2.5%	1.2%	6.5%	2.5%
	Ocean Whitefish	0.0%	4.2%	2.1%	7.6%	4.0%
	White Seabass	0.0%	9.3%	3.5%	19.3%	8.8%
Dana Point	Pacific Barracuda	0.0%	2.5%	1.8%	7.1%	3.2%
	Ca. Halibut	0.0%	3.3%	1.5%	10.0%	3.9%
	Kelp Bass (calico bass)	0.0%	3.2%	1.9%	8.6%	3.4%
	Lingcod	0.0%	6.7%	5.5%	11.6%	7.5%
	Rockfish	0.0%	6.5%	5.2%	10.4%	7.3%
	Ca. Scorpionfish (sculpin)	0.0%	5.7%	4.0%	10.8%	6.3%
	Ca. Sheephead	0.0%	13.3%	2.1%	14.1%	12.7%
	Sand Bass	0.0%	1.3%	0.5%	4.7%	1.6%
	Ocean Whitefish	0.0%	10.7%	8.1%	20.5%	13.7%
	White Seabass	0.0%	2.9%	0.7%	10.4%	3.4%
Oceanside	Pacific Barracuda	0.0%	7.8%	6.7%	6.3%	5.9%
	Ca. Halibut	0.0%	6.9%	6.0%	5.1%	5.1%
	Kelp Bass (calico bass)	0.0%	6.7%	5.5%	5.0%	4.8%
	Lingcod	0.0%	9.4%	8.9%	7.8%	7.7%
	Rockfish	0.0%	6.7%	5.9%	6.8%	6.8%
	Ca. Scorpionfish (sculpin)	0.0%	6.9%	5.7%	5.5%	5.4%
	Ca. Sheephead	0.0%	10.0%	8.7%	8.3%	7.8%
	Sand Bass	0.0%	6.4%	5.2%	5.8%	5.5%
	Ocean Whitefish	0.0%	15.6%	14.6%	9.6%	9.4%
	White Seabass	0.0%	7.1%	5.9%	6.0%	5.5%
San Diego	Pacific Barracuda	0.7%	11.0%	8.5%	11.0%	7.1%
	Ca. Halibut	0.1%	12.4%	6.9%	11.5%	8.6%
	Kelp Bass (calico bass)	0.0%	16.3%	12.3%	16.2%	11.7%
	Lingcod	2.4%	12.9%	9.8%	10.9%	8.8%
	Rockfish	2.5%	10.1%	9.4%	8.1%	6.7%
	Ca. Scorpionfish (sculpin)	0.4%	11.3%	6.7%	10.4%	7.7%
	Ca. Sheephead	0.2%	14.5%	9.0%	11.5%	8.4%
	Sand Bass	0.0%	7.9%	5.1%	9.1%	6.6%
	Ocean Whitefish	0.4%	16.7%	9.7%	15.4%	11.7%
	White Seabass	0.1%	14.0%	10.2%	14.8%	10.6%

Table E.1.5: Percentage area of total recreational fishing grounds affected by county for Channel Islands MPAs

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			0.2%	0.0%	0.0%	3.4%		2.8%		1.6%						5.4%	3.7%
	Kayak			0.0%	0.0%		0.0%						0.0%			0.0%		
	Private Vessel	0.0%		1.2%	0.0%		0.0%		10.3%				0.0%			0.2%	0.6%	0.0%
Ventura	Dive	0.0%		14.9%	13.6%		7.2%		0.0%		14.2%	0.0%	0.0%				9.1%	13.3%
	Kayak	0.0%		0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	6.3%	11.9%	7.9%	3.4%	0.0%	7.5%	0.0%	1.6%							0.0%	6.1%	4.7%
Los Angeles	Dive	0.0%	0.0%	0.6%	0.1%	0.0%	0.6%		0.0%		0.0%	0.0%	0.0%				4.4%	1.7%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	4.8%	0.0%
	Private Vessel	0.0%	0.0%	0.1%	0.2%	0.0%	0.0%	0.0%	0.6%			0.5%	0.0%		0.0%	0.0%	0.4%	0.4%
Orange	Dive		0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%				0.0%	0.0%
	Kayak	0.0%	0.0%	0.1%	0.0%		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	0.5%	0.0%
San Diego	Dive	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%				0.0%	0.0%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	0.0%	0.0%

Table E.1.6: Percentage area of total recreational fishing grounds affected by county for P1R

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			5.5%	9.2%	13.8%	8.6%		6.7%		7.4%						7.2%	3.7%
	Kayak			9.0%	11.9%		0.0%						27.6%			1.0%		
	Private Vessel	0.5%		9.2%	8.0%		2.3%		11.3%				0.0%			0.8%	5.0%	0.2%
Ventura	Dive	3.7%		17.9%	16.1%		14.2%		10.2%		16.4%	0.0%	11.6%				10.5%	14.0%
	Kayak	5.0%		8.9%	13.1%		13.9%	2.3%	11.4%	0.0%		16.0%	18.5%	11.3%		1.8%	10.4%	26.9%
	Private Vessel	8.5%	11.9%	10.5%	8.8%	0.0%	17.3%	0.0%	2.2%							7.3%	8.9%	11.4%
Los Angeles	Dive	15.2%	36.5%	13.0%	9.2%	18.2%	7.9%		20.7%		14.7%	26.5%	22.0%				9.6%	13.0%
	Kayak	3.5%	9.8%	4.5%	5.2%		9.8%	11.4%	13.7%	0.0%		5.8%	4.5%	19.0%		2.9%	10.5%	15.9%
	Private Vessel	4.3%	4.5%	4.2%	4.7%	0.0%	4.4%	1.2%	8.1%			5.3%	2.6%		1.7%	6.0%	7.3%	4.4%
Orange	Dive		12.7%	3.1%	10.0%	18.3%	5.4%		4.5%		7.0%	12.7%	11.1%				7.6%	4.2%
	Kayak	3.4%	7.0%	2.6%	4.9%		4.2%	0.0%	11.8%			17.3%	2.9%	21.9%		4.5%	8.6%	19.0%
	Private Vessel	4.3%	2.5%	3.6%	3.3%	11.7%	3.7%	1.8%	9.7%			23.1%	2.6%		0.0%	1.2%	6.2%	1.9%
San Diego	Dive	14.5%	17.4%	19.9%	15.2%	13.0%	9.6%		33.9%		28.3%	34.5%	11.0%				9.9%	9.5%
	Kayak	21.3%	13.2%	16.2%	16.9%		20.5%	21.6%	17.8%	20.6%		34.1%	15.2%	31.0%		28.7%	14.4%	12.6%
	Private Vessel	4.4%	2.7%	7.7%	8.8%	10.1%	9.4%	10.4%	8.9%			9.5%	5.9%		18.0%	1.4%	8.4%	1.8%

Table E.1.7: Percentage area of total recreational fishing grounds affected by county for P2R

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			6.8%	11.1%	16.6%	7.5%		7.9%		6.4%						7.4%	3.7%
	Kayak			6.1%	4.9%		0.0%						3.1%			3.8%		
	Private Vessel	0.3%		8.0%	5.8%		0.0%		11.6%				0.0%			0.4%	4.0%	0.2%
Ventura	Dive	0.0%		17.2%	15.4%		12.2%		9.1%		16.0%	0.0%	9.6%				10.0%	13.8%
	Kayak	8.5%		7.8%	7.6%		10.7%	10.2%	11.2%	0.0%		12.3%	16.1%	0.0%		0.0%	9.1%	4.6%
	Private Vessel	6.5%	11.9%	9.3%	6.8%	0.0%	9.0%	0.0%	3.6%							18.0%	7.4%	6.6%
Los Angeles	Dive	7.4%	16.2%	7.9%	7.0%	11.2%	3.8%		28.2%		14.9%	9.5%	15.7%				7.7%	10.1%
	Kayak	8.9%	3.2%	3.5%	3.5%		3.3%	4.2%	12.6%	0.0%		8.8%	2.7%	4.9%		5.4%	8.5%	13.4%
	Private Vessel	3.4%	3.2%	3.6%	4.0%	0.0%	3.0%	1.0%	6.7%			4.3%	1.6%		0.0%	7.7%	5.3%	3.5%
Orange	Dive		5.0%	1.7%	6.1%	7.1%	3.5%		3.2%		4.6%	4.6%	4.9%				5.1%	2.8%
	Kayak	1.7%	2.5%	2.2%	1.9%		2.9%	0.0%	6.9%			2.6%	1.4%	12.1%		2.6%	4.7%	14.9%
	Private Vessel	4.2%	1.6%	2.7%	2.3%	6.6%	2.0%	0.8%	7.2%			20.3%	1.6%		0.0%	1.2%	4.2%	1.7%
San Diego	Dive	11.6%	13.6%	14.2%	8.8%	2.5%	7.5%		18.7%		16.3%	19.5%	6.1%				6.6%	7.8%
	Kayak	15.1%	11.5%	11.4%	14.9%		15.3%	20.5%	7.9%	9.3%		26.2%	13.1%	15.4%		23.8%	11.2%	10.9%
	Private Vessel	3.9%	2.6%	5.1%	6.4%	5.5%	5.2%	8.0%	7.1%			7.0%	4.3%		11.4%	1.4%	6.4%	1.5%

Table E.1.8: Percentage area of total recreational fishing grounds affected by county for P3R

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			19.8%	17.6%	21.8%	18.5%		14.0%		6.4%						14.6%	3.7%
	Kayak			18.6%	21.8%		13.0%						29.6%			15.6%		
	Private Vessel	5.3%		12.0%	10.0%		0.0%		12.7%				0.0%			5.5%	9.6%	0.4%
Ventura	Dive	11.1%		18.6%	18.1%		15.8%		11.5%		16.8%	0.0%	13.1%				14.8%	15.4%
	Kayak	17.7%		10.2%	19.7%		17.7%	12.6%	13.0%	1.9%		18.2%	21.1%	12.9%		12.7%	11.9%	33.5%
	Private Vessel	9.0%	11.9%	10.5%	13.7%	0.0%	18.9%	0.0%	5.2%							26.8%	11.2%	17.2%
Los Angeles	Dive	26.5%	62.2%	25.3%	15.9%	54.1%	11.8%		42.9%		37.8%	37.6%	34.1%				14.3%	21.3%
	Kayak	15.6%	21.4%	8.1%	10.4%		8.0%	17.8%	18.4%	0.0%		16.1%	9.1%	29.5%		9.9%	17.0%	19.4%
	Private Vessel	5.0%	6.0%	6.0%	6.3%	30.0%	7.0%	3.0%	10.3%			11.6%	5.8%		2.2%	8.7%	9.8%	6.1%
Orange	Dive		15.1%	11.8%	20.2%	55.6%	8.2%		10.2%		9.4%	27.2%	27.4%				16.0%	8.2%
	Kayak	7.9%	18.2%	6.5%	12.1%		4.6%	0.0%	28.0%			16.9%	9.4%	25.9%		15.7%	20.3%	21.8%
	Private Vessel	4.7%	3.4%	7.1%	6.3%	24.0%	5.8%	2.3%	13.6%			29.4%	6.4%		0.0%	2.2%	9.3%	2.4%
San Diego	Dive	16.5%	20.7%	14.1%	20.0%	28.9%	8.6%		18.9%		21.3%	28.2%	13.6%				13.3%	9.8%
	Kayak	29.9%	29.4%	11.8%	19.9%		14.0%	23.6%	35.5%	18.8%		23.2%	12.3%	45.8%		21.4%	15.3%	11.2%
	Private Vessel	4.1%	2.8%	6.8%	9.8%	12.5%	9.7%	8.7%	9.4%			7.7%	6.0%		17.6%	1.3%	9.3%	2.9%

Table E.1.9: Percentage area of total recreational fishing grounds affected by county for the IPA

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			5.3%	8.8%	12.9%	8.5%		6.7%		6.4%						7.0%	3.7%
	Kayak			8.9%	11.2%		0.0%						29.6%			1.1%		
	Private Vessel	0.5%		8.9%	7.7%		0.0%		11.3%				0.0%			0.9%	4.8%	0.2%
Ventura	Dive	3.7%		17.7%	15.8%		14.7%		10.2%		16.4%	0.0%	11.6%				10.5%	13.9%
	Kayak	2.4%		8.9%	12.6%		13.9%	2.5%	11.4%	0.0%		16.0%	18.5%	11.2%		1.8%	10.4%	12.6%
	Private Vessel	6.7%	11.9%	10.5%	7.7%	0.0%	17.3%	0.0%	2.2%							8.1%	8.6%	6.6%
Los Angeles	Dive	7.4%	18.1%	13.0%	9.3%	19.4%	8.4%		20.7%		21.9%	27.2%	22.9%				8.9%	10.7%
	Kayak	1.4%	3.2%	4.6%	5.2%		9.9%	4.2%	12.7%	0.0%		8.8%	3.1%	4.9%		1.6%	10.5%	10.7%
	Private Vessel	4.4%	4.3%	4.2%	4.6%	0.0%	4.6%	1.1%	7.6%			5.3%	2.5%		1.7%	6.3%	6.9%	3.9%
Orange	Dive		10.1%	3.1%	9.6%	18.3%	5.7%		4.7%		7.7%	13.1%	10.3%				6.8%	3.6%
	Kayak	2.4%	9.7%	3.1%	4.7%		10.3%	0.0%	12.7%			16.4%	4.6%	18.1%		4.5%	8.9%	14.2%
	Private Vessel	4.5%	1.8%	3.8%	3.3%	12.2%	6.1%	1.8%	9.0%			20.3%	2.8%		0.0%	1.3%	5.9%	1.6%
San Diego	Dive	10.7%	13.4%	11.7%	14.7%	23.9%	6.7%		14.0%		15.8%	21.4%	9.5%				9.4%	6.0%
	Kayak	18.5%	18.9%	9.8%	16.5%		11.8%	15.1%	26.6%	14.1%		18.2%	9.2%	34.8%		16.9%	11.8%	8.6%
	Private Vessel	3.5%	1.7%	5.6%	7.4%	9.6%	7.2%	6.6%	7.3%			5.1%	4.8%		13.6%	0.9%	6.7%	1.4%

Table E.1.10: Percentage value of total recreational fishing grounds affected by county for Channel Islands MPAs

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			0.0%	0.0%	0.0%	0.4%		0.7%		4.3%						0.9%	0.6%
	Kayak			0.0%	0.0%		0.0%						0.0%			0.0%		
	Private Vessel	0.0%		0.4%	0.0%		0.0%		6.7%				0.0%			0.1%	0.2%	0.0%
Ventura	Dive	0.0%		0.2%	0.2%		1.5%		0.0%		3.7%	0.0%	0.0%				1.1%	12.0%
	Kayak	0.0%		0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	6.2%	1.2%	1.0%	2.6%	0.0%	4.6%	0.0%	4.4%							0.0%	2.3%	11.0%
Los Angeles	Dive	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%		0.0%		0.0%	0.0%	0.0%				0.6%	1.0%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	1.5%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%			0.4%	0.0%		0.0%	0.0%	0.1%	0.1%
Orange	Dive		0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%				0.0%	0.0%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	0.1%	0.0%
San Diego	Dive	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%				0.0%	0.0%
	Kayak	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
	Private Vessel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	0.0%	0.0%

Table E.1.11: Percentage value of total recreational fishing grounds affected by county for P1R

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			7.9%	12.0%	12.2%	9.6%		6.0%		10.0%						4.9%	0.6%
	Kayak			12.2%	12.2%		0.0%						18.9%			1.7%		
	Private Vessel	0.4%		14.7%	12.1%		2.8%		8.7%				0.0%			0.3%	5.9%	0.0%
Ventura	Dive	1.8%		20.2%	15.8%		17.0%		10.8%		13.7%	0.0%	11.6%				3.0%	12.8%
	Kayak	5.5%		15.9%	17.8%		13.6%	4.1%	15.5%	0.0%		25.0%	21.8%	11.3%		2.2%	13.8%	24.3%
	Private Vessel	9.6%	1.2%	4.0%	6.9%	0.0%	16.7%	0.0%	5.7%							7.3%	5.0%	15.7%
Los Angeles	Dive	25.6%	29.0%	11.7%	12.4%	34.0%	9.8%		20.7%		4.0%	22.6%	12.4%				8.9%	12.3%
	Kayak	7.2%	12.4%	5.2%	9.7%		12.0%	14.1%	19.1%	0.0%		10.9%	3.8%	19.0%		5.2%	12.2%	18.6%
	Private Vessel	3.3%	4.9%	2.1%	4.6%	0.0%	6.1%	0.8%	8.5%			7.5%	0.3%		2.0%	7.2%	11.2%	6.3%
Orange	Dive		16.9%	15.1%	32.9%	25.4%	17.1%		8.3%		11.9%	60.2%	35.5%				12.8%	10.5%
	Kayak	1.2%	14.9%	4.1%	7.2%		6.9%	0.0%	7.3%			39.4%	6.4%	15.2%		10.0%	7.5%	15.5%
	Private Vessel	3.6%	4.0%	2.1%	6.1%	8.9%	7.7%	3.5%	9.3%			33.5%	2.0%		0.0%	4.4%	11.5%	3.1%
San Diego	Dive	19.9%	18.9%	31.6%	26.2%	37.6%	19.1%		31.2%		30.2%	43.7%	18.1%				19.1%	13.1%
	Kayak	15.5%	15.4%	23.2%	19.9%		19.7%	13.9%	17.7%	18.3%		27.2%	20.1%	13.3%		18.6%	15.5%	15.5%
	Private Vessel	8.6%	6.0%	9.3%	17.9%	6.2%	17.2%	15.0%	10.0%			14.6%	5.7%		22.9%	2.4%	12.9%	3.9%

Table E.1.12: Percentage value of total recreational fishing grounds affected by county for P2R

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			9.2%	13.8%	18.4%	6.3%		7.1%		9.0%						5.0%	0.6%
	Kayak			9.1%	2.8%		0.0%						4.1%			2.1%		
	Private Vessel	0.1%		9.3%	7.5%		0.0%		8.5%				0.0%			0.1%	4.2%	0.0%
Ventura	Dive	0.0%		16.5%	12.4%		11.3%		8.9%		12.1%	0.0%	9.6%				1.1%	12.4%
	Kayak	8.1%		13.8%	13.3%		10.5%	14.5%	15.3%	0.0%		8.4%	14.6%	0.0%		0.0%	9.6%	5.2%
	Private Vessel	6.5%	1.2%	2.1%	5.4%	0.0%	6.5%	0.0%	8.7%							18.0%	4.6%	12.0%
Los Angeles	Dive	13.3%	39.5%	9.5%	10.0%	14.0%	6.6%		28.2%		19.8%	15.9%	8.4%				5.4%	10.6%
	Kayak	6.1%	3.6%	3.0%	7.1%		5.2%	4.6%	10.2%	0.0%		5.5%	2.0%	4.9%		4.8%	7.7%	13.4%
	Private Vessel	3.0%	5.1%	1.4%	3.7%	0.0%	3.3%	0.8%	7.5%			8.0%	0.3%		0.0%	6.8%	4.5%	3.9%
Orange	Dive		6.7%	6.9%	14.8%	10.0%	9.2%		5.3%		7.3%	10.4%	15.4%				7.4%	8.5%
	Kayak	0.4%	6.8%	2.0%	3.0%		3.1%	0.0%	3.7%			4.7%	2.9%	6.4%		5.2%	3.0%	9.8%
	Private Vessel	3.8%	2.4%	1.1%	3.5%	7.7%	3.4%	1.5%	7.3%			25.0%	0.9%		0.0%	4.8%	4.2%	2.2%
San Diego	Dive	12.1%	4.3%	11.2%	11.8%	3.2%	11.6%		14.7%		9.5%	14.2%	9.0%				9.1%	7.8%
	Kayak	4.2%	3.3%	11.0%	7.8%		12.0%	8.7%	3.2%	5.0%		12.9%	10.2%	4.8%		14.2%	3.9%	6.0%
	Private Vessel	7.1%	5.0%	5.2%	12.0%	3.6%	9.4%	10.6%	7.2%			8.4%	2.4%		19.9%	2.4%	7.7%	2.9%

Table E.1.13: Percentage value of total recreational fishing grounds affected by county for P3R

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			17.2%	22.8%	21.6%	17.5%		14.4%		9.0%						12.0%	0.6%
	Kayak			14.4%	20.9%		2.8%						21.6%			8.2%		
	Private Vessel	2.5%		17.8%	13.7%		0.0%		9.6%				0.0%			23.5%	10.9%	0.1%
Ventura	Dive	9.2%		23.2%	22.2%		19.7%		11.7%		15.1%	0.0%	13.1%				6.7%	16.1%
	Kayak	17.6%		19.2%	20.8%		16.0%	18.8%	19.2%	1.6%		32.4%	25.6%	12.9%		6.9%	16.5%	27.7%
	Private Vessel	10.9%	1.2%	4.0%	10.7%	0.0%	18.6%	0.0%	11.8%							26.8%	9.3%	20.1%
Los Angeles	Dive	47.6%	70.8%	23.2%	22.7%	84.5%	16.4%		42.9%		40.1%	35.8%	27.1%				20.9%	22.9%
	Kayak	16.6%	21.2%	9.8%	17.8%		20.3%	21.9%	26.9%	0.0%		16.5%	7.5%	29.5%		12.3%	24.3%	22.7%
	Private Vessel	3.8%	4.7%	3.0%	8.3%	9.7%	11.0%	1.6%	9.7%			10.9%	1.0%		2.6%	11.1%	20.9%	10.5%
Orange	Dive		18.6%	37.2%	78.3%	77.4%	21.8%		20.7%		14.8%	66.1%	83.2%				31.7%	18.8%
	Kayak	6.9%	29.6%	16.6%	24.1%		10.1%	0.0%	41.9%			39.0%	25.2%	19.9%		36.1%	35.0%	28.7%
	Private Vessel	5.1%	5.9%	5.8%	13.9%	25.6%	11.8%	4.1%	12.0%			52.6%	5.3%		0.0%	7.3%	21.3%	4.6%
San Diego	Dive	27.7%	46.7%	33.2%	37.9%	54.3%	25.2%		20.8%		30.3%	41.3%	26.6%				30.2%	20.8%
	Kayak	38.8%	38.4%	27.8%	37.3%		20.2%	33.7%	35.3%	29.9%		30.1%	29.3%	38.2%		30.0%	36.9%	36.9%
	Private Vessel	8.9%	6.2%	9.1%	18.0%	6.6%	13.3%	15.2%	10.4%			13.5%	8.3%		11.5%	2.4%	21.1%	5.7%

Table E.1.14: Percentage value of total recreational fishing grounds affected by county for the IPA

County	User group	Pacific Barracuda	Pacific Bonito	Ca. Halibut	Kelp Bass (calico bass)	White Croaker	Ca. Spiny Lobster	Jack Mackerel	Rockfish	Rock Crab	Scallops	Ca. Sheephead	Sand Bass	Market Squid	Surfperch	Thresher Shark	White Seabass	Ca. Yellowtail
Santa Barbara	Dive			7.3%	11.9%	12.1%	9.4%		6.0%		9.0%						4.7%	0.6%
	Kayak			11.5%	12.0%		0.0%						21.6%			1.7%		
	Private Vessel	0.4%		14.2%	11.6%		0.0%		8.8%				0.0%			0.3%	5.7%	0.0%
Ventura	Dive	1.8%		20.1%	15.3%		16.9%		10.8%		13.7%	0.0%	11.6%				3.2%	12.6%
	Kayak	3.5%		15.9%	17.8%		13.6%	4.3%	15.6%	0.0%		25.0%	21.8%	11.2%		2.2%	13.8%	12.2%
	Private Vessel	6.7%	1.2%	4.0%	5.4%	0.0%	16.7%	0.0%	5.7%							8.1%	4.8%	12.8%
Los Angeles	Dive	13.3%	45.5%	12.1%	13.0%	33.4%	9.8%		20.7%		21.0%	27.5%	10.5%				6.4%	11.4%
	Kayak	2.5%	3.6%	3.9%	9.2%		8.0%	4.6%	12.1%	0.0%		5.5%	2.2%	4.9%		2.9%	11.0%	12.4%
	Private Vessel	3.3%	5.8%	1.8%	4.8%	0.0%	6.2%	0.8%	8.0%			8.8%	0.4%		2.0%	6.1%	9.7%	4.8%
Orange	Dive		13.4%	14.6%	30.8%	25.4%	17.0%		8.2%		12.0%	59.8%	32.7%				11.4%	10.0%
	Kayak	0.8%	13.2%	4.5%	6.9%		30.7%	0.0%	11.0%			37.1%	6.6%	13.7%		9.1%	7.7%	17.7%
	Private Vessel	3.6%	2.8%	2.3%	6.2%	11.0%	15.0%	3.1%	8.9%			25.0%	2.0%		0.0%	4.2%	11.2%	2.4%
San Diego	Dive	16.1%	28.1%	25.6%	26.9%	41.3%	19.7%		15.1%		21.9%	29.8%	18.4%				20.6%	12.1%
	Kayak	23.4%	22.4%	21.4%	25.6%		13.6%	21.8%	25.0%	14.8%		20.3%	18.9%	26.5%		23.7%	21.9%	21.7%
	Private Vessel	4.2%	2.9%	7.0%	13.0%	5.2%	9.6%	10.7%	7.3%			9.1%	6.1%		9.2%	1.3%	11.6%	2.6%

Figure E.1.1: Disproportionate impacts (minus Channel Islands impacts) on commercial fisheries

Each dot in Figure E.1.1 represents one port/proposal impact on stated value for total fishing grounds for a specific fishery (from Table E.2). All points not in a box or on a line are considered statistically significant outliers (i.e., port-fishery combinations that may be disproportionately affected). The commercial fisheries are listed along the x-axis in descending order of importance (using average baseline gross economic revenue from 2000–07 as a proxy for importance). The y-axis measures the potential estimated impact on stated value of total fishing grounds minus the Channel Islands impacts. Please see section E.4.4 for further information on box plot analysis for commercial fisheries as well as identification of the potential outliers.

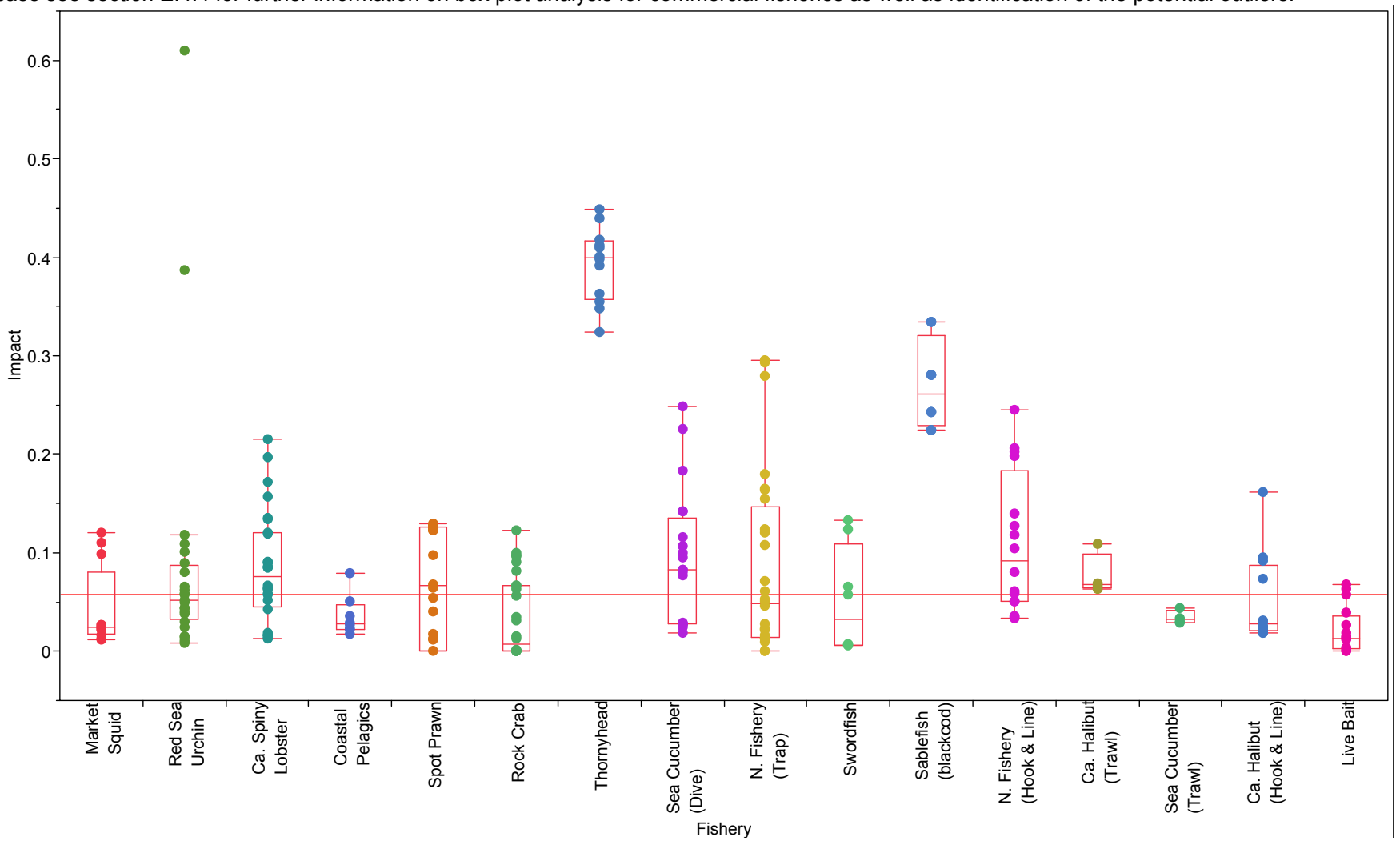
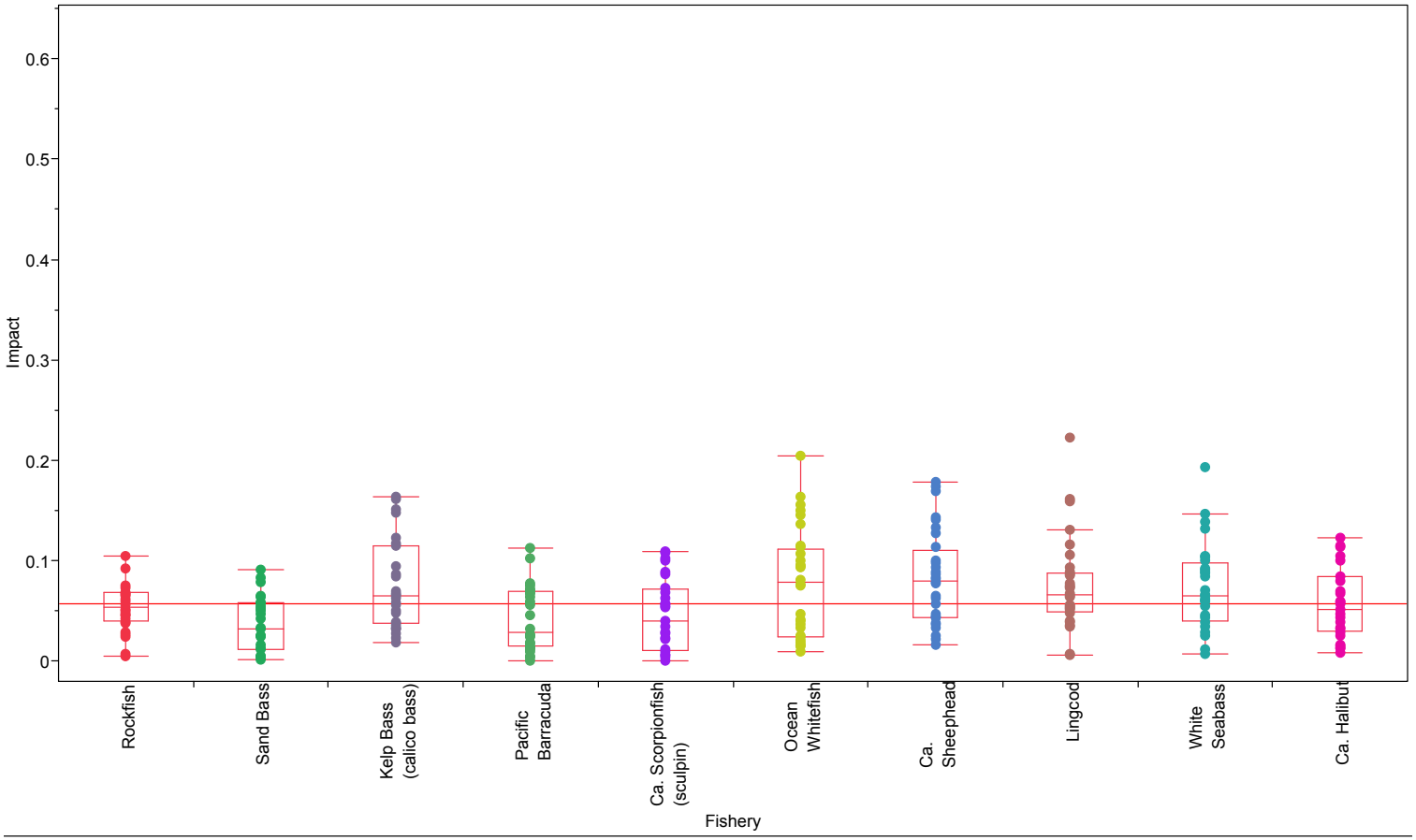


Figure E.1.2: Disproportionate impacts (minus Channel Islands impacts) on CPFV fisheries

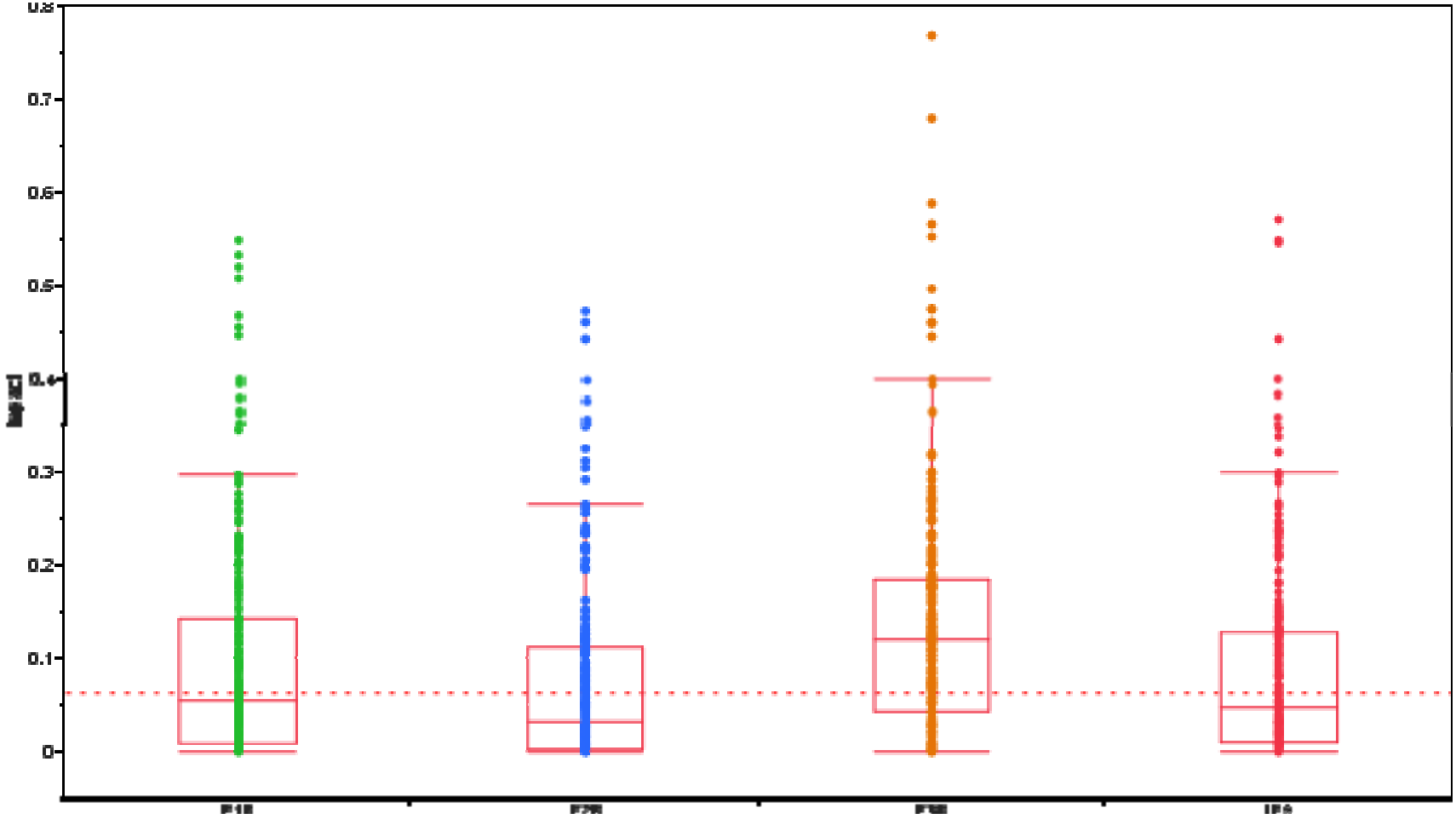
Each dot in Figure E.1.2 represents one port/proposal impact on stated value for total fishing grounds for a specific fishery (from Table E.4). All points not in a box or on a line are considered statistically significant outliers (i.e., port-fishery combinations that may be disproportionately affected). The CPFV fisheries are listed along the x-axis in order of importance using the cumulative number of fish landed (by species) from 2000–08[23] as a proxy for importance. Data on the number of fish landed were obtained from the Department of Fish & Game's annual California Recreational Fisheries Surveys. The y-axis measures the potential estimated impact on stated value of total fishing grounds minus the Channel Islands impacts. Please see section E.5.3 for further information on box plot analysis for CPFV fisheries.



[23] Rockfish landings were measured as the sum of unspecified, blue, canary, copper, gopher, and yelloweye rockfish landings. Unspecified rockfish landings were available in every year. However, blue, canary, copper, gopher, and yelloweye rockfish landings were not available in 2001. Nevertheless, the total number of rockfish landed was the highest out of all the CPFV fisheries.

Figure E.1.3: Disproportionate impacts (minus Channel Islands impacts) on individuals

Please see section E.4.5 for further information on box plot analysis for the disproportionate impacts on individual fishermen.



Example of Why Potential Impact on Profit (as a %) Can Exceed 100%

Cases where the potential net economic impact of a given MPA proposal on a commercial fishery exceeds 100% are not mistakes. Rather, they are directly related to how we account for operating costs.

In an effort to alleviate concerns over why potential impact can exceed 100%, we provide the following example.

The potential impact of a given MPA proposal is the impact to the baseline gross economic revenue (BGER), also know as ex-vessel landing value for the fishery. Assume a hypothetical fishery for which BGER is $196,774 and a given MPA proposal that has a 58% impact on that fishery. To estimate gross economic impact (GEI), we multiply BGER * 58%, which equals $114,207. Then we calculate the potential gross economic revenue (GER) if the MPA proposal went into effect by subtracting the GEI from BGER. In this case, GER = BGER - GEI = $82,566.

To determine net economic revenue (NER) (i.e., profit) prior to the MPA, we consider fishermen's costs. The total estimated cost for this hypothetical fishery is 66% of BGER, or 66% * $196,774 = $130,362. NER is calculated as BGER minus estimated costs, or $196,774 - $130,362 = $66,412.

To determine NER (i.e., profit) post impact, we consider how the MPA proposal will affect fishermen's costs. Total costs are equal to fixed costs + variable costs. Fixed costs[24], which are calculated as a percentage of BGER, will not change. In this case, fixed costs are 42% of BGER, or 42% * $196,774 = $83,457.

However, the MPA proposal will affect fishermen's variable costs because fishermen will no longer be able to fish in certain areas. Variable costs are broken out by crew (11%) and fuel (13%) and are based on GER after considering the impact of the MPA. In this case, variable costs = fuel (11% * $82,566) + crew (13% * $82,566) = $19,682.

Therefore, NER (i.e., profit) after the MPA proposal = GER - fixed costs - variable costs = $82,566 - $83,457 - $19,683 = -$20,572.

Net economic impact (NEI) after the MPA proposal (i.e., change in profit) is calculated as BNER - NER. In this case, $66,411 - (-$20,572) = $86,983. Finally, to estimate the % NEI we divide NEI by BNER, or $86,983 / $66,412 = 130.9%. Because fishermen are likely to incur fixed costs regardless of the MPA proposal, the impact of the MPA on fishermen's profit exceeds 100%.

For additional details, please see Section 12 of the *SAT Draft Methods Used to Evaluate Marine Protected Area Proposals for the MLPA South Coast Region.*

[24] We assume fixed costs to be anything other than crew and fuel (a simplifying assumption, but generally appropriate). Examples of fixed costs could be payment on a boat, docking/mooring fees, permit fees, gear costs, etc.

Appendix F: Port Profiles

F.1. Santa Barbara

Santa Barbara has fewer than 100,000 residents and is growing at the same rate as the rest of the state of California, which is faster than the national average. Median household income and per capita income are above the state and national averages. Santa Barbara has a predominantly white population, similar to the national average, but above the California state average. Selected demographic statistics are presented in Table F.1.1.

Table F.1.1: Selected demographic statistics – Santa Barbara

Statistic	Santa Barbara	California	United States
Population	92,325	33,871,648	281,421,906
Population growth (2000–06)	7.60%	7.60%	6.40%
Median household income	$47,498	$47,493	$41,994
Per capita income (1999)	$26,466	$22,711	$21,587
Percentage of individuals below poverty level	13.40%	14.20%	12.40%
Percentage high school graduate or greater	81.30%	76.80%	80.40%
Percentage aged 65 or greater	13.80%	10.60%	12.40%
Largest ethnic group (%)	white (74.0%)	white (59.5%)	white (75.1%)
Second largest ethnic group (%)	Asian (2.8%)	Asian (10.9%)	Black or African American (12.3%)

Source: U.S. Census Bureau

We interviewed 56 fishermen who specified Santa Barbara as their home port. Table F.1.2 provides statistics regarding their age, years experience fishing, and percentage of income from fishing.

Table F.1.2: Survey responses – Santa Barbara

	Age		Years experience		% income from fishing	
# of respondents	Mean	Median	Mean	Median	Mean	Median
56	52	52	28	30	91%	100%

Involvement in West Coast Fisheries

Over the past eight year period of 2000–07 landing size has increased slightly, unlike most other ports considered in our analysis which have seen a slight decreases in landing size. Despite the slight increase in landings, revenue still decreased during the eight year period. Santa Barbara's landing statistics are shown below in Table F.1.3.

Table F.1.3: Commercial landings and revenues – Santa Barbara

Landings (lbs.)			Ex-vessel revenue (2007$)		
2007	Annual Average (2000–07)	% Change 2000–07	2007	Annual Average (2000–07)	% Change 2000–07
7,312,610	7,020,922	0.04%	$6,514,950	$7,294,186	-0.23%

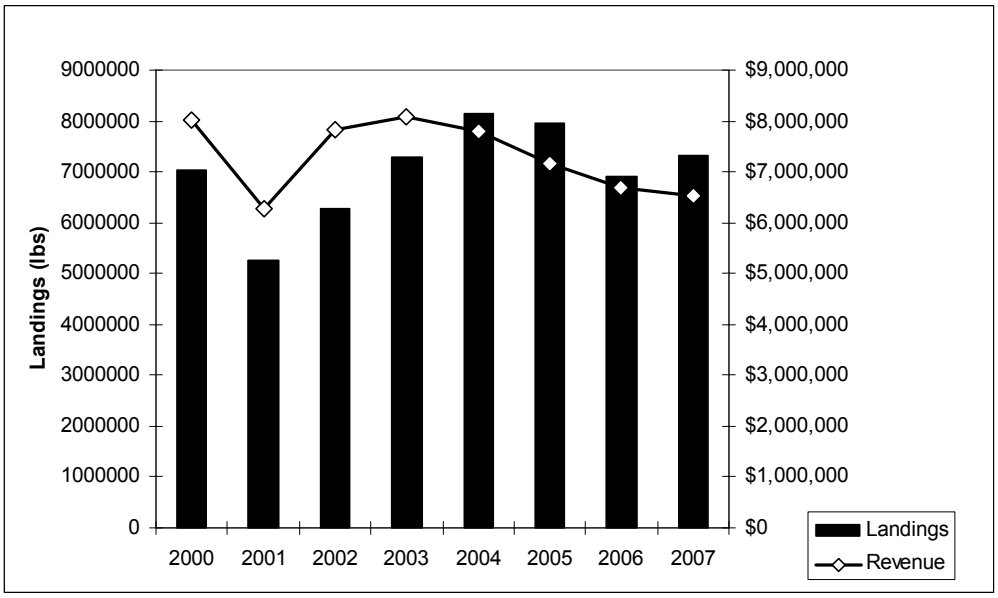
In terms of total revenue over the 2000–07 time period, urchin - dive has generated the largest revenue in Santa Barbara. Lobster - trap generated the second largest revenue, which was just more than half the revenue generated by urchin - dive. Statistics for the top three fisheries in terms of total revenue over the eight year period of 2000–07 are shown below in Table F.1.4.

Table F.1.4: Three largest fisheries in terms of revenues – Santa Barbara

Fishery	Landings (lbs.)	Ex-vessel revenue (2007$)
Urchin (Dive)	35,170,306	$24,515,231
Lobster (Trap)	1,456,939	$12,470,759
Rock Crab (Trap)	4,905,370	$6,760,839

Yearly landings and revenues for all fisheries at Santa Barbara are shown below in Figure F.1.1.

Figure F.1.1: Yearly landings and revenues – Santa Barbara



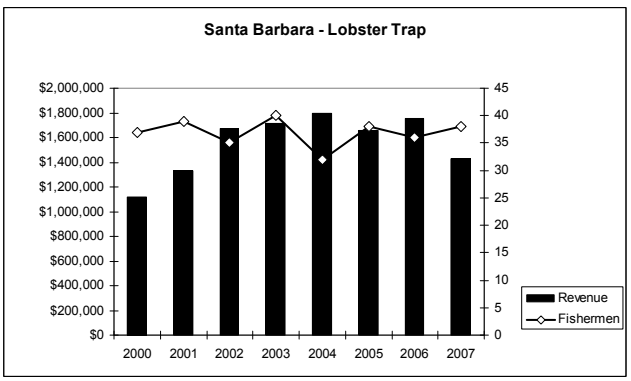
Santa Barbara, like all other ports included in our analysis, has seen a decrease in the total number of fishermen. See Table F.1.5 for numbers and percent change since 2000.

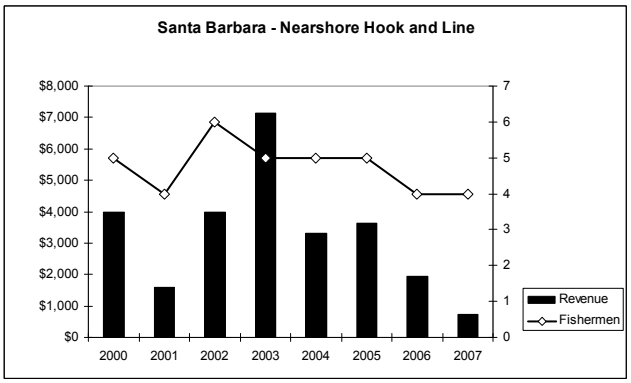
Table F.1.5: Number of fishermen – Santa Barbara

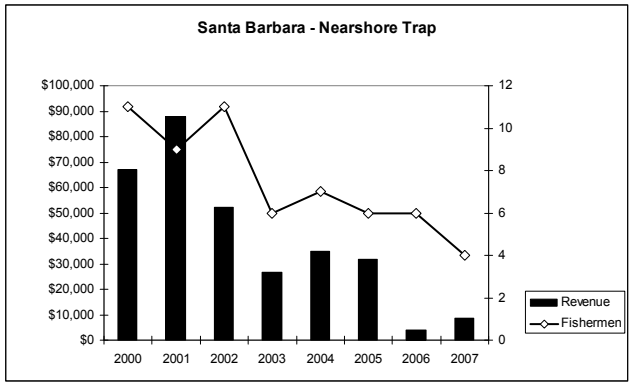
# of fishermen (2007)	% change 2000–07
454	-33.26%

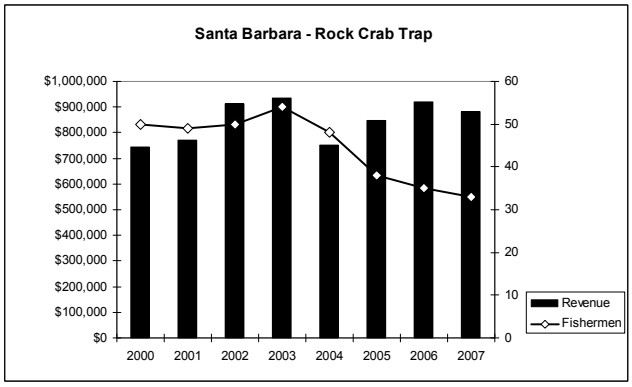
Figure F.1.2 tracks the number of fishermen with yearly revenues for specific fisheries in Santa Barbara.

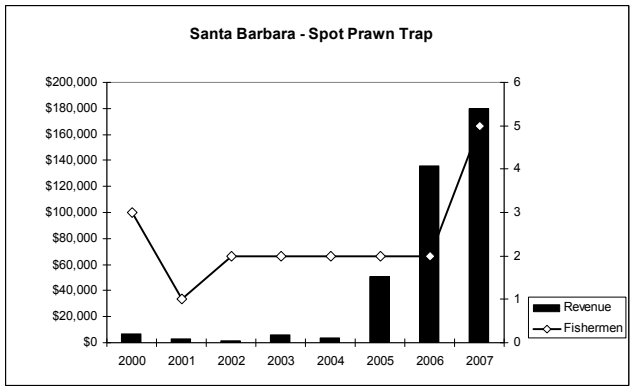
Figure F.1.2: Yearly revenues and fishermen for select fisheries – Santa Barbara

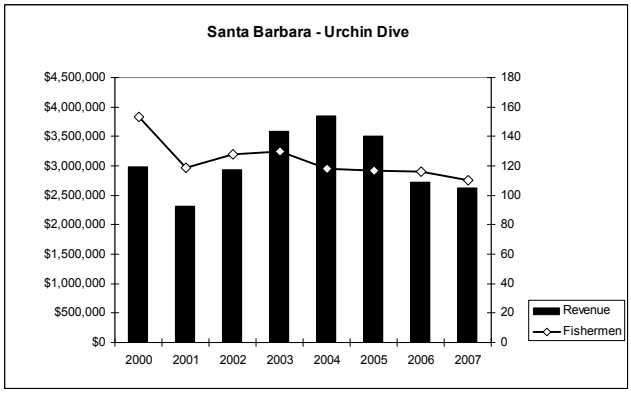












F.2. Ventura

San Buenaventura, commonly known as Ventura, has just over 100,000 residents and is growing at a relatively slow rate. The per capita and median household incomes as well as the percentage of high school graduates are above both the California and national averages. Table F.2.1 provides more demographic statistics.

Table G.2.1: Selected demographic statistics – Ventura

Statistic	Ventura	California	United States
Population	100,916	33,871,648	281,421,906
Population growth (2000–06)	3.1%	7.6%	6.4%
Median household income	$52,298	$47,493	$41,994
Per capita income (1999)	$25,065	$22,711	$21,587
Percentage of individuals below poverty level	9.0%	14.2%	12.4%
Percentage high school graduate or greater	85.7%	76.8%	80.4%
Percentage aged 65 or greater	12.8%	10.6%	12.4%
Largest ethnic group (%)	white (78.8%)	white (59.5%)	white (75.1%)
Second largest ethnic group (%)	Asian (3.0%)	Asian (10.9%)	Black or African American (12.3%)

Source: U.S. Census Bureau

We interviewed 12 fishermen from Ventura. Table F.2.2, below, summarizes their age, experience, and fishing related income.

Table F.2.2: Survey responses – Ventura

	Age		Years experience		% income from fishing	
# of respondents	Mean	Median	Mean	Median	Mean	Median
12	48	46	28	25	99%	100%

Involvement in West Coast Fisheries

Ventura saw slight increases in both landing size and revenue brought in over the eight year period between 2000 and 2007. This was the only port in our analysis to see positive growth in both areas. More information is found below in Table F.2.3.

Table F.2.3: Commercial landings and revenues – Ventura

Landings (lbs.)			Ex-vessel revenue (2007$)		
2007	Annual Average (2000–07)	% Change 2000–07	2007	Annual Average (2000–07)	% Change 2000–07
42,447,017	22,661,417	0.04%	$13,605,121	$6,540,969	0.50%

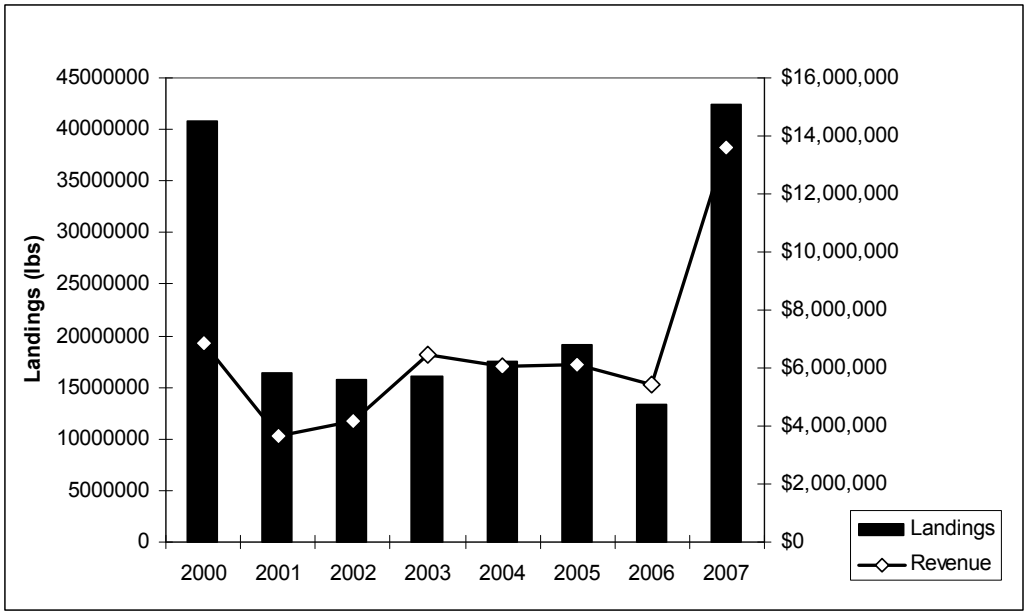
Squid- seine generated the most revenue, nearly $35,000,000 in Ventura over the 2000–07 time period. The next largest revenue generator, lobster - trap, brought in just under $3,000,000. More information regarding the top three fisheries in terms of revenues is found below in Table F.2.4.

Table G.2.4: Three largest fisheries in terms of revenues – Ventura

Fishery	Landings (lbs.)	Ex-vessel revenue (2007$)
Squid (Seine)	172,714,062	$34,822,748
Lobster (Trap)	334,894	$2,969,291
California Halibut (Set Gill Net)	434,331	$1,681,588

Yearly landing and revenue data are shown below in Figure F.2.1.

Figure F.2.1: Yearly landings and revenues – Ventura



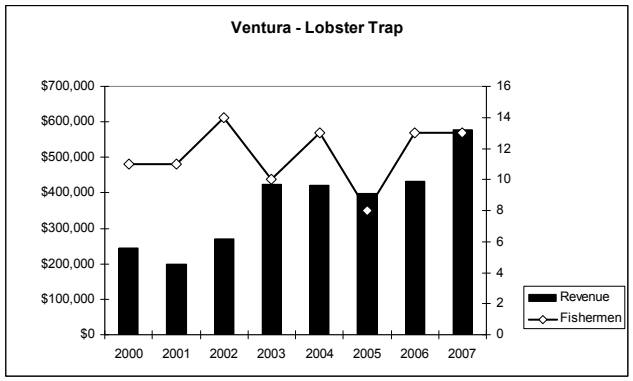
Consistent with other ports in our analysis, Ventura saw a decreased number of fishermen from 2000–07; however, out of all the ports, Ventura saw the least drastic drop in numbers.

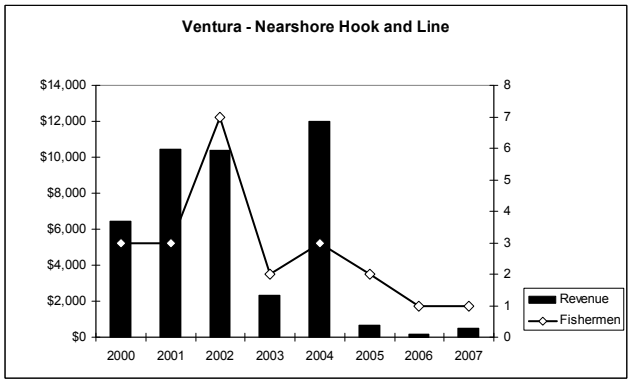
Table F.2.5: Number of fishermen – Ventura

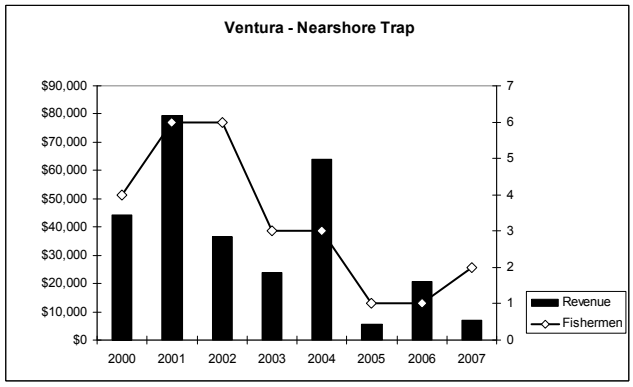
# of fishermen (2007)	% change 2000–07
243	-13.99%

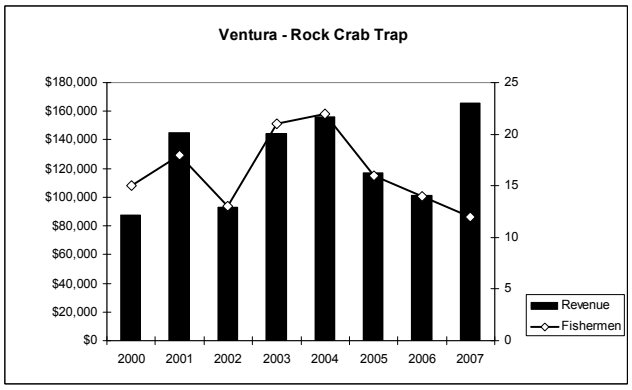
Figure F.2.2 tracks the number of fishermen and yearly revenues for specific fisheries in Ventura.

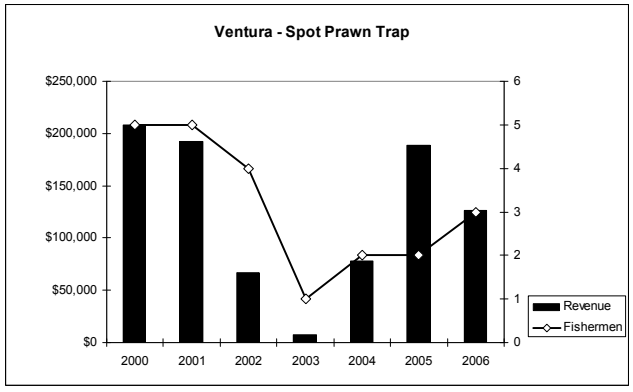
Figure F.2.2: Yearly revenues and fishermen for select fisheries – Ventura











F.3. Port Hueneme

Port Hueneme has a small population of just over 20,000 people. Population growth statistics were not available for Port Hueneme. Its per capita income is less than both California and national averages, as is the percentage of high school graduates.

Table F.3.1: Selected demographic statistics – Port Hueneme

Statistic	Port Hueneme	California	United States
Population	21,845	33,871,648	281,421,906
Population growth (2000–06)		7.6%	6.4%
Median household income	$42,246	$47,493	$41,994
Per capita income (1999)	$17,311	$22,711	$21,587
Percentage of individuals below poverty level	12.2%	14.2%	12.4%
Percentage high school graduate or greater	75.4%	76.8%	80.4%
Percentage aged 65 or greater	10.7%	10.6%	12.4%
Largest ethnic group (%)	white (57.3%)	white (59.5%)	white (75.1%)
Second largest ethnic group (%)	Black or African American (6.1%)	Asian (10.9%)	Black or African American (12.3%)

Source: U.S. Census Bureau

Nineteen fishermen were interviewed from Port Hueneme with an average age of 53 and an average of 30 years fishing experience. More information is shown below in Table F.3.2.

Table F.3.2: Survey responses – Port Hueneme

	Age		Years experience		% income from fishing	
# of respondents	Mean	Median	Mean	Median	Mean	Median
19	53	52	30	30	93%	100%

Involvement in West Coast Fisheries

Over the eight year time period of 2000–07, Port Hueneme has the second largest landing size in pounds and revenues (second to San Pedro). Like most of the other ports in our analysis, it has seen a decrease in landings and revenues in this time period. More information regarding landings and revenues is found below in Table F.3.3.

Table F.3.3: Commercial landings and revenues – Port Hueneme

Landings (lbs.)			Ex-vessel revenue (2007$)		
2007	Annual Average (2000–07)	% Change 2000–07	2007	Annual Average (2000–07)	% Change 2000–07
52,627,112	58,573,395	-1.35%	$13,832,484	$11,803,437	-0.31%

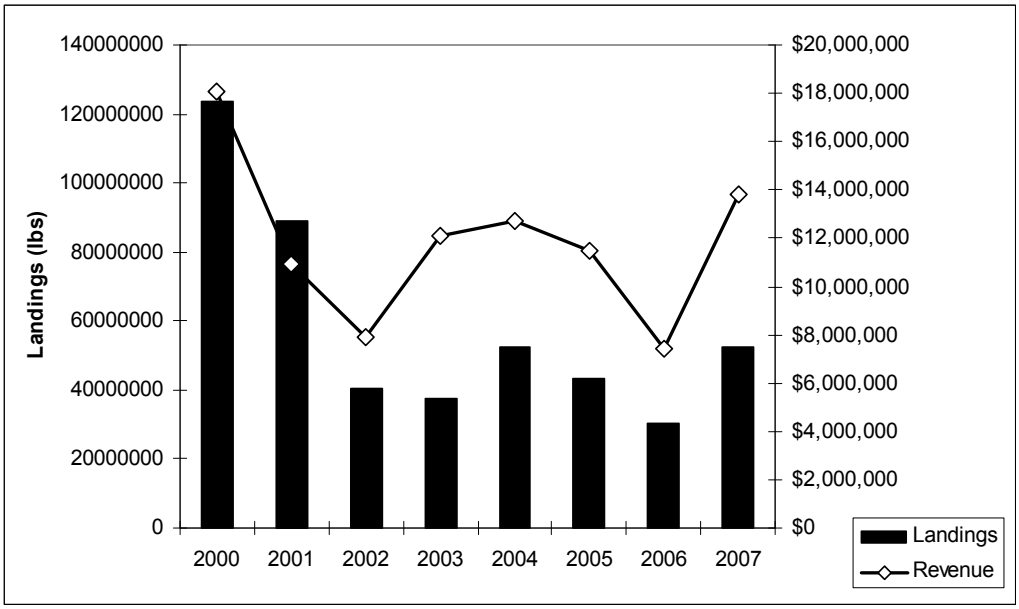
The largest revenue generator at Port Hueneme is squid - seine, followed by urchin - dive, which only generated about one fourth as much revenue as squid - seine. Landing and revenues for the top three revenue generators at Port Hueneme are shown below in Table F.3.4.

Table F.3.4: Three largest fisheries in terms of revenues – Port Hueneme

Fishery	Landings (lbs.)	Ex-vessel revenue (2007$)
Squid (Seine)	341,340,453	$59,098,992
Urchin (Dive)	16,057,185	$12,290,213
Coastal Pelagics (Seine)	103,818,093	$6,143,480

Yearly landings and revenues for the 2000–07 time period are shown below in Figure F.3.1.

Figure F.3.1: Yearly landings and revenues – Port Hueneme



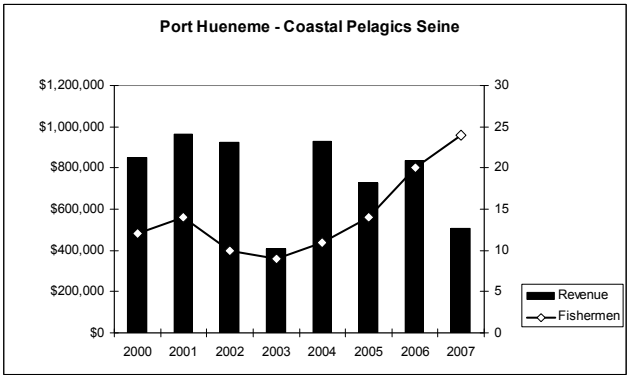
As shown in Table F.3.5, Port Hueneme has seen a 75% reduction in number of fishermen.

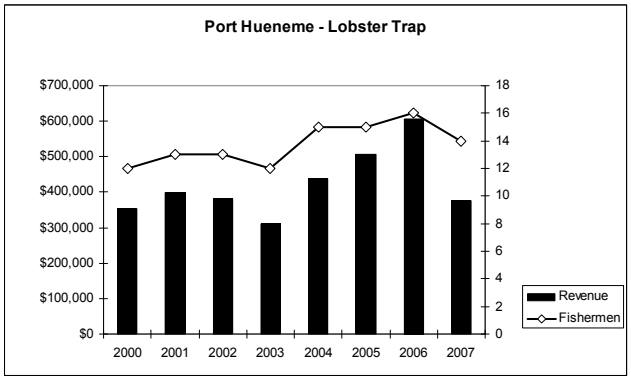
Table F.3.5: Number of fishermen – Port Hueneme

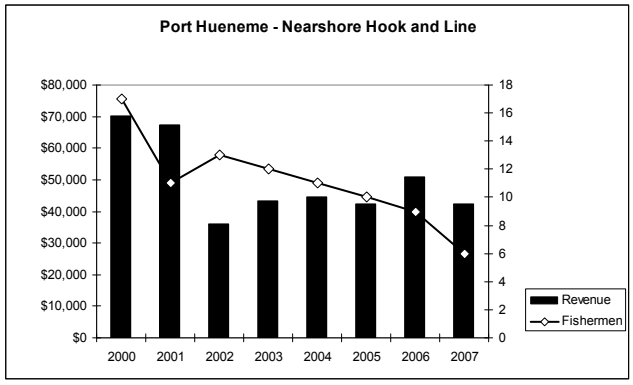
# of fishermen (2007)	% change 2000–07
296	-75.34%

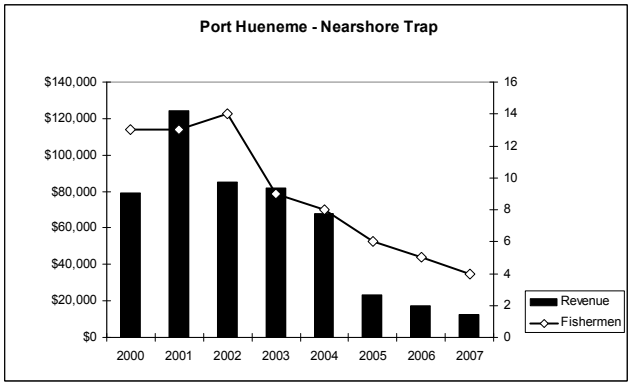
Figure F.3.2 shows the correlations between the number of fishermen and revenues being brought in for specific fisheries in Port Hueneme.

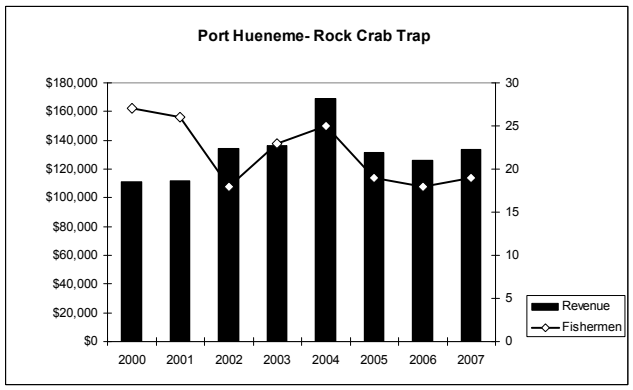
Figure F.3.2: Yearly revenue and fishermen for select fisheries – Port Hueneme

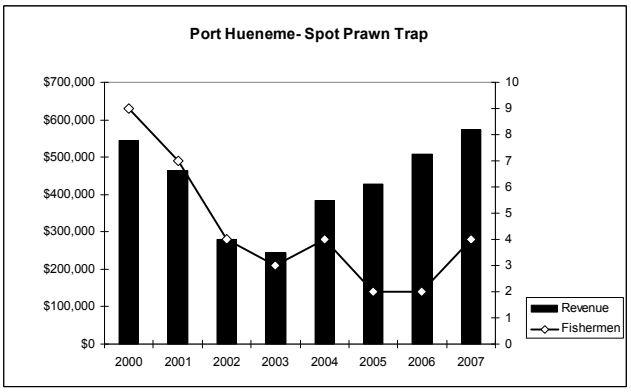


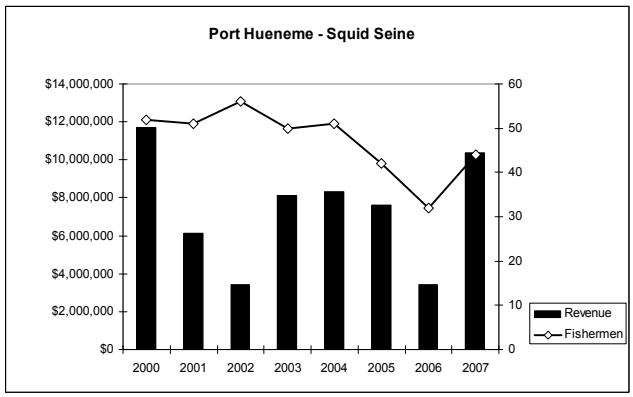


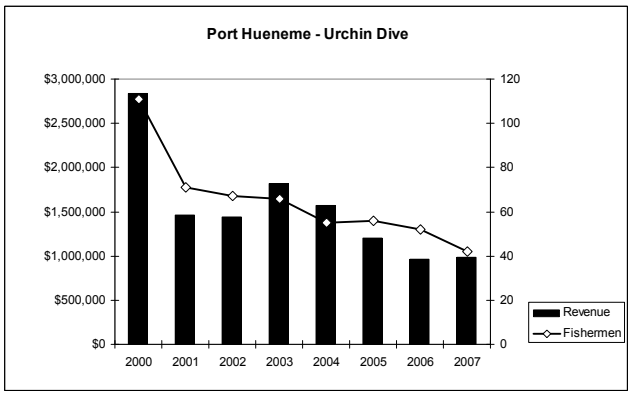












F.4. San Pedro

The Community of San Pedro is a neighborhood community within the city of Los Angeles. Demographics for the city of Los Angeles are shown below as statistics specifically for San Pedro where not available from the U.S. Census Bureau. Los Angeles is the most populated city in California and the second most populous in the United States. Between the years of 2000 and 2006 the city grew at a rate slower than both the California state and national averages. Per capita and median household incomes are less than these averages and the city has a higher poverty rate and lower percentage of high school graduates than both the state and national averages. Selected demographic statistics are presented in Table F.4.1.

Table F.4.1: Selected demographic statistics – Los Angeles

Statistic	Los Angeles	California	United States
Population	3,694,820	33,871,648	281,421,906
Population growth (2000–06)	4.2%	7.6%	6.4%
Median household income	$36,687	$47,493	$41,994
Per capita income (1999)	$20,671	$22,711	$21,587
Percentage of individuals below poverty level	22.1%	14.2%	12.4%
Percentage high school graduate or greater	66.0%	76.8%	80.4%
Percentage aged 65 or greater	9.7%	10.6%	12.4%
Largest ethnic group (%)	white (46.9%)	white (59.5%)	white (75.1%)
Second largest ethnic group (%)	Black or African American (11.2%)	Asian (10.9%)	Black or African American (12.3%)

Source: U.S. Census Bureau

We conducted 77 interviews in San Pedro, making it our largest group of respondents. They reported an average of 25 years experience. Additional statistics are shown below in Table F.4.2.

Table F.4.2: Survey responses – San Pedro

	Age		Years experience		% income from fishing	
# of respondents	Mean	Median	Mean	Median	Mean	Median
77	49	49	25	25	89%	100%

Involvement in West Coast Fisheries

San Pedro had the largest landings both in terms of size (lbs.) and revenues for the 2000–07 time period out of the ports used in our analysis. Despite large numbers, San Pedro has still seen decreases in number over the eight year period. Landing and revenue data are shown below in Table F.4.3.

Table F.4.3: Commercial landings and revenues – San Pedro

Landings (lbs.)			Ex-vessel revenue (2007$)		
2007	Annual Average (2000–07)	% Change 2000–07	2007	Annual Average (2000–07)	% Change 2000–07
141,684,171	158,540,485	-0.79%	$19,248,276	$28,222,884	-1.45%

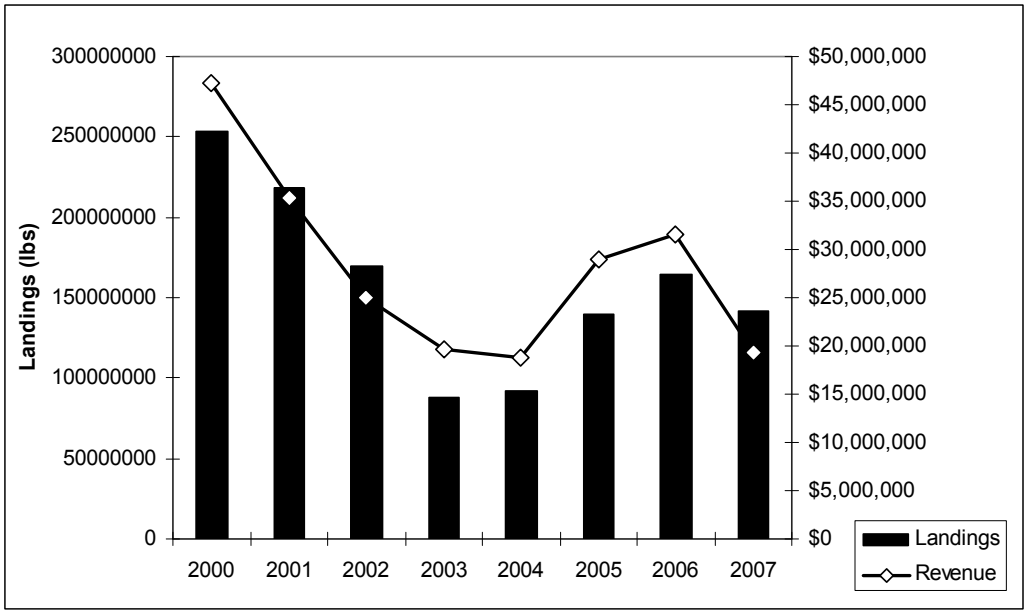
The largest revenue generator at San Pedro (and also across all the ports in our analysis) was squid - seine, bringing in more than $85,000,000 over the eight year period. Information regarding the top three fisheries in terms of revenue generated between 2000 and 2007 is shown below in Table F.4.4.

Table F.4.4: Three largest fisheries in terms of revenue – San Pedro

Fishery	Landings (lbs.)	Ex-vessel revenue (2007$)
Squid (Seine)	447,654,988	$85,752,693
Coastal Pelagics (Seine)	731,276,103	$40,970,085
Swordfish (Hook & Line)	10,685,129	$28,884,960

Yearly landings and revenues for the 2000–07 time period are shown below in Figure F.4.1.

Figure F.4.1: Yearly landings and revenues – San Pedro



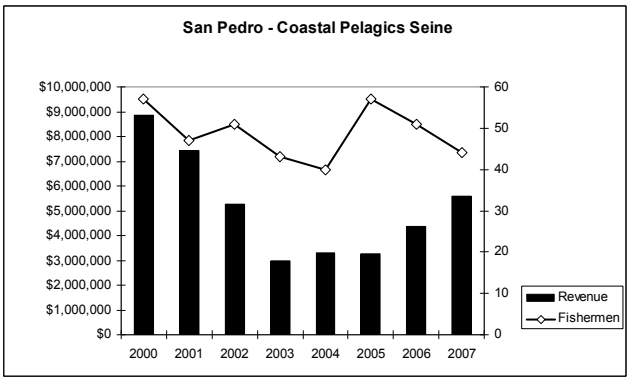
San Pedro has the largest number of fishermen out of the ports in our analysis, but as also seen the largest decrease since 2000. The number reported in 2007 was just over half of the number reported in 2000.

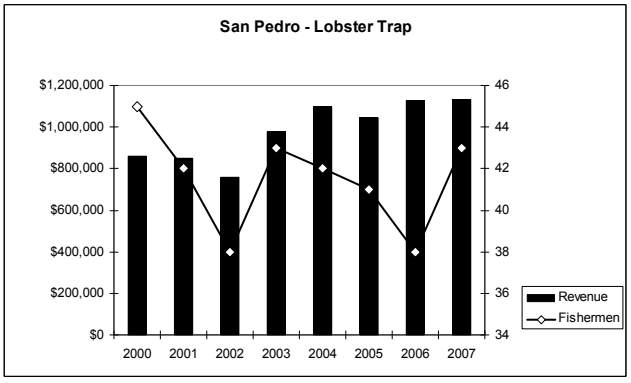
Table F.4.5: Number of fishermen – San Pedro

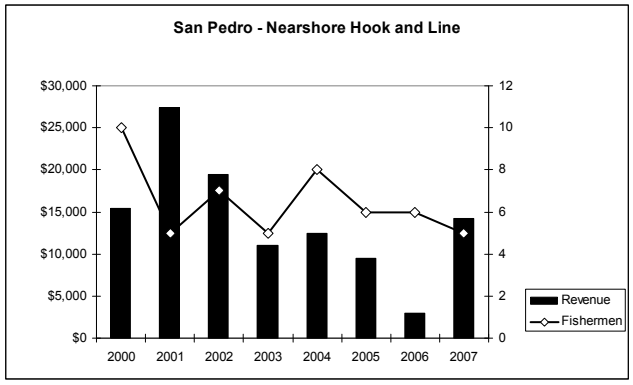
# of fishermen (2007)	% change 2000–07
633	-94.47%

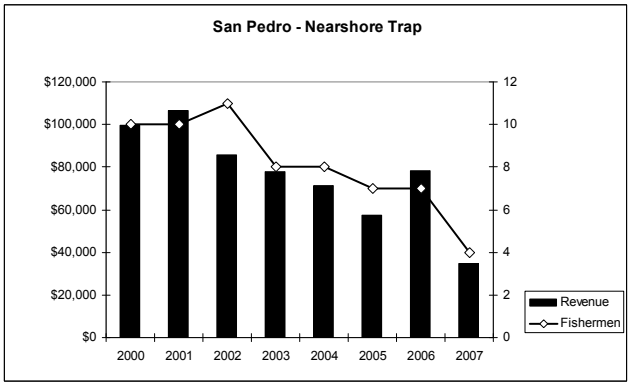
Figure F.4.2 shows the number of fishermen and yearly revenue data for specific fisheries in San Pedro.

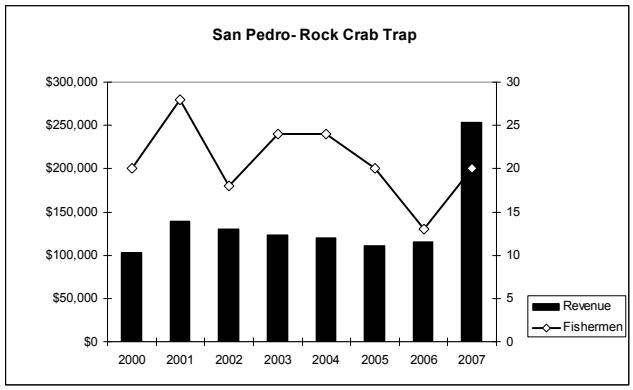
Figure F.4.2: Yearly revenues and fishermen for selected fisheries – San Pedro

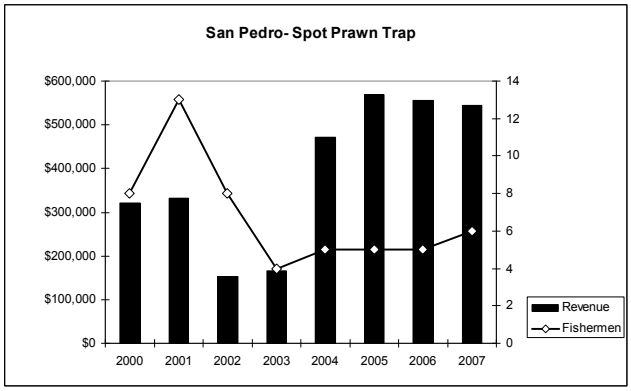


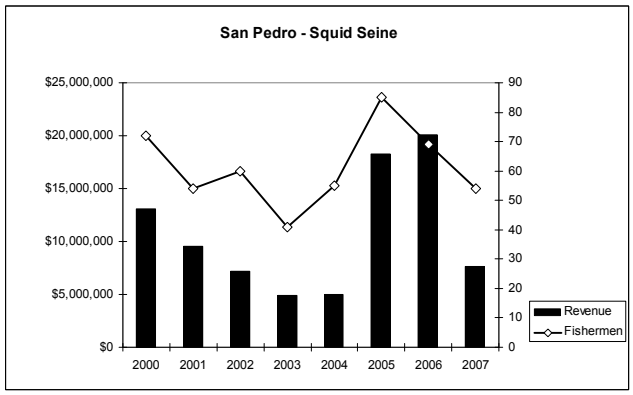


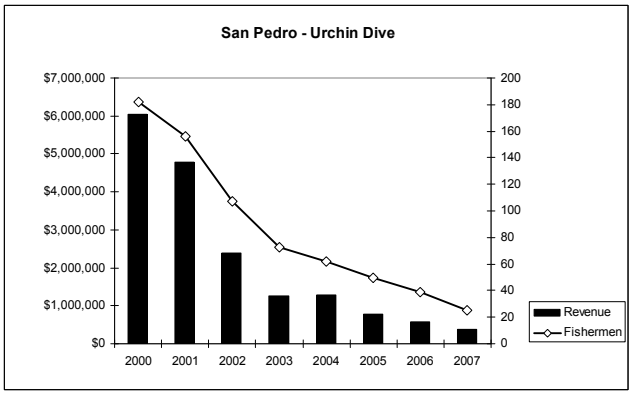












F.5. Dana Point

Dana Point has a small population of just over 35,000. Its growth rate is the slowest of all the ports included in our analysis. In addition, of the ports included, it has the highest household income, per capita income, and percentage of high school graduates. Additional statistics are shown below in Table F.5.1.

Table F.5.1: Selected demographic statistics – Dana Point

Statistic	Dana Point	California	United States
Population	35,110	33,871,648	281,421,906
Population growth (2000–06)	2.4%	7.6%	6.4%
Median household income	$63,043	$47,493	$41,994
Per capita income (1999)	$37,938	$22,711	$21,587
Percentage of individuals below poverty level	6.7%	14.2%	12.4%
Percentage high school graduate or greater	90.7%	76.8%	80.4%
Percentage aged 65 or greater	13.0%	10.6%	12.4%
Largest ethnic group (%)	white (87.2%)	white (59.5%)	white (75.1%)
Second largest ethnic group (%)	Black or African American (0.8%)	Asian (10.9%)	Black or African American (12.3%)

Source: U.S. Census Bureau

We interviewed 23 fishermen who specified Dana Point as their home port. Table F.5.2 provides statistics regarding their age, years experience fishing, and percentage of income from fishing.

Table F.5.2: Survey Responses – Dana Point

	Age		Years experience		% income from fishing	
# of respondents	Mean	Median	Mean	Median	Mean	Median
23	51	50	27	21	88%	100%

Involvement in West Coast Fisheries

Unlike most other ports in our analysis, Dana Point had a slight increase in revenue over the 2000–07 time period. The revenue increase is in spite of a slight decrease in landing size. Table F.5.3 provides specific numbers for landings and revenues.

Table F.5.3: Commercial landings and revenues – Dana Point

Landings (lbs.)			Ex-vessel revenue (2007$)		
2007	Annual Average (2000–07)	% Change 2000–07	2007	Annual Average (2000–07)	% Change 2000–07
455,100	514,558	-0.09%	$2,245,038	$1,987,932	0.13%

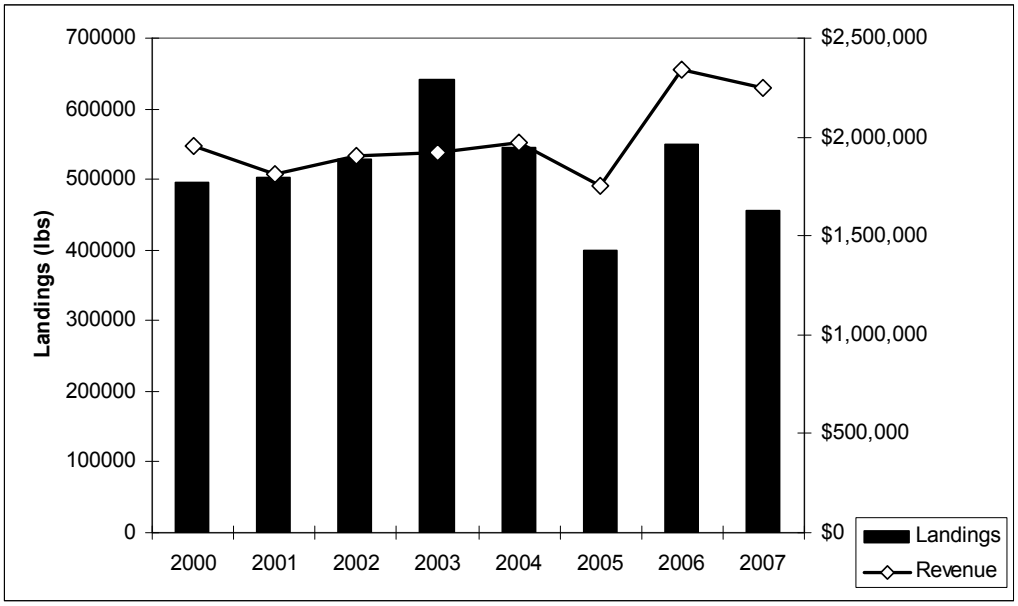
The largest fishery in terms of revenue at Dana Point is lobster - trap, followed by spot prawn - trap. More information regarding the top three revenue generating fisheries at Dana Point is found below in Table F.5.4.

Table F.5.4: Three largest fisheries in terms of revenue – Dana Point

Fishery	Landings (lbs.)	Ex-vessel revenue (2007$)
Lobster (Trap)	847,117	$7,312,761
Sport Prawn (Trap)	224,014	$2,406,336
Swordfish (Harpoon & Spear)	255,588	$1,574,188

Yearly landings and revenues for the 2000–07 time period are shown below in Figure F.5.1.

Figure F.5.1: Yearly landings and revenues – Dana Point



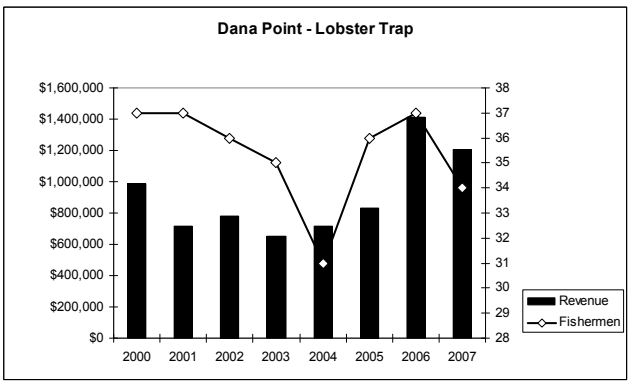
In 2007, Dana Point reported 144 fishermen, which was a decrease from 2000. See Table F.5.5 for more information.

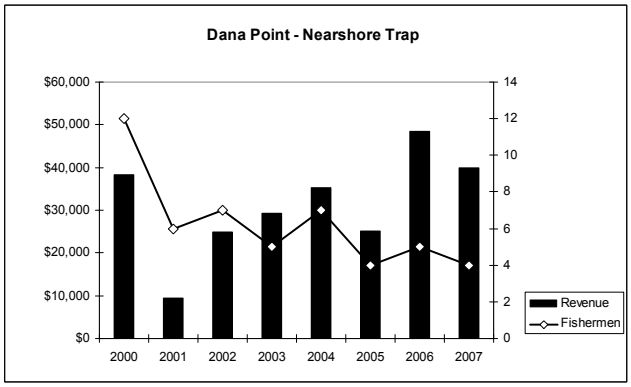
Table F.5.5: Number of fishermen – Dana Point

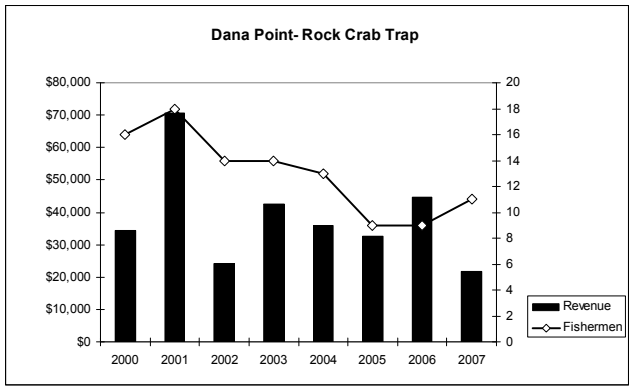
# of fishermen (2007)	% change 2000–07
332	-48.19%

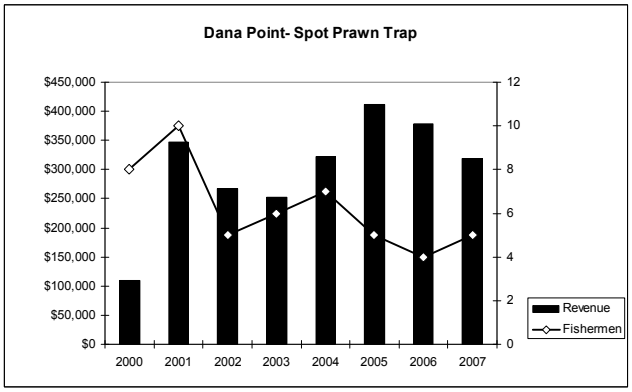
Figure F.5.2 shows the number of fishermen and yearly revenue data for specific fisheries in Dana Point.

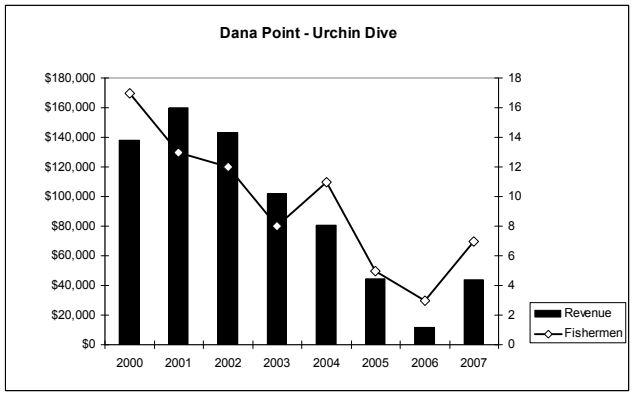
Figure F.5.2: Yearly revenues and fishermen for selected fisheries – Dana Point











F.6. Oceanside

Oceanside, larger than Dana Point, has a similarly low growth rate. More demographic statistics are found below in Table F.6.1.

Table F.6.1: Selected demographic statistics – Oceanside

Statistic	Oceanside	California	United States
Population	161,029	33,871,648	281,421,906
Population growth (2000–06)	3.0%	7.6%	6.4%
Median household income	$46,301	$47,493	$41,994
Per capita income (1999)	$20,329	$22,711	$21,587
Percentage of individuals below poverty level	11.6%	14.2%	12.4%
Percentage high school graduate or greater	80.8%	76.8%	80.4%
Percentage aged 65 or greater	13.6%	10.6%	12.4%
Largest ethnic group (%)	white (66.4%)	white (59.5%)	white (75.1%)
Second largest ethnic group (%)	Asian (5.5%)	Asian (10.9%)	Black or African American (12.3%)

Source: U.S. Census Bureau

Oceanside was our smallest group of respondents, with eight interviews conducted. Oceanside fishermen had an average of 26 years of experience. More statistics are shown below in Table F.6.2.

Table F.6.2: Survey responses – Oceanside

	Age		Years experience		% income from fishing	
# of respondents	Mean	Median	Mean	Median	Mean	Median
8	49	51	26	30	75%	100%

Involvement in West Coast Fisheries

Like most of the other ports included in our analysis, Oceanside has seen a decrease in landing size and revenue between the years 2000 and 2007. Landings and revenues are reported below in Table F.6.3.

Table F.6.3: Commercial landings and revenues – Oceanside

Landings (lbs.)			Ex-vessel revenue (2007$)		
2007	Annual Average (2000–07)	% Change 2000–07	2007	Annual Average (2000–07)	% Change 2000–07
237,260	618,364	-1.47%	$1,085,369	$1,333,468	-0.06%

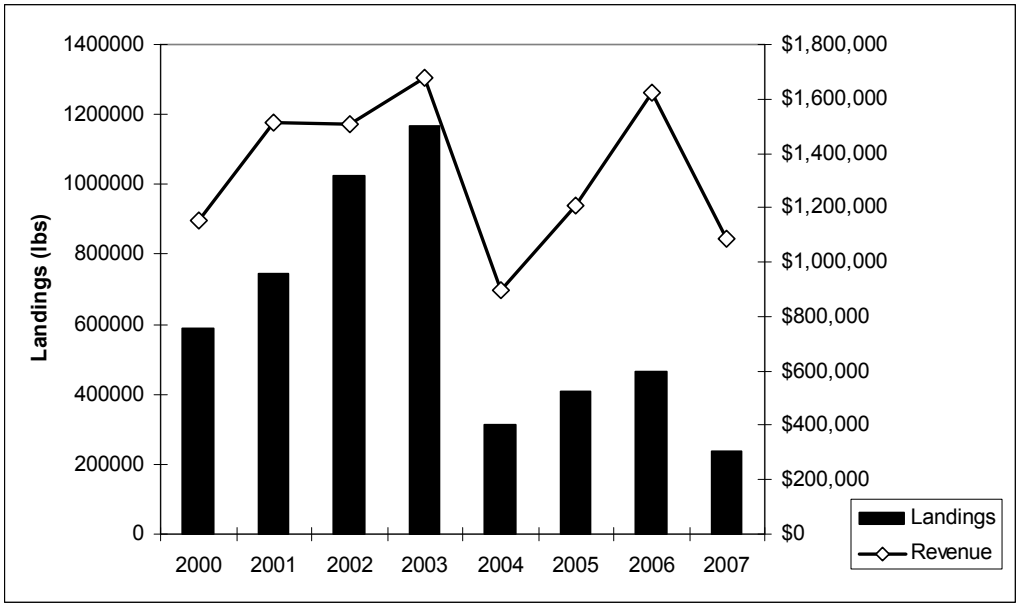
Also like Dana Point, Oceanside's two largest fisheries in terms of total revenue from 2000–07 are lobster - trap and spot prawn - trap, respectively. The top three fisheries are listed below in Table F.6.4.

Table F.6.4: Three largest fisheries in terms of revenues – Oceanside

Fishery	Landings (lbs.)	Ex-vessel revenue (2007$)
Lobster (Trap)	398,480	$3,205,570
Sport Prawn (Trap)	174,520	$1,691,925
Thornyhead (Hook & Line)	467,637	$1,661,898

Yearly landings and revenues for the 2000–07 time period are shown below in Figure F.6.1.

Figure F.6.1: Yearly landings and revenues – Oceanside



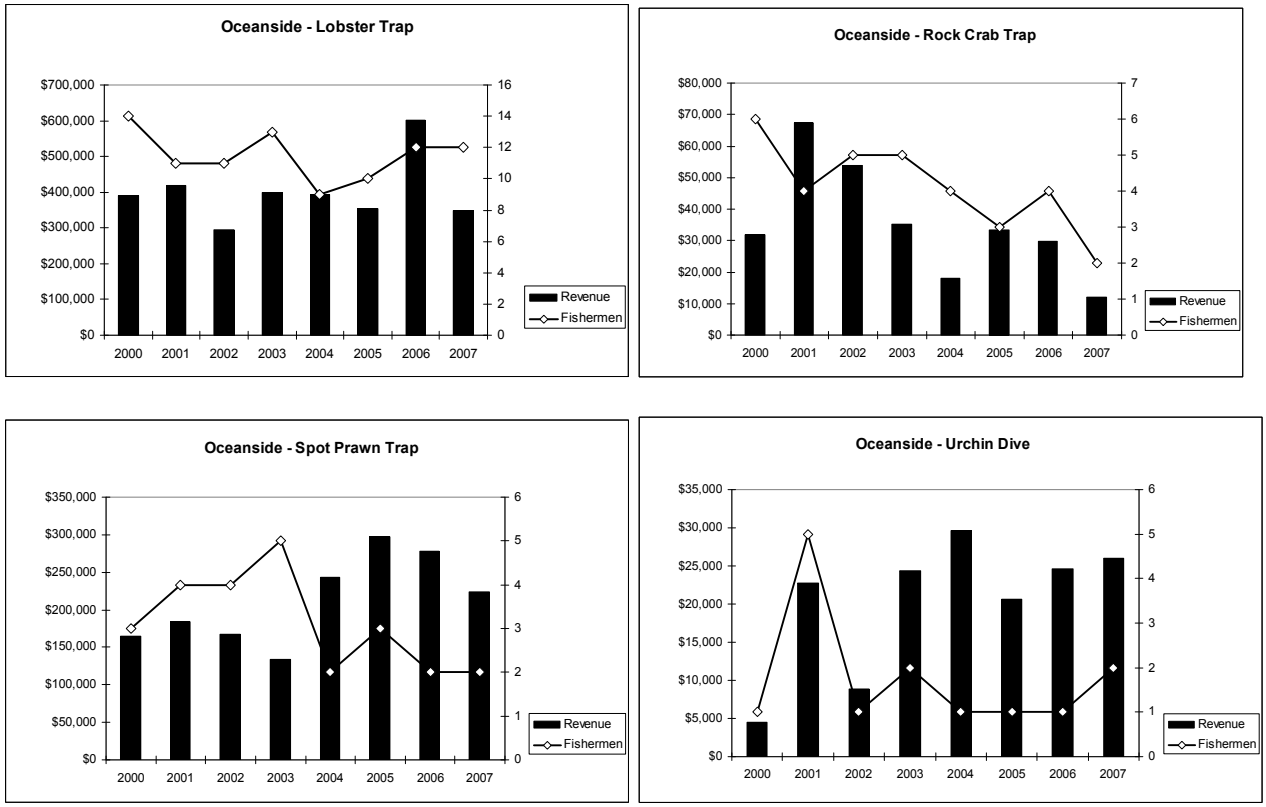
Oceanside has seen the second largest decrease in number of fishermen among the ports included in our analysis. See Table F.6.5 for more information.

Table F.6.5: Number of fishermen – Oceanside

# of fishermen (2007)	% change 2000–07
66	-86.36%

Figure F.6.2 shows the number of fishermen and yearly revenue data for specific fisheries in Oceanside.

Figure F.6.2: Yearly revenues and fishermen for selected fisheries – Oceanside



F.7. San Diego

San Diego is California's second largest city, and, according to the U.S. Census (2000), has close to 1,300,000 residents. The population of San Diego is growing, although at a slower rate than the California and national averages. Per capita income and median household income are slightly above the state average, although the poverty level is also slightly above these averages.

Table F.7.1: Selected demographic statistics – San Diego

Statistic	San Diego	California	United States
Population	1,223,400	33,871,648	281,421,906
Population growth (2000–06)	2.7%	7.6%	6.4%
Median household income	$45,733	$47,493	$41,994
Per capita income (1999)	$23,609	$22,711	$21,587
Percentage of individuals below poverty level	14.6%	14.2%	12.4%
Percentage high school graduate or greater	82.8%	76.8%	80.4%
Percentage aged 65 or greater	10.5%	10.6%	12.4%
Largest ethnic group (%)	white (60.2%)	white (59.5%)	white (75.1%)
Second largest ethnic group (%)	Asian (13.6%)	Asian (10.9%)	Black or African American (12.3%)

Source: U.S. Census Bureau

We interviewed 50 fishermen from San Diego, with an average of 24 years of fishing experience. More information is found below in Table F.7.2.

Table F.7.2: Survey responses – San Diego

	Age		Years experience		% income from fishing	
# of respondents	Mean	Median	Mean	Median	Mean	Median
50	49	48	24	26	86%	100%

Involvement in West Coast Fisheries

San Diego has seen slight decreases in both landing size and revenue over the past eight years. Landing and revenue data for San Diego are presented below in Table F.7.3.

Table F.7.3: Commercial landings and revenues – San Diego

Landings (lbs.)			Ex-vessel revenue (2007$)		
2007	Annual Average (2000–07)	% Change 2000–07	2007	Annual Average (2000–07)	% Change 2000–07
1,735,067	2,040,763	-0.33%	$5,155,220	$5,083,308	-0.20%

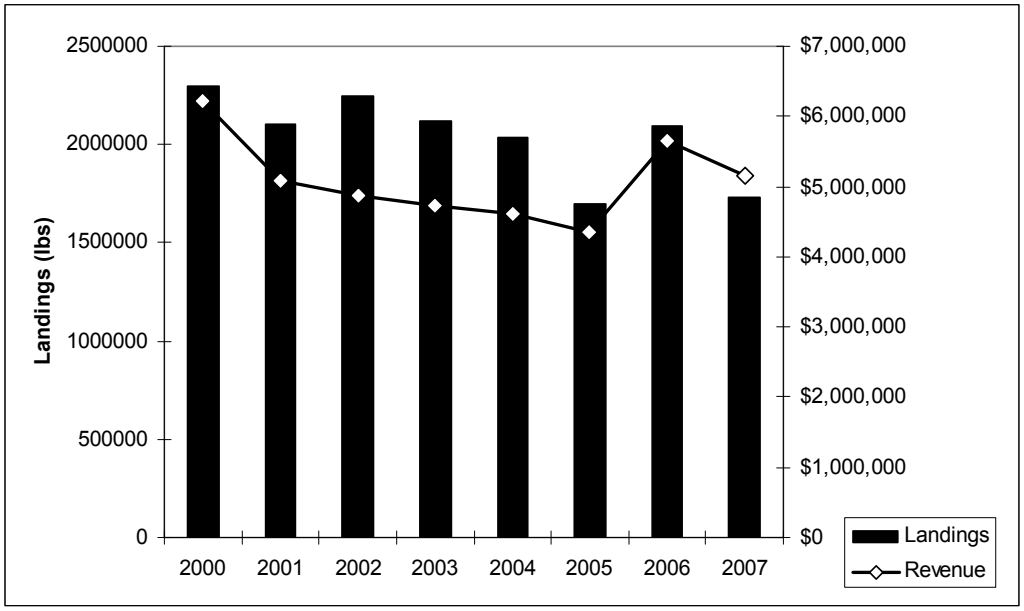
Like its neighbors to the north (Dana Point and Oceanside), San Diego's largest revenue generator is lobster - trap. However, during 2000–07 San Diego's lobster - trap fishery generated nearly $14,000,000 dollars—nearly twice as much as Dana Point.

Table F.7.4: Three largest fisheries in terms of revenues – San Diego

Fishery	Landings (lbs.)	Ex-vessel revenue (2007$)
Lobster (Trap)	1,644,478	$13,720,946
Swordfish (Drift Gill Net)	2,328,541	$8,445,843
Urchin (Dive)	6,217,267	$5,429,935

Yearly landings and revenues for the 2000–07 time period are shown below in Figure F.7.1.

Figure F.7.1: Yearly landings and revenues – San Diego



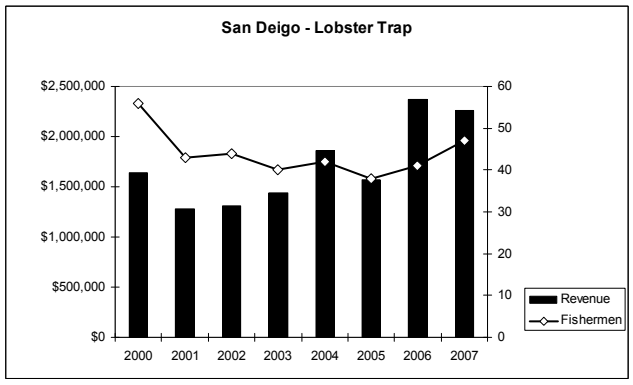
In 2007, San Diego reported 332 fishermen, which is a decrease from numbers reported in 2000. More information is found in Table F.7.5.

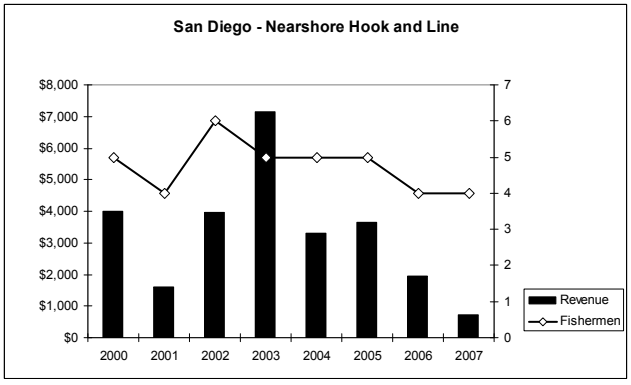
Table F.7.5: Number of fishermen – San Diego

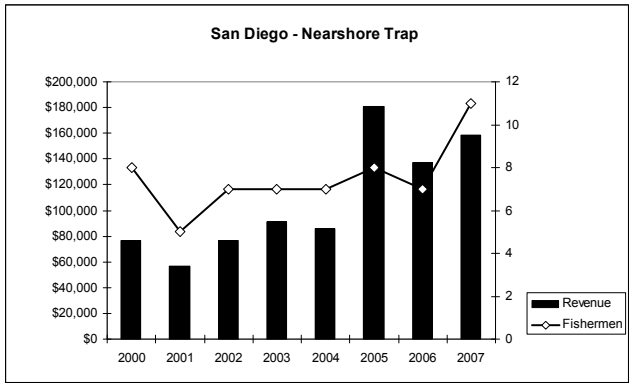
# of fishermen (2007)	% change 2000–07
332	-48.19%

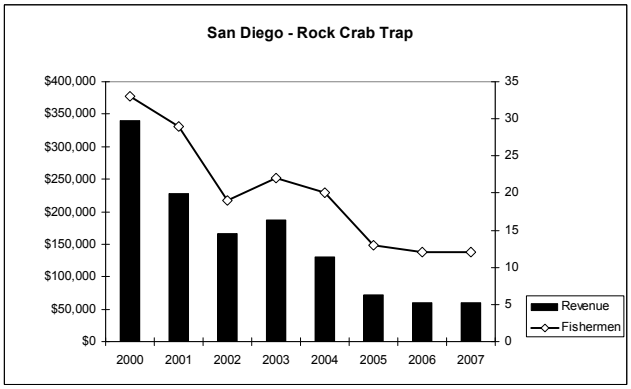
Figure F.7.2 shows the number of fishermen and yearly revenue data for specific fisheries in San Diego.

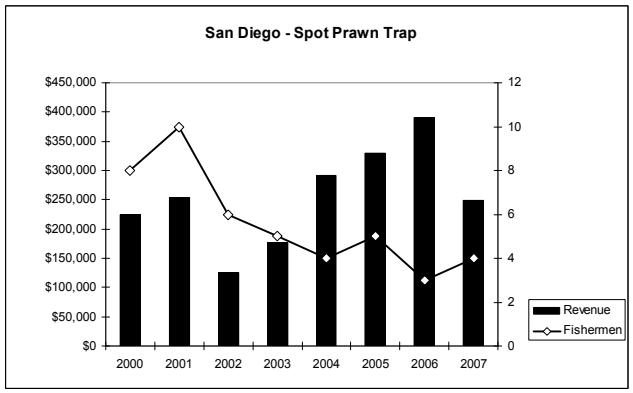
Figure F.7.2: Yearly revenues and fishermen for selected fisheries – San Deigo

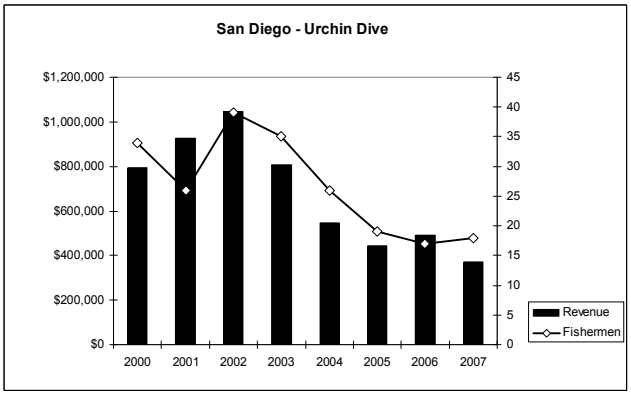





San Diego - Nearshore Trap
$200,000
$180,000
$160,000
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$0
12
10
8
6
4
2
0
2000
2001
2002
2003
2004
2005
2006
2007
Revenue
Fishermen


San Diego - Rock Crab Trap
$400,000
$350,000
$300,000
$250,000
$200,000
$150,000
$100,000
$50,000
$0
35
30
25
20
15
10
5
0
2000
2001
2002
2003
2004
2005
2006
2007
Revenue
Fishermen


San Diego - Spot Prawn Trap
$450,000
$400,000
$350,000
$300,000
$250,000
$200,000
$150,000
$100,000
$50,000
$0
12
10
8
6
4
2
0
2000
2001
2002
2003
2004
2005
2006
2007
Revenue
Fishermen


San Diego - Urchin Dive
$1,200,000
$1,000,000
$800,000
$600,000
$400,000
$200,000
$0
45
40
35
30
25
20
15
10
5
0
2000
2001
2002
2003
2004
2005
2006
2007
Revenue
Fishermen

Appendix G: Consent Forms

Commercial Consent Form

MLPA Initiative – South Coast Study Region
Fisheries Uses and Values Project – Project Description

The Marine Life Protection Act (MLPA) is a state law directing the California Department of Fish and Game (CDFG) to design and manage an improved network of marine protected areas off California's coast. To implement this law, a public-private partnership has been formed between the California Resources Agency, CDFG, and Resources Legacy Fund Foundation—the MLPA Initiative. As part of this effort, Ecotrust has been retained to collect, compile and analyze information pertaining to commercial fisheries on the south coast of California. The project is designed to provide spatially explicit socioeconomic information to the MLPA Initiative.

The goal of the Fisheries Uses and Values Project is to compile a comprehensive picture of the commercial fishing use patterns along the south coast of California, using the expert knowledge of fishermen themselves. The purpose of this project is fourfold:

1. Incorporate commercial fishermen's knowledge into the deliberations of the Regional Stakeholder Group in the MLPA South Coast Study Region;
2. Use this information to improve on the spatial resolution and accuracy of CDFG landings and logbook data;
3. Develop accurate maps of the local fishing grounds and their economic importance to the local fleets; and
4. Estimate the maximum potential socioeconomic impact of proposed MPA networks to the commercial fishery sector.

This kind of spatially explicit information on commercial fisheries and their value will ensure representation of socioeconomic values in the design, implementation and management of marine protected areas.

During the summer months of 2008 (June through August) Ecotrust personnel will interview approximately 200 fishermen along the south coast of California. Fishermen will be selected based on CDFG data and recommendations by peers. The interview approach is based on peer-reviewed, social science techniques for collecting local expert knowledge. The sample is designed to capture the majority of landings for the most significant regional fisheries, as well as the depth of expertise of longtime and successful fishermen.

Ecotrust personnel will contact fishermen directly, and arrange for interviews with contracted staff based in the region (from Santa Barbara south to the US/Mexico Border). The format includes one-on-one or small group interviews, with follow-up meetings by fishery and/or gear group in which the information collected will be validated by fishermen. Due to the sensitive nature of commercial fishing information, only Ecotrust staff (operating under a strict confidentiality protocol) will handle the raw data generated during the interviews. All information collected in the interviews is anonymous and confidential on the individual level. All analyses and results will be presented in aggregate form, and will be reviewed in aggregate form by participating fishermen from each fishery. The information will be used to create a comprehensive profile of the commercial fishing use patterns and values along California's south coast, and the aggregated results will also be published. More specifically, aggregated results will be compiled so as to provide both an accurate portrayal of aggregated data to different audiences and protect any sensitive data or data of concern from any single or small sampling of involved participants.

Your willingness to participate and/or to refer other fishermen we should contact is not only appreciated, but indeed vital to the success of this project. If you have any questions or concerns, contact Dr. Sarah Kruse at skruse@ecotrust.org or Charles Steinback at charles@ecotrust.org or 971.404.5632. The project website is http://www.ecotrust.org/mlpa.

If you agree to participate under the conditions described above, please print and sign your name.

Participant's name _____ Signature _____
Field Staff signature _____ Date _____

CPFV Consent Form

MLPA Initiative – South Coast Study Region
Fisheries Uses and Values Project – Project Description

The Marine Life Protection Act (MLPA) is a state law directing the California Department of Fish and Game (CDFG) to design and manage an improved network of marine protected areas off California's coast. To implement this law, a public-private partnership has been formed between the California Resources Agency, CDFG, and Resources Legacy Fund Foundation—the MLPA Initiative. As part of this effort, Ecotrust, has been retained to collect, compile and analyze information pertaining to recreational fisheries on the south coast. The project is designed to provide spatially explicit information to the MLPA Initiative and the information collected in this project will improve upon what is currently available regarding recreational fisheries.

The goal of the Recreational Fisheries Uses Project is to characterize recreational fishing areas of relative importance and recreational fishing use patterns along the southern California coast, using the expert knowledge of fishermen themselves. The purpose of this project is twofold:

1. Develop accurate maps of the local recreational fishing grounds and characterize their relative importance to recreational fishermen; and
2. Incorporate recreational fishermen's knowledge into the deliberations of the Regional Stakeholder Group in the MLPA South Coast Study Region.

This kind of spatially explicit information on recreational fisheries and will ensure representation of recreational values in the design, implementation and management of marine protected areas.

Ecotrust personnel will contact fishermen directly, and arrange for interviews with contracted staff based in the region (from Santa Barbara south to the US/Mexico Border). The format includes one-on-one or small group interviews, with follow-up meetings by landing group in which the information collected will be validated by fishermen. Due to the sensitive nature of fishing information, only Ecotrust staff (operating under a strict confidentiality protocol) will handle the raw data generated during the interviews. All information collected in the interviews is anonymous and confidential on the individual level. All analyses and results will be presented in aggregate form, and will be reviewed in aggregate form by participating fishermen from each fishery. The information will be used to create a comprehensive profile of the fishing use patterns and values along California's south coast, and the aggregated results will also be published. More specifically, aggregated results will be compiled so as to provide both an accurate portrayal of aggregated data to different audiences and protect any sensitive data or data of concern from any single or small sampling of involved participants.

Your willingness to participate and/or to refer other fishermen we should contact is not only appreciated, but indeed vital to the success of this project. If you have any questions or concerns, contact Dr. Sarah Kruse at skruse@ecotrust.org or Jon Bonkoski at jbonkoski@ecotrust.org or 503.467.0804. The project website is http://www.ecotrust.org/mlpa.

If you agree to participate under the conditions described above, please print and sign your name.

Participant's name _____ Signature _____
Field Staff signature _____ Date _____

Recreational Email Description and Consent

MLPA Initiative – South Coast Study Region
Fisheries Uses and Values Project – Project Description

Name,

You've been registered for an account at http://ramses.ecotrust.org/sc_mlpa/ using this email address. To activate your account, click the link below or copy and paste it into your web browser's address bar:
http://ramses.ecotrust.org/sc_mlpa/accounts/activate/5348904874435ec71872f5a8363f46c19c1827ec/
Username: ****@******. ***
Password: **********

By activating this account you agree to participate under the following conditions:
The Marine Life Protection Act (MLPA) is a state law directing the California Department of Fish and Game (CDFG) to design and manage an improved network of marine protected areas off California's coast. To implement this law, a public-private partnership has been formed between the California Resources Agency, CDFG, and Resources Legacy Fund Foundation—the MLPA Initiative. As part of this effort, Ecotrust has been retained to collect, compile and analyze information pertaining to recreational fisheries along the southern California coast. The project is designed to provide spatially explicit information to the MLPA Initiative and the information collected in this project will improve upon what is currently available regarding recreational fisheries.

The goal of the Recreational Fisheries Uses Project is to characterize recreational fishing areas of relative importance and recreational fishing use patterns along the southern California coast, using the expert knowledge of fishermen themselves. The purpose of this project is twofold:

1. Develop accurate maps of the local recreational fishing grounds and characterize their relative importance to recreational fishermen; and
2. Incorporate recreational fishermen's knowledge into the deliberations of the Regional Stakeholder Group in the MLPA South Coast Study Region.

This kind of spatially explicit information on recreational fisheries will ensure representation of recreational values in the design, implementation and management of marine protected areas.

During the summer and early fall 2008, Ecotrust personnel will contact approximately 700 recreational fishermen along the southern California coast to be interviewed. The format will be online, with follow-up meetings by user group in which the information collected will be validated by fishermen. Due to the sensitive nature of the information, only Ecotrust staff (operating under a strict confidentiality protocol) will handle the raw data generated during the interviews. All information collected in the interviews is anonymous and confidential on the individual level. All analyses and results will be presented only in aggregate form. The information will be used to create a comprehensive profile of the recreational fishing use patterns and values along California's south coast, and may also be written up in a peer-reviewed journal. If appropriate, there may be the opportunity for release of aggregated study results for uses other than the MLPA process, but in line with the purposes of this research; however, your individual results will never be included in any release of aggregated results without your explicit consent.

Your willingness to participate is not only appreciated, but indeed vital to the success of this project. If you have any questions or concerns, contact Jon Bonkoski at jbonkoski@ecotrust.org or 503.467.0804 or Dr. Sarah Kruse at skruse@ecotrust.org or 503.467.0785. The project website is http://www.ecotrust.org/mlpa.