Socioeconomic Impact Analysis of Marine Reserve Alternatives for the Channel Islands National Marine Sanctuary

April 8, 2003

by
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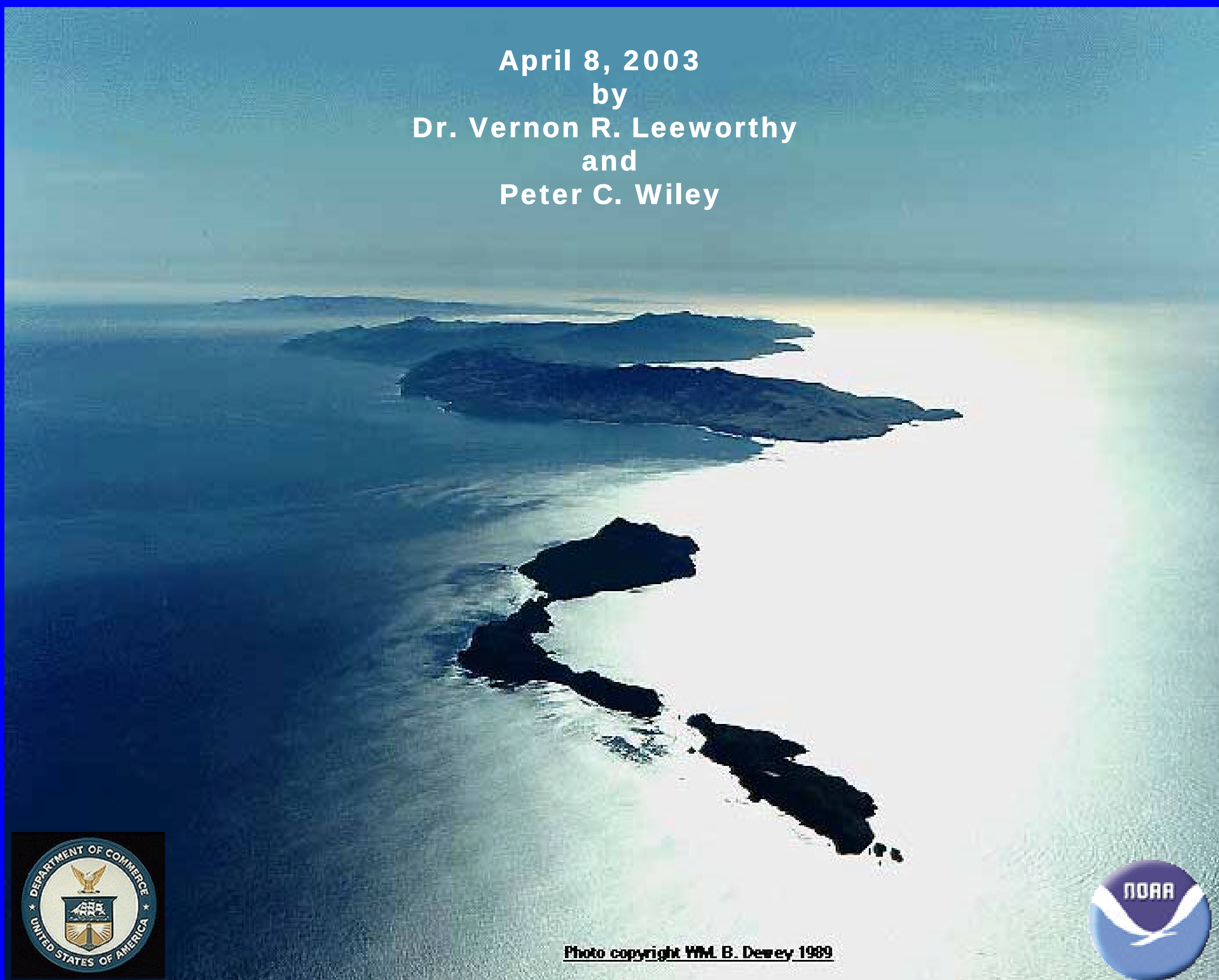

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Errata

For *Socioeconomic Impact Analysis of Marine Reserve Alternatives for the Channel Islands National Marine Sanctuary*

April 8, 2003

The following pages contain revisions and corrections of the analysis document dated April 29, 2002. They have been incorporated into the version of the analysis document dated April 8, 2003. These changes are described below.

<u>Commercial Fishing</u>

- Typos in the text describing the Step 1 analysis for the preferred alternative were corrected (Page 50).

The remaining changes in this errata document are based on a review form the Science and Statistical Committee (SSC) of the Pacific Fishery Management Council (PFMC). Changes to the document were based on the following.

<u>Consumptive Recreation</u> (pages 30-31 and 57-68)

- Estimates from Rowe et al. (1985) have been dropped from the calculation of the recreation consumers' surplus parameter.

- We have expanded the range of parameters taken from Wegge et al. and altered our conversion of per-trip values to per-day values. We used all estimates for the appropriate boat modes from the conventional travel cost demand model and the contingent valuation model. We did not use results from the time demand model presented in Wegge et al. because data were insufficient to provide statistically reliable estimates for all modes of fishing. The authors used the conventional demand model results in their estimation of gross economic value and based on that reasoning, that is what we choose to use in our analysis.

- Regarding the conversion of per-trip estimates to per-day estimates, we have made the following adjustment to our parameter calculation. Estimations of values for a one-day trip were factored into the average unaltered. For private boat trips, length of trip was given in ours instead of days, with the average number of hours being twenty-two (22). Because we required a per-day estimate, we proceeded on the assumption that 22 hours translated into about three days (based on a typical fishing day being six to eight hours). For the contingent valuation estimates, the breakdown of single day and multi-day trips was not given. We proceeded on the assumption that half of the trips were single day trips, (which is consistent with the assumption made in our analysis that half of the users are study area residents). We then calculate a weighted average with half of the estimate used unaltered and half divided by the average trip length of 4.13.

- Because estimates in Wegge, et al. are in 1984 dollars we have adjusted our parameter estimate to 1999 dollars.

In making these changes, we now characterize our estimates of impacts to consumptive recreational users as a probable overestimation of actual impacts. The values found in table 1.20 represent loss of access to all of southern California. Using these values for the CINMS overstates the values, since values would be expected to decline as the scope of access is reduced.

Non-consumptive Recreation (pages 90-101, 114)

- The change described in consumptive recreation (above) also affected the consumers' surplus estimates for non-consumptive recreation. These have also been revised appropriately.

- The range of elasticities used to estimate potential benefits to non-consumptive users was changed to incorporate quality elasticities for marine recreation derived from information in Freeman (1995).

Net Benefit Assessment (page 107–110)

- A revised net benefits assessment concluded that the study area includes an insignificant portion of the total supply of commercial fishing catch and results in no impact on prices, therefore, there are no consumers' surplus losses. Although we still maintain there are no economic rents or negative economic rents due to overfishing, we have relaxed the benefit-cost analysis assumptions that the economy is at full employment and that labor and capital are mobile and can find alternative employment. We estimate the losses in returns to labor and capital as a percent of harvest revenue and apply this to the estimated maximum potential harvest revenue loss for each marine reserve alternative. We also expand the policy analysis to include two scenarios for the percentage of U.S. households that would be willing to pay the three dollar amounts per household per year to one and two percent. We also added justification of why one and two percent of households represent extremely conservative (lower-bound) assumptions in the policy analysis.

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Acknowledgements

As readers will discover, the contents of this report include a considerable amount of information. This report is a product based on the input and assistance of a great many people, not all which are listed here. Those listed below made special contributions that we would like to acknowledge. Any errors are solely our responsibility.

We would first like to thank the Channel Islands National Marine Sanctuary management and staff for all their assistance and support. Managers Ed Cassano and Matt Pickett provided the necessary contract and travel funds that were vital to filling many gaps in available socioeconomic information and supported our efforts in working with the different user groups. Sean Hastings and Michael Murray provided direction and information on how the Socioeconomic Panel interacted with the Marine Reserve Working Group (MRWG), the Pacific Fisheries Management Council and other entities. This effort would not have been possible without the excellent geographic information system support provided by Ben Waltenberger. Kathryn Hintergardt did an excellent job of making sure all project outputs were posted on the Sanctuary Web site for public access. Finally, a special thank you to Satie Airame for having the patience to work with us in translating the results of the Science Panel's findings into information we could integrate into the socioeconomic analyses.

Our Socioeconomic Panel and reviewers also deserve special recognition. Dr. Craig Barilotti of Sea Foam Enterprises, Inc. led the data collection effort for all the commercial fisheries other than squid/wetfish. Dr. Barilotti also organized a Fishermen's Data Committee to review and approve all the commercial fishing data maps. Dr. Caroline Pomeroy led the squid/wetfish data collection effort and also provided her expertise as a professional sociologist to the project. Dr. Charles Kolstad led the data collection efforts for the charter/party/guide service recreational industry. As one of the nation's leading natural resource and environmental economists, Dr. Kolstad also provided critical review and guidance on our economic impact models. Dr. James Lima of the U.S. Department of Interior's, Minerals Management Service provided important background literature and contacts for information relevant to the study and reviewed our methodologies.

We would like to acknowledge each of the members of the socioeconomic data collection teams. Dr. Barilotti's team members, Terry Hawkins and Chris Miller, did an excellent job of getting commercial fishermen to participate and provide the necessary project information. Terry also should receive special recognition for organizing a one-day workshop, where commercial fishermen worked with us in designing several marine reserve alternatives. This allowed the fishermen a much richer exposure to their information and the tools we used for analysis than they got in the MRWG process. Dr. Pomeroy's team included Doug Reese, Monica Hunter, Marc Los Huretos and Natalie McKinney. Doug, Monica and Marc worked with the squid/wetfish fishermen in compiling the information and Natalie provided data entry and checking. Dr. Pomeroy was also received valuable assistance from Sheli Smith with lodging while collecting information in the Long Beach area. Canetti's hosted many meetings with squid/wetfish fishermen. Will Daspit of the Pacific Marine Fisheries Commission provided invaluable assitance with PacFin data for the squid/wetfish fishery. Also, Manoj Shivlani and Daniel Suman of the University of Miami, Rosensteil School of Atmospheric and Marine Science shared their experiences in gathering spatial catch information in the Tortugas Ecological Reserve of the Florida Keys National Marine Sanctuary.

Bevin Ashenmiller deserves special recognition for her work in the recreational for hire data collection as part of Dr. Kolstad's team. Her efforts resulted in a Census not a sample of all operators in the CINMS. This was a major achievement. We would also like to thank Jae Yi for his contribution to the Kolstad team effort.

We would also like to acknowledge the assistance of several National Marine Fisheries Service economists on the West Coast of the U.S. in helping us understand the various data sources and available literature on the economics of the California marine fisheries. We would like to thank Cindy Thomson, Dale Squires, Jim Hastie, Sam Herrick, Wes Silverthorne, Stephen Freese and Dave Colpo.

Jim Seeger of the Pacific States Marine Fisheries Commission provided us with the Fishery Economics Assessment Model (FEAM). We could not have done the economic impacts of the marine reserves on the local economies without this invaluable contribution. We would also like to thank Wade Van Buskirk of the Pacific States Marine Fisheries Commission for assistance and understanding of the RecFin data. A special thank you to Dr. Linwood Pendleton and Steven Lutz of the University of Southern California for sharing their economic research on the Southern California squid fishery and Orlando Amoroso for his insights about the fishermen from the San Pedro fleet.

The California Department of Fish and Game provided enormous support for our efforts. Without the fundamental data and information support from the Department, none of this would have been possible. We would first like to thank Patty Wolf and Marija Vojkovich for paving the way for us and our contractors in getting access to the necessary commercial and recreational fishing data. We would like to extend a very special thank you to Joanna Eres and Jana Robertson in providing the commercial fishing data and documentation, to Deborah Aseltine-Neilson for providing recreational fishing logbook data, to Dave Ono for the diving skiff survey data and Gina Wade for the geographic information system files for the existing protected areas in the study area.

At the beginning of the Marine Reserve Working Group (MRWG) process, we received valuable input from Environmental Defense. Rod Fujita and Jacob Kritzer did an excellent job of providing an overview of the socioeconomic information available for Santa Barbara and Ventura counties. Their contribution gave us a running start in understanding available data sources and the socioeconomics of the immediate area surrounding the CINMS. We would also like to thank Astrid Scholz of Ecotrust, who served as a consultant to Environmental Defense, for her contributions on nonuse or passive economic use values and her review and advice on our analyses.

We would like to thank Susan Smith of the Channel Islands National Park for the information on private boating activities around the islands and Jeff Nadler of the Professional Association of Dive Operators (PADI) for information on divers. We would also like to thank Bob Tellefson, President of the Santa Barbara Kayakers Association, for providing background information and helping us with refining the data on kayaking.

Ron Little, of the University of Utah, provided us with profile information of commercial fishermen from the Santa Barbara, Ventura and San Luis Obispo counties. This information came from a study he conducted for the Minerals Management Service and allowed for comparisons with our survey data.

Several members of the Channel Islands National Marine Sanctuary, Sanctuary Advisory Council (SAC) and the Marine Reserve Working Group (MRWG) provided us with valuable information and contacts, which were a tremendous help. Rudy Scott provided us with a small business perspective. Dr. Craig Fusaro shared his many contacts and sources of information for the commercial fisheries. Deborah McArdle shared information compiled by Sea Grant on the charter/party/guide service industry, which helped us tremendously with that industry. Gary Davis directed us to the appropriate contacts for information at the Channel Islands National Park. Neil Guglielmo hosted a meeting with members of the squid/wetfish fishery so we could explain our efforts and how their information would be used in the process. Neil's efforts in getting the squid/wetfish fishermen involved contributed greatly to Dr. Pomeroy's team success. Finally, we would like to thank Dale Glantz of ISP Alginates for working with us in developing the economic impact model for kelp. Dale provided all the map data and all the details we needed to construct the economic impact model for kelp.

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Introduction

Purpose. The purpose of this document is to provide a complete socioeconomic impact analysis for the proposed network of marine reserves (no take areas) in the Channel Islands National Marine Sanctuary (CINMS). The report provides analyses for six alternative networks, and within each alternative, two jurisdictions (e.g., State and Federal). The jurisdiction results have been mislabeled as Phase 1 and Phase 2 in some preliminary work. The original intent of this labeling was to distinguish administrative processes that would each be on separate time paths. However, the term phasing has socioeconomic implications and we have dropped the use of the term phases when what is really meant are the jurisdictions (State and Federal). The time dimensions of the State and Federal processes will only differ by months or a year. Phasing has socioeconomic significance because it is a strategy that can be used to minimize socioeconomic impacts by giving displaced users more time to adapt.

This document also provides background materials that were generated over a two-year time period and provided to the Marine Reserve Working Group (MRWG) to assist them in their attempt to design a network of marine reserves for the CINMS. Background materials, detailed documentation of methods and further tabular details of analyses are provided in appendices. This document will serve as the main reference document for the Socioeconomic Impact Analyses in future Environmental Impact Statements and Regulatory Impact Reviews to be produced by the State and Federal governments.

Approach. Analyses are provided in two steps. Step 1 analyses are very quantitative and many detailed tables are produced. ***Step 1 analyses*** simply add-up all the activities displaced from marine reserve areas, with the assumption that all is lost, i.e., there is no mitigation or off-sets through behavioral responses. Substitution/relocation, replenishment effects, the effects of other regulations, the current and future status of fishing stocks, and the benefits of marine reserves are not addressed in Step1 analyses. We have generally labeled the Step 1 analyses as "***maximum potential loss***". In cases where congestion effects occur due to displacement and relocation of fishing effort, losses could exceed our estimates of maximum potential loss.

It is rare, however, for there not being some possibilities for substitution and relocation to mitigate or off-set impacts. Human beings have proven to be quite ingenious, adaptive and resilient in the face of change and often surprise us with solutions that the rest of us could never have imagined. ***Step 2 analyses*** are by their nature less quantitative. We simply are not capable of forecasting all the human responses as well as the ecological-biological responses, and the interaction of these systems that will result from the network of marine reserves. All the benefits and costs of marine reserves cannot be quantified, and so a formal benefit-cost analysis is not conducted. Instead, we use the benefit-cost framework and list all the potential benefits and costs, and quantify them where we can. Where we can't quantify benefits or costs, we discuss them qualitatively and in what direction we believe benefits or costs will move (under various conditions), from the point of our estimate of losses from Step 1 analyses.

Our socioeconomic impact analysis will surely seem weighted more heavily toward the economic and less towards the social impacts. We provide extensive profiles of commercial fishermen, measures of their dependency on CINMS resources, the extent of impacts on samples of individual fishermen, and information relevant to assessing the ability to adapt to change. We attempt to provide some interpretation in a rudimentary social impact analysis. For the recreation industry, there is much less information on the social side. The recreation industry is diverse and employs many people spread across many industries. Profiles of the direct recreational users and all the suppliers of recreational services were not available.

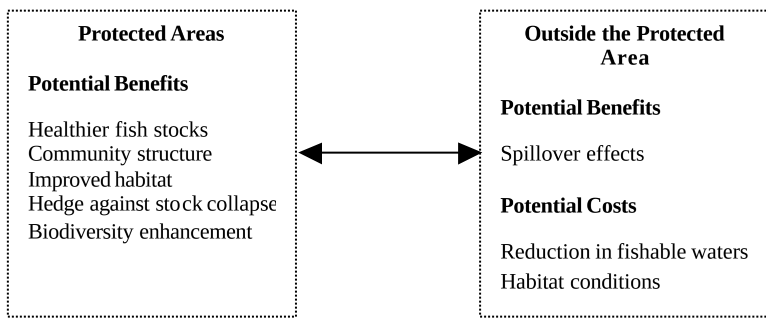
The analyses of the impacts of marine reserves are generally about what will happen in the future. So by its nature, our analyses will be characterized by great ***uncertainty***. Although we have assembled considerable information and our Step 1 analyses yield good starting points to assess the potential impacts, the uncertainties of human and biophysical responses, and the interaction between them, make the results of the Step 2 analyses less certain. We have used theoretical models from socioeconomic literature to guide us through Step 2 analyses and establish under what conditions and which direction we could expect benefits and/or costs to go.

The information and analyses presented here provide critical baseline information to contribute to the adaptive management of the Channel Islands National Marine Sanctuary. The use of ***monitoring*** to address uncertainty is fundamental to the practice of ***adaptive management***. We regard the information and analyses presented here as a first step in the adaptive management process.

Benefits and Costs of Marine Reserves (no take areas)

There are two perspectives on identifying the benefits and costs of marine reserves. The first focuses on the potential biophysical benefits and costs. Sanchirico (2000) has provided a simple summary of these benefits and costs (Figure 1). These are issues for which the Science Panel for the Marine Reserves of the CINMS has summarized the literature supporting the biophysical benefits and costs. A key distinction is the closed areas themselves versus the areas outside the closed areas, and the linkages between the areas. As Sanchirico and Wilen (2001) have shown, the biophysical benefits and costs are contingent on socioeconomic behavioral responses. So even though socioeconomic benefits and costs are dependent on the biophysical benefits and costs, the biophysical benefits and costs are predicated on socioeconomic behavioral responses. The determination of final outcomes is dependent upon both how both the natural environment and humans respond to the protection strategy.

Figure 1. Potential Ecological/Biological Benefits and Costs of Marine Reserves



The boundaries of the two areas are drawn with dashed lines to symbolize the openness of the marine ecosystem. The link between the two areas is formally defined by the migration/dispersal patterns of fish stocks residing within and outside the protected areas along with the geographic or oceanographic characteristics of the marine environment. In general, fish migration patters depend upon currents, temperatures, prevailing winds, and behavioral characteristics. The term "community structure" refers to the potential benefits in age/size structure of the fish stock and in trophic levels present in the protected area.

Source: Sanchirico (2000)

The second perspective on benefits and costs of marine reserves is the socioeconomic benefits and costs. As stated above, they are both contingent on the biophysical benefits and costs and on socioeconomic behavioral responses. In addition, there is a time dimension to benefits and costs. For purposes of our analyses, the short-term is defined as one to five years and the long-term, beyond five years. Below we list each potential benefit and cost along with each user group that would receive each benefit and/or cost and what measurement we would use to quantify or describe qualitatively the benefit and/or cost.

A. Potential Benefits

1. Non-consumptive Users (sport divers and wildlife viewers)

Since marine reserves will continue to allow non-consumptive activities, these user groups are potential beneficiaries. Over time it is expected that the closed areas will increase in quality. Marine reserves also may reduce conflicts with consumptive users. This will attract additional non-consumptive users, which will increase demand for services and have impacts on the local economies. In addition, the quality increase is expected to increase the net user value (consumer's surplus) per unit of use (measured as person-days). Consumer's surplus or net user value by non-consumptive users is also sometimes referred to as non-market economic use value. Below is a list of potential benefits to non-consumptive users.

- Increased sales and income to businesses directly providing goods and services to non-consumptive users.
- Secondary increases in sales/output, income, jobs and tax revenues in the local economies (through economic multiplier impacts).
- Increase in Consumer's surplus or net economic user value (non-market economic use value).

2. Nonusers or Passive Users

Economists have long recognized a special class of non-market economic values for natural resources and the environment referred to generally as nonuse or passive use economic value. See Kopp and Smith (1993) for a detailed discussion. These values are widely accepted as legitimate values to include in benefit-cost analyses of environmental regulations and in damage assessment cases. The term passive use, instead of nonuse, has become more popular because it is recognized that for people to have value for something they must have some knowledge about what they are valuing. People learn about natural resources or the environment they are asked to value through books, newspapers, magazines, newsletters, radio, television and other media sources. The people don't actually visit the sites and directly use the resources protected themselves, they consume them passively through the many indirect sources. The values have been referred to in the literature as option value, bequest value and existence value to clarify people's underlying motives for their willingness to pay.

For nonconsumptive users and passive users, the conditions of the ecosystem are important for determining the benefits of marine reserves. Marine reserves are known to change the status of the habitats protected

<u>Definitions</u>

Consumer's Surplus: The amount that a person is willing to pay for a good or service over and above what they actually have to pay for a good or service. The value received is a surplus or net benefit. And, for natural resources, for which no one owns the resources and can't charge a price for use of the resources, consumer's surplus is referred to as a non-market economic value since the goods and services from the natural resources are not traded in markets. Consumer's surplus is applicable to both use and nonuse or passive use value.

Option Value: The value to current non-users who would be willing to pay an amount to ensure possible future use. This value is based upon uncertainty about both their future demand and the state of future supply. One can think of this like buying an insurance policy for future use. Weisbrod (1964) first introduced the concept of option value. Bishop (1982) extends and further clarifies this concept.

Quasi-Option Value: The value of preserving options for future use given some expectation of the growth of knowledge. Quasi-option value is positive when there are uncertainties about the future benefits of preservation and negative when the uncertainties are about future development issues. Examples are issues about future scientific discoveries or commercial applications that might arise from future study. Fisher and Hanemann (1987) discuss and clarify this concept. To the extent that consumptive uses might eliminate certain resources, this concept becomes an important potential benefit of marine reserves.

Bequest Value: The value to people that never plan to visit, but would be willing to pay an amount to ensure that future generations can experience the area in a certain protected condition.

Existence Value: The value to people who never plan to visit, but would be willing to pay an amount to ensure the resource exists in a certain protected condition. Krutilla (1967) first introduced the concepts of bequest and existence values. Brookshire, Eubanks and Randall (1983) discuss important issues in estimating these values.

Economic Rent: A return on investment over and above a normal rate of return on investment. A normal rate of return on investment is that rate of return in which incentives are such that capital will neither outflow or inflow into the industry.

and often result in changes in community structure and increased biodiversity. Also, one of the main benefits is the possibility of protecting a different functioning ecosystem (i.e., a more natural system with minimum influence by man). These may be conditions for which these user groups would have a willingness to pay.

2. Commercial Fishing and Kelp Harvesting

Commercial fishing and kelp harvesting are displaced activities from marine reserves and so these user groups would be expected to suffer losses and can therefore be placed under potential costs. However, if marine reserves result in benefits to surrounding unprotected sites, i.e., increases in biomass and aggregate harvests, the commercial fishing industry will be a beneficiary. The benefits of marine reserves are usually stated as long-term benefits given the time frames necessary for habitats and fish stocks to improve. Below is a list of expected long-term benefits to commercial fishing.

- Long-term increases in harvest revenue and income to fishermen.
- Long-term increases in secondary output/sales, income, jobs and tax revenues in local economies. (Through economic multiplier impacts).
- Long-term increases in Consumer's Surplus to consumers of commercial fishing products (if prices to consumers decline with increased harvests).
- Long-term increases in Economic Rents (may or may not exist in open access fisheries)[1].

3. Recreational Fishing and Consumptive Diving

Just as with commercial fishing, recreational fishing and consumptive diving are displaced activities from marine reserves, and so these groups associated with these activities are expected to suffer losses, which constitute negative potential impacts or potential costs. However, if marine reserves result in benefits to surrounding unprotected sites, i.e., increases in biomass and aggregate harvests, the recreational fishermen and consumptive divers, and supporting industries will be beneficiaries. The basis for these benefits is the potential increase in quality of the experience including the number and size of catch and possibly reduced conflicts with other users. The benefits of marine reserves are usually stated as long-term benefits given the time frames necessary for fish stocks to improve. Below is a list of expected long-term benefits to recreational fishing and consumptive diving.

- Long-term increases in sales and income to businesses that directly provide goods and services to recreational fishermen and consumptive divers.
- Long-term increases in secondary output/sales, income, jobs and tax revenues in local economies (through economic multiplier impacts).
- Long-term increase in Consumer's Surplus.
- Long-term increases in Economic Rent (may or may not exist in open access fishery).

4. Scientific and Education Values

Marine reserves provide a multitude of scientific and educational values. Sobel (1996) provides a list of these benefits. Scientific and education values were categorized by Sobel into those things reserves provide that increase knowledge and understanding of marine systems. Sobel provided the following list of benefits:

Scientific

- Provides long-term monitoring sites
- Provides focus for study
- Provides continuity of knowledge in undisturbed sites
- Provides opportunity to restore or maintain natural behaviors
- Reduces risk to long-term experiments

- Provides controlled natural areas for assessing anthropogenic impacts, including fishing and other impacts

Education

- Provides sites for enhanced primary and adult education
- Provides sites for high-level graduate education

B. Potential Costs

1. Commercial Fishing and Kelp Harvesting

As mentioned above, commercial fishing is one of the displaced activities from marine reserves. Sanchirico and Wilen (2001) discuss the biophysical and socioeconomic conditions under which commercial fisheries might benefit or suffer costs from marine reserves. There are sets of conditions under which they predict would result in short-term and/or long-term costs.

- Lost harvest revenue and income to fishermen and processors.
- Secondary losses in output/sales, income, jobs and tax revenues in local economies (through economic multiplier process).
- No loss in harvest but increased cost of harvesting resulting in lost income to fishermen.
- Losses in Consumer's Surplus to consumers of commercial seafood products (if prices rise for fishery products due to reductions in harvests).
- Overcrowding, User conflicts, Possible Overfishing or Habitat destruction in remaining open areas due to displacement. This could raise costs and/or lower harvests.
- With displacement, loss of site-specific harvest knowledge that supports sustainable fishing practices.
- Social disruptions from losses in incomes and jobs.

The extent to which these costs are realized in the short-term or long-term depends greatly on the off-site impacts of the protected areas as listed in Figure 1, but also on the status of the fish stocks fishery management regulations (are current harvest levels sustainable?), and the behavioral responses and economic conditions of the fishing industry. It is not always true that there will even be short-term losses (Leeworthy, 2001a).

2. Recreational Fishing and Consumptive Diving

As mentioned above, recreational fishing and consumptive diving would be displaced from marine reserves. Sanchirico and Wilen (2001) discuss the biophysical and socioeconomic conditions under which these user groups might benefit or suffer costs from marine reserves. There are sets of conditions under which they predict would result in short-term and/or long-term costs.

- Lost sales revenue and income to businesses that directly provide goods and services to recreational fishermen and consumptive divers.
- Secondary losses in output/sales, income, jobs and tax revenues in local economies (through economic multiplier impacts).
- Losses in Consumer's Surplus (if consumptive users are forced to substitute to less valued locations or if they are crowded into remaining open areas where they experience congestion effects or if it costs more to relocate to other areas).
- Losses in Economic Rent (may or may not exist in open access environment).

As with the commercial fisheries, whether any of the above costs are short-term or long-term depends greatly on the off-site impacts of the protected areas as listed in Figure 1, but also status of the fish stocks fishery management regulations (are current harvest levels sustainable?), and on the behavioral responses and economic conditions of the consumptive recreational industry. It is not always true that there will even be short-term losses if there are adequate substitute sites.

Ports and Harbors. Those involved in managing ports and harbors have expressed concern with respect to both boundary expansion and marine reserves in the CINMS may have a negative impact on ports and harbors, if these actions result in decreases in business volume. The concern goes beyond the impacts described above and is focused on the issue of how the Federal government (the U.S. Army Corps of Engineers and Congress) make decisions about funding for dredging to maintain ports and harbors. Our economic impact estimates do provide some details on ports and harbors and can be used to assess these indirect effects. As with the above, there might be short-term gains and losses in business volume (gains to nonconsumptive users and losses to consumptive users) and their might be long-term gains for all users. Thus, there is a possibility of both benefits and costs to ports and harbors.

Outline of the Report

In Chapter 1, we provide a socioeconomic overview of the study area. There we define the various study areas and background socioeconomic descriptions of the study area. Also provided are baseline estimates of commercial fishing activity and recreational activities and how they are connected to the local economies. Here we also show what we were able to quantify in our Step 1 analyses and document our data and models.

Chapter 2 includes our Step 1 analyses of the marine reserve alternatives. Results are generated at very detailed levels, so we include summary tables in the chapter and place the tables with greater details in appendices.

Chapter 3 includes our Step 2 analyses of alternatives. Here we attempt to assess how likely are the losses estimated in our Step 1 analyses are to occur. We also include an assessment of the potential benefits of the marine reserves and a summary net assessment.

Appendix G – Preferred Alternative is added to the report to provide an area-by-area Step 1 analysis. We don't provide all the tables with all the details as we do for complete alternatives since this would require hundreds of tables. Instead here we provide a set of summary tables for each user group potentially impacted. Details will be available from the authors upon request.

Appendix H – This appendix was added to address an analysis conducted by Robert Southwick of Southwick and Associates for the American Sportfishing Association (ASA). The ASA criticizes our previous step 1 analyses for MRWG options A through D arguing that our analyses are flawed and under estimate the impact to recreational support industries. Our expenditure profiles for recreational fishermen were the major criticism - that we used older outdated data and did not include equipment purchases. The inclusion of all major equipment expenditures in the ASA report would not be appropriate for analyzing the impacts of marine reserves. We provide updated estimates using the new trip expenditures and explain the reason the ASA approach is flawed.

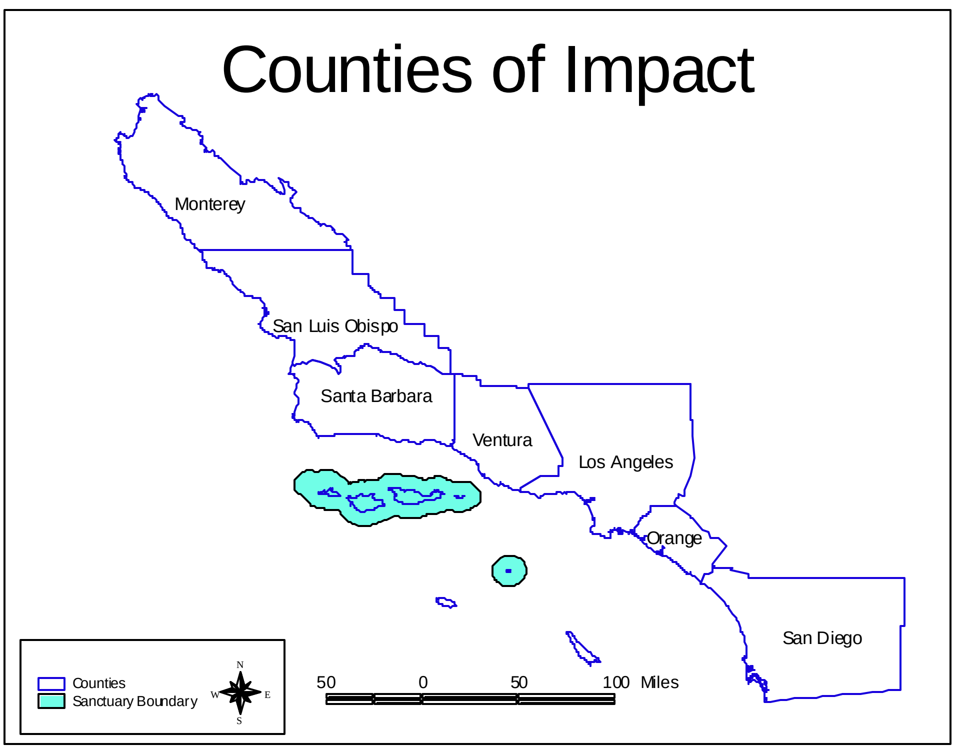
Chapter 1

A Socioeconomic Overview of the Study Area

Study Areas and Economic Dependence on the CINMS

There are two fundamental definitions of the study area. First is the where the activities take place that use the natural resources and the second is the place where the economic and social impacts take place. For the first area, the definition is the area within the boundaries of the CINMS or six nautical miles seaward of the Channel Islands (see maps in Appendix C). For the second area, we relied on several sources of information: 1) California Department of Fish and Game (CDFG) commercial fishing data that shows for each area where fish are caught, the ports where the fish are landed, 2) data from contractor Pomeroy's research on the squid/wetfish fishery on the spatial organization of squid processing (see also Pomeroy and Fitzsimmons 2001), 3) kelp harvesting and processing information was obtained form ISP Alginates, 4) data from our surveys of recreational for-hire operators on their base of operations and 5) National Marine Fisheries Service, Marine Recreational Fishing Statistics Survey for intercept/access points for those fishing from private household boats. Appendix B includes a report that details our data collection and estimation methods. Figure 2 shows a map of the seven-county area we defined as the area of socioeconomic impact. All seven counties are impacted by commercial fishing activities and three counties (e.g., Santa Barbara, Ventura and Los Angeles) are impacted by recreational activities.

Figure 2. Socioeconomic Impact Area for the Channel Islands National Marine Sanctuary (CINMS)



The seven-county impact area had a 2000 population of over 16.98 million. Between 1990 and 2000, the population of the study area grew at a slower pace than the entire State of California or the U.S. (Table 1.1). The seven-county area had a much higher population density and higher poverty rate than either the

State of California or the U.S. The higher population densities are mostly influenced by the inclusion of Los Angles and Orange counties, which have extremely high population densities, while the relatively high poverty rate is due to Los Angeles County. For per capita income, the seven-county area is higher than the U.S. but lower than the State of California.

Table 1.1 Selected Socioeconomic Measures for Description of Impact Areas

County	2000 Population	Population Change 1990-2000	Population Density[1]	1999 Per Capita Income	1997 Persons Below Poverty
Monterey	401,762	13.0%	120.9	$29,393	15.4%
San Luis Obispo	246,681	13.6%	74.7	$25,888	12.9%
Santa Barbara	399,347	8.0%	145.9	$30,218	14.6%
Ventura	753,197	12.6%	408.2	$29,639	10.3%
Los Angeles	9,519,338	7.4%	2,344.1	$28,276	20.5%
Orange	2,846,289	18.1%	3,607.5	$33,805	11.0%
San Diego	2,813,833	12.6%	670.0	$29,489	14.2%
All Counties	16,980,447	10.4%	838.2	$28,932	17.0%
California	33,871,648	13.6%	217.2	$29,856	16.0%
U.S.	281,421,906	13.1%	79.6	$28,546	13.3%

1. Number of people per square mile.

Source: U.S. Department of Commerce, Bureau of the Census, State and County QuickFacts. (http://quickfacts.census.gov)

Before we can analyze the impact we need to establish the baseline relationship between the local economies (county economies) and the use of the CINMS. Table 1.2 shows personal income and employment by county for the seven-county impact area. Personal income is presented from two perspectives, by place of work and by place of residence. This is an important distinction because many county economies are less dependent on sources of income from work related activities in the county, i.e., they derived their incomes from sources outside the county. Sources of incomes from outside the county include retirement pensions, dividends and interest from investments and from work in other counties (commuters). All seven counties in the impact areas have larger personal incomes by place of residence than by place of work.

Table 1.2 Personal Income and Employment by County 1999

County	Personal Income By Work 000's $	Personal Income By Residence 000's $	Employment Number Full and Part time Jobs
Monterey	$7,568,214	$10,927,131	218,719
San Luis Obispo	$3,818,023	$6,134,244	137,169
Santa Barbara	$7,678,915	$11,817,328	244,175
Ventura	$13,612,027	$22,083,017	390,770
Los Angeles	$211,861,080	$263,814,766	5,369,705
Orange	$70,341,257	$93,332,511	1,801,299
San Diego	$60,296,132	$83,183,395	1,664,791
Region Total	$375,175,648	$491,292,392	9,826,628

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Information Management System (http://www.bea.gov)

We have estimated the economic impact of each of the activities in the CINMS on each of the seven counties in the impact area. The economic models are discussed in a latter section of this chapter. In 1999, all activities in the CINMS generated almost $172 million in personal income (Table 1.3). Our estimate of employment (number of full and part-time jobs) is about 4.9 thousand. These estimates include the multiplier impacts in each county. However, the estimates are underestimates because we were not able to find any information on the amount of nonconsumptive recreation from private household boats. Including private household nonconsumptive recreation would probably result in estimates of between $180 and $190 million in income and between 5 and 5.5 thousand jobs that depend on the uses of the CINMS.

Table 1.3 Local/Regional Economic Dependence on CINMS: Personal Income, 1999

County		Commercial Fishing	Consumptive Recreation	Total Consumptive Activities	Nonconsumptive Recreation[1]	All Activities
Monterey		$19,316,416	0	$19,316,416	0	$19,316,416
	%[2]	0.1768	0	0.1768	0	0.1768
San Luis Obispo		$121,758	0	$121,758	0	$121,758
	%	0.0020	0	0.0020	0	0.0020
Santa Barbara		$15,041,824	$1,872,105	$16,913,929	$1,928,484	$18,842,413
	%	0.1273	0.0158	0.1431	0.0163	0.1594
Ventura		$79,190,758	$22,430,489	$101,621,247	$4,022,904	$105,644,151
	%	0.3586	0.1016	0.4602	0.0182	0.4784
Los Angeles		$18,452,223	$384,325	$18,836,548	$69,366	$18,905,914
	%	0.0070	0.0001	0.0071	0.0000	0.0072
Orange		$271	0	$271	0	$271
	%	0.0000	0	0.0000	0	0.0000
San Diego		$9,521,785	0	$9,521,785	0	$9,521,785
	%	0.0114	0	0.0114	0	0.0114
All Counties		$141,645,036	$24,686,919	$166,331,955	$6,020,754	$172,352,709
	%	0.0288	0.0050	0.0339	0.0012	0.0351

1. Nonconsumptive recreation and All Activities are under estimated because no information was available for nonconsumptive recreation using private household boats to access the CINMS.
2. Percents are the percent of the total economy of each county, or for all counties, the percent of regional totals for all seven counties. The percents are all less than one percent or fractions of a percent.

Significance. The use of the term "significant impact" is a highly charged term and is often misunderstood or purposely misused to marginalize a particular group. In socioeconomic impact analysis, we have to be very careful how and when we use this descriptor. The term "significant," can only be interpreted for each context of use.

There exist some administrative definitions of significance. Presidential Executive Order 12866 defines a significant impact for Federal Regulations as any impact of $100 million or more. When the impact of a Federal Regulation is expected to have impacts of $100 million or more, then the requirement is that the Federal agency proposing the regulation must conduct a benefit-cost analysis of the regulation. As we shall show below, none of the six alternatives analyzed here results in that level of impact.

Another Federal law (Magnuson-Stevens Fishery Conservation and Management Act, Section 303, a), specifies 10 National Standards. National Standard 9 deals with impacts on the fisheries, which are addressed in this report and National Standard 8, which deals with impacts on fishing communities (not addressed in this report). Although the Act did not explicitly define a fishing community, several court cases have resulted in the National Marine Fisheries Service (NMFS) adoption of criteria to define communities and further fishing communities. Census Designated Places or cities define communities. Counties are considered too large for identifying communities. Census Designated Places or CDPs are officially recognized by the U.S. Bureau of the Census and have Federal Information Processing System (FIPS) codes for organizing socioeconomic information on CDPs or cities, as do counties and states. Fishing communities are CDPs or cities that depend directly or indirectly on the recreational and commercial fisheries for at least 20 percent of either their income or employment, or that 20 percent of the population living in the community is directly or indirectly dependent on the fisheries. Once a community is identified as a "fishing community", National Standard 8 requires a detailed Social Impact Analysis (SIA). Impacts of five (5) percent of a community's income or employment are considered significant by NMFS. NMFS currently recommends following the guidelines issued by the International Association for Impact Assessment (1993) for SIAs. The information included in this report can be used to assess the need for an SIA.

In Tables 1.3 and 1.4, we show our estimates for personal income and employment generated from each activity in each county. Directly under each estimate is the percent of the total personal income or employment that a given activity accounts for in each county's economy. Across all activities, we show that our estimate of personal income impact of about $172 million was less than four one-hundredths of one percent (a small fraction of one percent) of the entire seven-county area. If all the activities in the CINMS were prohibited, it would not have significant impact on the total economy of the seven-county region. Here the use of significant impact is limited to the relationship between the activities in the entire economy of the region. If all the activities in the CINMS were prohibited, a benefit-cost analysis would be required.

Table 1.4 Local/Regional Economic Dependence on CINMS: Employment, 1999

County		Commercial Fishing	Consumptive Recreation	Total Consumptive Activities	Nonconsumptive Recreation[1]	All Activities
Monterey		570	0	570	0	570
	%[2]	0.2606	0	0.2606	0	0.2606
San Luis Obispo		5	0	5	0	5
	%	0.0036	0	0.0036	0	0.0036
Santa Barbara		488	62	550	67	617
	%	0.1999	0.0254	0.2252	0.0274	0.2527
Ventura		2,410	579	2,989	110	3,099
	%	0.6167	0.1482	0.7649	0.0281	0.7930
Los Angeles		488	13	501	2	503
	%	0.0091	0.0002	0.0093	0.00004	0.0094
Orange		0	0	0	0	0
	%	0.0000	0	0.0000	0	0.0000
San Diego		94	0	94	0	94
	%	0.0056	0	0.0056	0	0.0056
All Counties		4,056	654	4,710	179	4,889
	%	0.0413	0.0067	0.0479	0.0018	0.0498

1. Nonconsumptive recreation and All Activities are under estimated because no information was available for nonconsumptive recreation using private household boats to access the CINMS.
2. Percents are the percent of the total economy of each county, or for all counties, the percent of regional totals for all seven counties. The percents are all less than one percent or fractions of a percent.

A review of Tables 1.3 and 1.4 will reveal that the inclusion of Orange County may bias our assessment of the significance, since Orange County has a relatively large economy and very little activity in the CINMS impacts Orange County. However, each of the seven counties in the seven-county impact area is not significantly impacted by the activities in the CINMS. The highest impact is in Ventura County, which depends on about eight-tenths of one percent of its employment on activities in the CINMS.

From Tables 1.3 and 1.4, we can conclude that any impacts from marine reserves, which would only impact some fraction of the activities in the CINMS, that the economic impact in any local economy will not be significant. By this we mean to limit this conclusion as to the total incomes, employment and tax revenues in each county. Thus we predict that there will be ***no significant macroeconomic or fiscal impacts from marine reserves in the CINMS.***

As we have demonstrated above, the limitation of activities in the CINMS from marine reserves will not have significant impacts on the local economies. However, that is the limit of our abilities to make judgements about the significance of socioeconomic impacts. We are ***not able to conclude that there would or wouldn't be significant impacts on certain individuals or groups.*** Certainly if you are among those who are impacted it is significant to you. We have no basis for judging significance in this context. All we can do is provide our best estimates of what we think are the extent of potential impacts. We make no judgements as to their significance.

Conclusions about the County Economies. Much of the impacts from activities in the CINMS take place in Ventura and Santa Barbara counties. Appendix A includes a shortened version of a paper we produced in June 2000 entitled "A Socioeconomic Overview of the Santa Barbara and Ventura Counties as it relates to Marine Related Industries and Activities". This report was developed at the beginning of the CINMS management plan revision process. Some of the data has been updated and changed as a result of further research. The original report is still posted in portable document format (downloadable pdf) on the CINMS World Wide Web site (http://www.cinms.noaa.gov/Semembreserves.html).

Appendix A provides much greater detail on the populations and economies of Ventura and Santa Barbara counties. Generally, these areas can be characterized as growing, dynamic and diverse areas with both healthy and diverse economies.

Commercial Fishing Industry and Kelp Harvesting

Here we provide a baseline socioeconomic profile of the commercial fishing industry and kelp harvesting/processing. Figure 3 summarizes the economic impact model used for the commercial fisheries in the CINMS.

Economic Impact Model. The top box in Figure 3 refers to the maps of ex vessel value (revenue received by fishermen) by species/species group. We compiled commercial fishing catch data from 1988 – 1999 by species and California Department of Fish and Game (CDFG) 10-by-10 mile blocks. The definition of blocks most closely approximating the CINMS was comprised of 22 CDFG blocks (see Appendix C for a map showing the blocks used for defining the CINMS). There are many species and from previous reports and our own judgement, we formed 27 species groups. Some such as herring roe, surf perch, grenadiers and octopus that were prominently noted in previous reports did not prove to be very significant. The definitions of the species groups are also included in Appendix C.

Table 1.5 shows the ex vessel value of the commercial fisheries in the CINMS for years 1999 and for the average of years 1996-1999. In 1999, the top 14 species/species groups accounted for 99.7 percent of the commercial landings from the CINMS and for the years 1996-1999, the top 14 accounted for 98.69 percent of the commercial landings from the CINMS. Abalone fishing was halted in 1997, so for the years 1996-1999, the top 14, excluding Abalone accounted for 99.21 percent of the value of commercial landings.

The top 14 species/species groups are included in our analyses for the commercial fisheries along with Kelp. Kelp was treated differently because only one company harvests it, ISP Alginates located in San Diego, California. Harvested value equivalent to ex vessel value was not available. Instead, ISP Alginates supplied us with the processed value of kelp (1996-1999 average of $5,991,367). We constructed a separate economic impact model for kelp with the help of Dale Glantz of ISP Alginates. All the economic impact from kelp takes place in San Diego County where it is landed and processed.

After reviewing the trends in CINMS catch and value from 1988 – 1999, we decided that the average of years 1996-1999 would be the most representative estimate for extrapolating future impacts. The trends in catch, value of catch and prices for CINMS and for the State of California are included in Appendix C. One can see in Table 1.5 that squid is the dominant fishery in the CINMS as well as the State of California. But squid catch is sensitive to El Nino events. In 1998, squid catch plummeted, then rebounded to a record catch in 1999. The 1996-1999 average accounts for this time variability.

Figure 3. Economic Impact Model for Commercial Fisheries in the CINMS

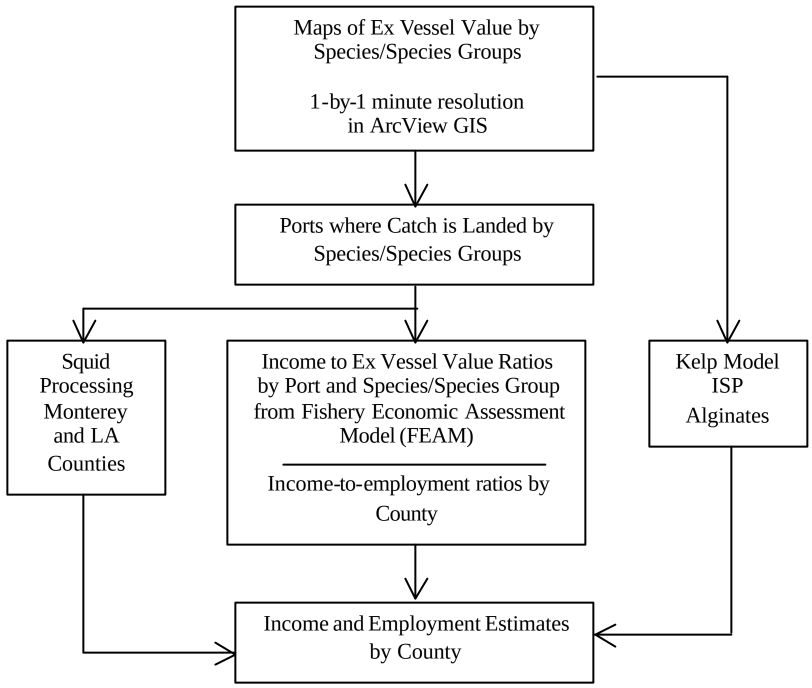


Table 1.5 Commercial Fishing Ex Vessel Value for the CDFG 22 Block Definition of the CINMS

Species/Species Group	1999 Value $	Percent	Avg. 1996-1999 Value $	Percent	Rank 1999	Rank 1996-1999
Squid	26,558,813	72.31	13,046,664	58.21	1	1
Urchins	5,963,876	16.24	5,265,233	23.49	2	2
Spiny Lobster	952,991	2.59	922,098	4.11	3	3
Prawn	743,159	2.02	703,186	3.14	4	4
Rockfishes	549,446	1.50	549,319	2.45	5	5
Anchovy & Sardines [1]	548,944	1.49	234,367	1.05	6	9
Flatfish	324,685	0.88	183,871	0.82	7	10
Crab	313,289	0.85	343,664	1.53	8	6
Sea Cucumbers	267,842	0.73	167,700	0.75	9	12
CA Sheepshead	153,147	0.42	235,928	1.05	10	7
Sculpin&Bass	88,547	0.24	60,327	0.27	11	14
Mackerel [1]	59,921	0.16	67,119	0.30	12	13
Tuna	53,694	0.15	305,665	1.36	13	8
Shark	41,638	0.11	34,751	0.16	14	16
total included in analyses	**36,619,992**	**99.70**	**22,119,892**	**98.69**		
Abalone	47	0.00	178,027	0.79	25	11
Swordfish	21,472	0.06	39,090	0.17	17	15
Roundfish	37,318	0.10	33,262	0.15	15	17
Other	23,728	0.06	22,990	0.10	16	18
Yellowtail	14,832	0.04	6,891	0.03	18	19
Shrimp	1,057	0.00	5,813	0.03	22	20
Mussels and Snails	7,745	0.02	4,694	0.02	19	21
Salmon	1,407	0.00	1,411	0.01	21	22
Rays & Skates	2,283	0.01	1,164	0.01	20	23
Surf Perch	447	0.00	695	0.00	23	24
Grenadiers	0	0.00	211	0.00	26	25
Octopus	169	0.00	196	0.00	24	26
total not included in analyses	**110,505**	**0.30**	**294,444**	**1.31**		
Total All Species [2]	**36,730,497**	**100.00**	**22,414,336**	**100.00**		
Total, excluding Abalone	**36,730,450**	**99.99987**	**22,236,309**	**99.21**		

1. Anchovy & Sardine and Mackerel are combined in the Wetfish map.
2. Kelp is not included here because it is measured differently. The 1996-1999 average for Kelp used in our analysis is $5,991,367 and represents the processed value of kelp from ISP Alginates.

For the top 14 species/species groups included in our analyses, we hired two contractors, Dr. Craig Barilotti and Dr. Caroline Pomeroy, to gather socioeconomic data on the fishermen who fish in the CINMS and their distribution of catch at the 1-by-1 nautical mile unit of resolution within the boundaries of the CINMS. We use the control totals from CDFG and PacFIN trip ticket information for total catch. The report detailing our data collection and estimation methods is included here as Appendix B. The ex vessel value landing data is organized in a geographic information system called ArcView. We built an economic model using the spreadsheet software Microsoft Excel.

The commercial fishery economic impact model translates ex vessel value of landings into total income and employment impacts on the local economies. This is done by first using the distributions of catch by species/species group from the CINMS and port where landed (see Appendix C for the port/species distributions). Then multipliers are used that translate ex vessel value of landings by species/species groups at a given port to total income generated in the local county economy where the port where the catch was landed is located. These multipliers were obtained from the Fishery Economic Assessment Model (FEAM). Two economists under contract to the Pacific Fishery Management Council developed FEAM. FEAM is based on Input-Output models detailing inter-industry relationships. FEAM was designed for regional economic analysis and processing of the landings are assumed to take place within the county where the port is located. The assumption is that for regional analysis the cross-county effects cancel each other out.

For squid, the socioeconomic panel decided that the squid processing had effects large enough to warrant special treatment. Multipliers from FEAM were adjusted downwards for ports where squid was sent to another county for processing. The 1996-1999 average distributions for processing squid from port to county of processing were used. Generally, multipliers were reduced by 1.5 (if multiplier was 4.5 it was reduced to 3.0) at the port where landed and thus the impact in the county where landed and increased by 1.5 in the county where processed. Monterey and Los Angeles counties were the primary places for processing squid. Squid accounts for the relatively large income impacts estimated for Monterey and Los Angeles counties even though very little squid is landed in Monterey County.

The income-to-ex vessel value multipliers from FEAM are not the standard economic multipliers one sees in most local and regional economic analysis. However, the multipliers are derived from the standard economic multipliers in the input-output models for each county. FEAM was used to estimate the income generated from ex vessel value reported at each port for each species/species group. We took the average of the income-to-ex vessel value for years 1994-1998 and applied these multipliers to the ex vessel value from the CINMS at each port. Table 1.6 provides the Ventura County Port multipliers as an example. Full details are available from the authors upon request.

Table 1.6 Income-to-Ex Vessel Value Multipliers: Ventura Harbor

Species/Species Groups	Income-to-Ex Vessel Multipliers
Squid [1]	3.2
Urchins	2.1
Spiny Lobsters	2.0
Rockfishes	1.6
Prawn	2.0
Crab	2.8
Wetfish	1.6
CA Sheepshead	1.6
Flatfish	1.6
Sculpin & Bass	1.6
Tuna	1.7
Shark	2.3

1. For squid, 24.45 percent was trucked to Monterey County for Processing and 64.98 percent was trucked to Los Angeles County for processing. The remaining 10.57 percent was Processed in Ventura County. The multiplier for squid is adjusted downwards by 1.5 to account for processing in Monterey and Los Angeles counties.

Employment impacts are estimated by dividing the total income estimated in each county by the ratio of total income to employment in each county. Total income and total employment impacts fully account for all the multiplier impacts. Because of the FEAM assumptions about processing, the results are more reliable at the total region level.

Baseline 1996-1999 Economic Impacts. Table 1.7 summarizes the baseline 1996-1999 annual averages for total income and employment generated from commercial fishing and kelp from the CINMS. It is especially important to note the differences in Table 1.7 from those presented earlier in Table 1.3. As with the average ex vessel value of landings, the annual average total income and employment impacts for years 1996-1999 are much smaller than the impacts for 1999. Again, most of the difference is explained by the record year for squid in 1999. The 1996-1999 average adjusts for the 1997-1998 El Nino (bust year) and the 1999 record year. All Step 1 analyses of alternatives presented in Chapter 2 are based on the 1996-1999 annual averages. Percents of a user group ex vessel revenue or total income and employment impacted are percents of these 1996-1999 baselines.

Table 1.7 Economic Impact of Commercial Fishing and Kelp Harvesting: Baseline Annual Average 1996-1999

County	Total Income	Employment
Monterey	$9,488,934	280
San Luis Obispo	$113,547	4
Santa Barbara	$13,352,514	433
Ventura	$40,397,319	1,229
Los Angeles	$10,043,552	266
Orange	$583	0
San Diego	$9,517,101	93
All Counties	$82,913,552	2,307

Socioeconomic Profiles of Fishermen. Two separate samples of fishermen were surveyed (details are included in Appendix B). The first sample is sometimes referred to as the Pomeroy Sample and includes fishermen in the squid/wetfish fishery. The second sample is sometimes referred to as the Barilotti Sample and includes fishermen in all other fisheries, except squid and wetfish. It is important to note that both samples can be characterized as being involved in multi-species fisheries. Tables 1.8, 1.9 and 1.10 provide socioeconomic profiles for both samples of fishermen and demonstrate that each sample depends on multiple species. Often the multiple species dependence is seasonal and important in supplying income flows over the course of a year. Small percents of dependence on a particular species/species group may involve a week or a month of income at a time when the opportunity to catch the main species/species groups fished are not available and participation in other fisheries are the only source of income. In our Step 1 analyses in Chapter 2, we take this kind of dependence into account. Here we provide a baseline profile of fishermen of the CINMS and compare them with some profiles of fishermen obtained from a study of Tri-County fishermen (e.g., Santa Barbara, Ventura and San Luis Obispo counties).

Table 1.8 Commercial Fishing: Multi-Species Fishery, Barilotti Sample

	N	Mean	Range
Number of Species/Species Groups Caught in CINMS	56	2.59	1 - 13
	Number	Percent	Cumulative Percent
	1	48.2	48.2
	2	25.0	73.2
	3 - 4	12.5	85.7
	5	5.4	91.1
	GT 5	8.9	100.0
Number of Species/Species Groups Caught Anywhere	N	Mean	Range
	58	3.41	1 - 14
	Number	Percent	Cumulative Percent
	1	39.7	39.7
	2	22.4	62.1
	3 - 4	12.0	74.1
	5	6.9	81.0
	GT 5	19.0	100.0

Table 1.9 Socioeconomic Profiles: Commercial Fishermen, Barilotti Sample

	N	Mean	Range
EXPERIENCE			
Years Commercial Fishing	58	20.16	8 - 32
Years Fishing IN CINMS	57	19.11	4 - 32
AGE	58	44.83	30 - 64
EDUCATION			
Years of Schooling	57	12.89	0 - 17
DEPENDENCY ON FISHING			
Percent of 1999 Income from Fishing	57	90.02	10 - 100
Percent of 1999 Household Income from Fishing	57	83.49	10 - 100
Percent of Fishing Outside CINMS	55	17.71	0 - 97
Percent of 1999 Fishing Revenue from CINMS			
Urchin	40	73.76	0 - 100
Spiny Lobster	10	58.39	0 - 100
Sea Cucumbers	13	71.88	0 - 100
Rockfish	17	20.42	0 - 100
Crab	17	35.85	0 - 100
Flatfish	11	10.47	0 - 52.16
CA Sheepshead	16	49.27	0 - 100
Sculpin & Bass	6	10.02	0 - 37.74
Shark	8	4.72	0 - 18.93
Other (those not listed above)	17	52.92	0 - 100
All Species/Species Groups	**57**	**71.46**	**2.8 - 100**
PEOPLE DIRECTLY EMPLOYED AND FAMILY MEMBERS SUPPORTED			
Number of Crew	55	1.36	0 - 11
Number of Crew with Skipper's Licenses	55	1.29	0 - 11
Number of Family Members Supported by Captains/Owners, not including self	58	2.1	0 - 5
OWNERSHIP/INVESTMENT			
Boat Ownership (Percent Yes)	88.3		
Replacement Value of Boat	57	120,930	0 - 1,400,000
Replacement Value of Electronic Equipment	53	11,126	0 - 90,000
Replacement Value of Fishing/Diving Gear	54	16,231	1,000 - 110,000
Replacement Value Boat, including Equipment and Gear	50	128,104	1,500 - 660,000

Table 1.9 (continued)

RESIDENCE/MAIN LANDING PORT	Percent
State	
California	100
City	
Arroyo Grande	1.8
Atascadero	3.5
Carpenteria	5.3
Goleta	3.5
La Conchita	1.8
Morro Bay	1.8
Newbury Park	1.8
Ojai	1.8
Oxnard	7.0
Oak View	1.8
San Pedro	1.8
Santa Barbara	52.6
Simi Valley	1.8
Tarzana	1.8
Ventura	12.3
Main Landing Port	
Channel Islands Harbor	13.8
Santa Barbara	63.8
San Pedro	1.7
Ventura Harbor	15.5
Multiple	5.1

The commercial fishermen other than squid/wetfish or the Barilotti Sample included 59 fishermen. The squid/wetfish or Pomeroy Sample included 29 purse seine boat's skippers and 8 light boat's skippers. Profiles of purse seine boat's skippers and light boat's skippers are presented separately. Not every fisherman supplied complete information so sample size (N) or the number responding to each item is reported in Tables 1.8, 1.9 and 1.10. Measurements included: 1) Experience (Years of Commercial Fishing and Years Commercial Fishing in the CINMS and Age of the fisherman interviewed), 2) Education (Years of Schooling of the fisherman interviewed), 3) Dependency on Fishing (Percent of Income from Fishing, Percent of Fishing Revenue from CINMS and Number of Crew and Family Members Supported by directly by the fishing operation), 4) Ownership/Investment (Boat Ownership and Replacement Value of Boats and Equipment), 5) Residence (State and City) and 6) Ports Used (Home Port, Main tie-up Port, and Main Landing Port). More detail was available from the squid/wetfish fishermen (Pomeroy Sample) than the other commercial fishermen (Barilotti Sample).

Although our samples of commercial fishermen accounted for 79 percent of the total ex vessel of catch from the CINMS, they represent only 13 percent of the total number of fishermen reporting catch in the CINMS. In 1999, there were 737 fishing operations reporting some catch from the CINMS. Nineteen (19) percent accounted for 82 percent of the total ex vessel value, with each of these operations receiving at least $50,000 per year in ex vessel value (141 operations). Almost 64 percent of fishing operations (469) received less than $20,000 per year and accounted for only about 6 percent of total ex vessel value from the CINMS, and 23 percent (170 operations) earned less than $1,000, which was 0.20 percent of the total ex vessel value from the CINMS (see Appendix C for details). For analyzing catch distributions, we believe the information is highly reliable. We do not think, however, that the profiles of the sample fishermen are "representative" samples of the commercial fishing population and our profiles information cannot be extrapolated to population totals. Our sample does provide a broad range of types of fishermen (who happen to catch most of the fish) and can be used for assessing adverse impacts and difficulties of adapting to change[2].

Table 1.10 Socioeconomic Profiles: Squid/Wetfish Fishermen, Pomeroy Sample

	Purse Seine Boats		Light Boats	
EXPERIENCE	Mean	Range	Mean	Range
Years Commercial Fishing	26.28	9 - 56	19.12	8 - 28
Years Fishing in CINMS	17.00	4 - 45	13.62	6 - 27
AGE	44.18	29 - 61	37.00	26 - 44
EDUCATION				
Years of Schooling	11.78	0 - 16	12.56	10 - 15.5
DEPENDENCY ON FISHING				
Percent of 1999 Income				
From CINMS Squid	70.34	32 - 100	86.90	65 - 100
From Other CINMS Fisheries	3.88	0 - 25	6.62	0 - 25
From Fisheries Outside CINMS	23.33	0 - 60	5.84	0 - 27
From Non Fishing Work	0.38	0 - 10	0.00	0
From Investments	2.07	0 - 17	0.63	0 - 5
Percent of Average Annual 1996-99 Fishing Revenue1				
Squid fishing in CINMS/All Squid Fishing	71.07	25.39 - 98.47	14.63	0.96 - 44.44
Wetfish in CINMS/All Wetfish Fishing	22.10	0 - 100	3.77	0 - 15.08
Tuna in CINMS/All Tuna Fishing	3.79	0 - 100	14.59	0 - 25.73
Other Finfish in CINMS/All Other Finfishing	6.90	0 - 100	38.67	0 - 70.72
Shellfish in CINMS/All Shellfishing	3.45	0 - 100	41.97	0 - 100
All CINMS Fishing/All Fishing	60.93	11.95 - 94.60	13.71	5.20 - 22.29
People Directly Employed and Family Members Supported				
Number of Crew on Main Vessel	5.00	3 - 9	0.875	0 - 2
Number of Relief Skippers	0.31	0 - 1	0.375	0 - 1
Number of Captain/Owners Family Members, including self	3.64	1 - 6	2.75	1 - 5
Number of Family Members Supported by Crew, including crew	18.54	3 - 54	2.375	0 - 8
Total Supported, except Relief Skipper Family	22.12	5 - 59	5.5	2 - 12
OWNERSHIP/INVESTMENT				
Boat Ownership	***Percent***			
Sole Owner	27.6		25.0	
Owns with Other Family Member	44.8		12.5	
Owns with Partner	13.8		50.0	
Market owns	3.4		0.0	
Other owns	10.3		12.5	
	Mean	Range	Mean	Range
Length of Ownership	19.04	4 - 37	11.19	0 - 23
Number of Boats Owned	0.86	0 - 3	0.88	0 - 3
Replacement Value of Main Boat, including all equipment	$778.793	75.000 - 2.000.000	$210.000	70.000 - 485.000
Replacement Value of All boats, including all equipment	$917,931	275,000 - 2,800,000	$272,500	120,000 - 600,000
RESIDENCE/HOME PORT/MAIN LANDING PORT	Percent		Percent	
Residence				
State				
California	93.1		100	
Washington	6.9		0	

Tri-County Fishermen. The socioeconomic panel obtained summary tables of information from a study done by Utah State University researchers (Ron Little and Joanna Endter-Wada) under contract to the U.S. Department of the Interior, Minerals Management Service. The Tri-county area includes San Luis Obispo, Santa Barbara, and Ventura counties. In 1996, the Utah State University researchers conducted a survey of 248 commercial fishermen who live in the Tri-County area. 95 of their 248 fishermen fished in the CINMS. 60 of the 96 fishermen in our samples lived in the Tri-county area. Very few of the squid/wetfish fishermen from our samples lived in the Tri-County area. A comparative profile was constructed comparing some common measurements taken in our two studies (Table 1.11).

Table 1.11 Comparative Profiles: Tri-County Fishermen [1]

	All Tri-County Fishermen [2]	Tri-County Fishermen that Fish in CINMS	Tri-County Fishermen NOAA Samples [3]
EXPERIENCE			
Years Commercial Fishing	Percent	Percent	Percent
1 to 10	26.1	27.4	6.3
11 to 20	32.2	39.0	36.1
21 to 30	29.8	26.3	41.3
31 to 40	6.2	6.3	6.3
Greater than 40	5.7	1.0	0.0
N	245	95	63
Mean	N/A	17.53	20.75
AGE	Percent	Percent	Percent
25 to 29	3.0	5.4	0.0
30 to 39	27.2	36.9	25.0
40 to 49	37.5	36.9	43.8
50 to 59	20.4	15.3	29.6
60 to 69	7.3	3.3	1.6
Greater than 69	4.8	2.2	0.0
N	235	92	60
Mean	N/A	42.98	45.28
EDUCATION			
Years of Schooling	Percent	Percent	Percent
Less than 12	8.1	7.6	12.7
12	24.6	21.7	30.2
Greater than 12	67.3	70.7	57.1
N	236	92	63
DEPENDENCY ON FISHING			
Percent of Income from Fishing	Percent	Percent	Percent
0 to 19	19.5	10.8	0.0
10 to 29	12.2	8.7	1.6
30 to 49	6.1	5.4	4.8
50 to 69	11.3	15.1	6.4
70 to 89	12.6	12.9	8.0
90 to 99	10.8	12.9	9.6
100	27.7	34.3	69.8
N	231	93	63

Table 1.11 (continued)

Number of Crew	All Tri-County Fishermen [2] Percent	Tri-County Fishermen that Fish in CINMS Percent	Tri-County Fishermen NOAA Samples [3] Percent
0	20.8	12.2	13.1
1	43.3	42.2	55.7
2	27.3	35.6	16.4
3 to 4	7.8	8.9	13.2
5 to 6	0.8	1.1	0
Greater than 6	0	0	1.6
N	231	90	61
Mean	N/A	1.48	1.52
BOAT OWNERSHIP	Percent	Percent	Percent
Owner	95.7	95.7	84.3
Non Owner	4.3	4.3	15.7
N	237	93	57
RESIDENCE/HOME PORT			
County of Residence	Percent	Percent	Percent
Ventura	27.7	47.3	39.1
Santa Barbara	32.8	44.8	54.7
San Luis Obispo	39.5	8.8	6.3
N	238	91	64
Home Port	Percent	Percent	Percent
Port Hueneme	2.5	2.2	7.8
Channel Islands/Oxnard	16.9	29.3	15.6
Ventura Harbor	9.1	16.3	14.1
Santa Barbara	30.9	48.9	57.8
Port San Luis/Avila Beach	15.6	1.1	0
Morro Bay	23	2.2	0
Other	2	0	4.7
N	243	92	64

1. Tri-County area is San Luis Obispo, Santa Barbara and Ventura Counties.
2. All Tri-County Fishermen and Tri-County Fishermen that Fish in CINMS are from a study funded by the U.S. Dept. of Interior, Minerals Management Service to Utah State University researchers Ron Little and Joanna Endter-Wada.
3. NOAA Samples are the ones derived from contracts with Dr. Craig Barilotti and Dr. Caroline Pomeroy.

No difference was found between the two studies samples for Experience, Age, or Number of Crew. Our samples had lower levels of education, a lower percentage of boat ownership, a higher proportion of our samples lived in Santa Barbara and also reported Santa Barbara as their Home Port, and our sample was more dependent on fishing for their income.

Consumer's Surplus. In the section above that discussed the benefits and costs to each user group, we discussed the possibility of there being losses to consumers if the supply of commercial seafood products were reduced enough to have impacts on prices to consumers or a gain to consumers, if marine reserves resulted in increased supplies and lower prices to consumers. To estimate consumer's surplus requires access to econometric demand and supply models for each of the fisheries. We were not able to find any such research for California seafood products, except urchins (see Reynolds 1994). One problem with the

Reynolds paper was that all the information required to utilize the model was not included in the report. Therefore, we are not able to provide estimates of impacts on consumers from possible price changes.

Although we cannot estimate consumer's surplus, we can assess whether the amount of supply from the CINMS is a significant portion of total supply and therefore whether reductions in the supply might effect prices. Table 1.12 summarizes CINMS landings, U.S. landings, and U.S. Supply and the proportions of CINMS supply relative to that of the U.S., for eight of the species/species groups. The information is from the National Marine Fisheries Service for 1999. It appears that squid and urchins are the only species/species groups for which significant proportions of U.S. landings come from the CINMS. Eliminating the total catch from the CINMS might have impact on prices. However, squid and urchins are primarily sold in foreign markets, therefore the world supply is probably more relevant for determining whether supply from the CINMS would have price effects. The United Nations, Food and Agricultural Organization (FAO) reports a 1999 world commercial catch of squid of 3,373,463 metric tons or 7,438.486 million pounds. CINMS landings were only 2.15 percent of world supply and 1999 was a record year for squid in the CINMS. FAO also reports the 1999 world commercial catch of urchins of 118,750 metric tons or 261.844 million pounds. CINMS landings were 2.24 percent of world supply. Given the small proportions of world supply accounted for by CINMS squid and urchin catches, any changes in supply from marine reserves would not be expected to change prices to consumers and thus there are no likely impacts on consumer's surplus.

Table 1.12 Relative Supply of Selected CINMS Commercial Species, 1999

	Landings		Landings		Landings		Supply	
	CINMS	CINMS	U.S.	U.S.	CINMS/U.S.	CINMS/U.S.	U.S.	CINMS/U.S.
	1999	1999	1999	1999	1999	1999	1999	1999
Species/Species Group	(Millions lbs)	(Millions $)	(Millions lbs)	(Millions $)	% of lbs	% of $	(Millions lbs)	% of lbs
Squid	159.564	26.545	258.198	71.172	61.80	37.30	N/A	N/A
Urchins	5.855	5.969	33.55	35.647	17.45	16.74	N/A	N/A
Spiny Lobster	0.121	0.951	6.692	29.754	1.81	3.20	90.586	0.13
Prawn & Shrimp	0.178	0.726	304.173	560.501	0.06	0.13	1,083.60	0.01
Crab	0.247	0.313	458.307	521.237	0.05	0.06	N/A	N/A
Rockfishes	0.192	0.553	60.223	30.436	0.32	1.82	N/A	N/A
Flatfishes	0.121	0.324	411.548	214.642	0.03	0.15	N/A	N/A
Tuna	0.168	0.054	58.12	86.254	0.29	0.06	N/A	N/A

Sources: Current Fishery Statistics No. 2000, Fisheries of the United States, 2000. National Marine Fisheries Service and California Department of Fish and Game, Marine Fisheries Statistical Unit.

Economic Rent. Another measured listed as a possible benefit or cost was economic rent. To estimate economic rents requires detailed information on the costs and returns and investment by fishermen. Although both contractors sought to obtain this information, many fishermen were reluctant to reveal their full costs and earnings. This prevents us from evaluating the existence or extent of impact on economic rents.

In open access fisheries, economic rents are generally predicted to be dissipated by new entrants into the fishery (Smith, 1968)[3]. Entry stops when average cost per unit of catch equals the price per unit of catch and economic rents are eliminated (i.e., every fisherman is earning a normal return on investment). Some economists have noted certain conditions under which economic rents could exist even under open access conditions. Economic rents could exist if they were many fishermen but only one buyer (Worcester, 1969). The buyer would have monopoly power and could limit the amount of catch purchased from fishermen and claim all the economic rents. Under this condition, the fishermen are not earning economic rents, instead the buyer due to his monopoly position is able to capture all the economic rents. Another possibility is that certain contractual arrangements between buyers and fishermen could lead to them gaining some monopoly power. In the squid fishery, there might be relationships between light boats, purse seine boats and buyers such that they are able to gain some monopoly power (Pomeroy and Fitzsimmons 2001). The result may be what economists have called "inframarginal" rents (Johnson and Libecap, 1982). These are above normal returns to a few fishermen, who have these special relationships, which are not generally available to new entrants. These types of rents don't get dissipated with new entrants.

Lutz and Pendleton (2001) and Pendleton, Cai and Lutz (2001) have conducted studies of the San Pedro squid/wetfish fleet. Part of this fleet fish in the CINMS. The researchers were able to get more complete costs and earnings and investment information than we were able to get from the Pomeroy and Barilotti samples. The more complete information supported an assessment of economic rents in this fishery. Generally, the San Pedro squid/wetfish fleet seemed to be earning less than even normal returns to investment. The authors concluded that although there may not be sufficient evidence of biological overfishing for squid, there is some evidence of economic overfishing. This is a condition under which we might expect some exit from the industry[4].

All of the commercial fisheries in the CINMS can currently be characterized as open access fisheries. The squid/wetfish fishery is currently considering implementing a limited entry program in the current draft management plan. However, we have not seen any analysis of whether the limits would lead to economic rents in the fishery. We are not able to make any estimates of the impacts of marine reserves on economic rents.

Ethnographic Data Survey. At the beginning of the CINMS five-year management plan revision process, the CINMS conducted an ethnographic data survey (Kronman et al, 2000). Fifteen professional fishermen were interviewed about their opinions on the current status of various species and habitats, whether the status of the species and habitats have changed, environmental cycles observed, changes in climate, changes in equipment used for fishing, changes in regulations and when and/or if they affected their operations, changes in domestic and/or export markets for their products or changes in distributions of boats and fisheries and when and/or if these changes affected their operations.

The ethnographic information was used in developing some of our catch distributions (see Appendix B). We also expect to utilize some of the information in our Step 2 analyses.

Recreation Industry

Here we provide the baseline economic measures for the recreation industry. Recreation is divided into consumptive activities and nonconsumptive activities. Consumptive recreation includes recreational fishing from a charter/party boat, fishing from a private household/rental boat, consumptive diving from a charter/party boat and consumptive diving from a private household/rental boat. Nonconsumptive recreation includes nonconsumptive diving, whale watching, sailing and kayaking/sightseeing from for hire or charter/party boats. We were not able to find any information on nonconsumptive activities from private household/rental boats, so ***nonconsumptive uses are undercounted***. As mentioned in the section on benefits and costs, the consumptive recreation users potentially are both sufferers of costs and well as beneficiaries of marine reserves under various conditions. Nonconsumptive recreationists are potential beneficiaries of marine reserves. Because nonconsumptive users accessing CINMS from private household/rental boats are not counted, nonconsumptive benefits of marine reserves are underestimated. 1999 is the baseline year used for extrapolating future impacts.

In our previous assessment of recreational fishing (Leeworthy and Wiley, 2000), we had summarized information available for years 1993 to 1998 from the National Marine Fisheries Service, Marine Fishing Statistics Survey (MRFSS). MRFSS data was showing a downward trend in fishing trips and catch for Southern California over this period. Total trips had declined 26.4 percent. For the top 20 species, in terms of total number of fish caught, 10 had downward trends, 7 had no trend and 3 had upward trends. These trends were contrasted with the trends between 1991 and 1996, for all of California, based on the U.S. Fish and Wildlife Survey of Fishing, Hunting and Wildlife Associated Recreation (USFWS, 1991 and 1996). This latter survey showed a slight decrease in the number of recreational anglers (-0.76 percent), but an increase in the number of angler days (27.88 percent). Although the definitions of the populations covered are different between the surveys, we were not able to reconcile the differences in trends because the MRFSS Northern California data also showed a downward trend.

Table 1.13 Number of Marine Recreational Fishing Trips in Southern California: 1993 - 2000 (thousands)

Year	Total	Private/ Rental Boat	Charter/ Party Boat	Shore
1993	4,037	1,625	1,174	1,238
1994	4,749	1,932	1,201	1,616
1995	4,301	1,701	1,129	1,471
1996	3,768	1,478	889	1,401
1997	3,232	1,275	788	1,169
1998	2,973	1,325	674	974
1999	2,437	1,019	617	801
2000	3,782	1,755	956	1,071
Percent Change 1993 - 1999				
	-39.6	-37.3	-47.4	-35.3
Percent Change 1993 - 2000				
	-6.3	8.0	-18.6	-13.5

Source: National Marine Fisheries Service, Marine Recreational Fisheries Statistics Survey (MRFSS) (http://www.st.nmfs.gov/st1)

In reviewing the list of the top 20 recreational species from our original table, we have noted that many species mentioned in major saltwater fishing magazines over the past couple of years were missing from the list of top 20 species. In addition, some information from the ethnographic data survey (Kronman et al, 2000) about the gill net restrictions and their impacts on certain species led us to investigate whether what we were reading about would show up in the MRFSS updated information. We were able to update the MRFSS information for 1999 and 2000 (Table 1.14). In 1999, trips continued on their downward trend, but the top 20 species for catch were starting to reveal some of the changes we had read about. Species like California Halibut, White Seabass, Pacific Barracuda and Yellowtail, which were not among the top 20 species between 1993 and 1998, were now moving up into the top 20 (Yellowtail actually ranked 21). In 2000, the number of trips ended the downward trend in total trips and across all boat modes and total catch increased as well. The number of trips increased dramatically between 1999 and 2000 (55.19%). The number of trips rebounded to almost their 1996 level. Overall, the trend in trips is still down from the 1993 level (-6.3%).

The top 20 species also changed fairly dramatically (Table 1.15). In 1999 and 2000, all the rockfish species previously among the top 20 between 1993 and 1998 dropped out of the top 20, except Vermillion Rockfish and Bocaccio. Vermillion Rockfish were ranked 13th in 1999 and 17th in 2000 and Bocaccio was ranked number 19 in 1999 and 21 in 2000. Species ranked number 11 to 20 in 1993 were all out of the top 20 in 2000, even though only three of theses species showed downward trends in catch between 1993 and 1998.

Table 1.14 Summary of Trends in Marine Recreational Catch in Southern California: 1993 - 1998

Ranking 1993	Ranking 1998	Species	Number	Mean Length
1	1	Chub Mackerel	down	no trend
2	2	Kelp Bass	down	no trend
3	3	Barred Sand Bass	down	no trend
4	5	White Croaker	down	no trend
5	6	Pacific Bonito	down	up
6	4	Barred Surf Perch	up	up
7	7	Vermillion Rockfish	down	no trend
8	13	Bocaccio	down	no trend
9	8	Pacific Sanddab	no trend	no trend
10	9	California Sheepshead	no trend	no trend
11	18	Chilipepper Rockfish	down	no trend
12	11	Copper Rockfish	no trend	no trend
13	10	Yellowfin Tuna	no trend	down
14	15	Lingcod	no trend	up
15	14	Dolphin	no trend	up
16	17	Brown Rockfish	down	no trend
17	16	Gopher Rockfish	up	no trend
18	12	Blue Rockfish	no trend	no trend
19	20	Canary Rockfish	down	up
20	19	Yellowtail Rockfish	up	up

Source: National Marine Fisheries Service, Marine Recreational Fisheries Statistics Survey (MRFSS) (http://www.st.nmfs.gov/st1)

Table 1.15 Changes in Top 20 Species in Marine Recreational Catch in Southern California, 2000

Ranking 1999	Ranking 2000	Species
2	1	Barred Sand Bass
4	2	Kelp Bass
1	3	Chub Mackerel
5	4	**California Halibut** [1]
3	5	**Pacific Barracuda**
6	6	White Croaker
12	7	**Spotted Sand Bass**
15	8	Pacific Sanddab
7	9	**California Scorpionfish**
10	10	**Ocean Whitefish**
8	11	California Lizardfish
21	12	**Yellowtail**
17	13	**White Sea Bass**
16	14	**Jacksmelt**
14	15	**Queenfish**
-	16	Pacific Bonito
13	17	Vermillion Rockfish
-	18	Yellowfin Tuna
-	19	**Shovelnose Guitarfish**
18	20	California Sheepshead

1. Species in bold were not among the top 20 1993 through 1998.
Source: National Marine Fisheries Service, Marine Recreational Fisheries Statistics Survey (MRFSS) (http://www.st.nmfs.gov/st1)

The confusing trends present a problem in choosing a baseline for extrapolating about future possible impacts. If the downward trends continue, then using the 1999 baseline estimates would overstate future impacts. If the trends were to start on an increasing path, then using the 1999 baseline estimates would understate impacts. One year of information is not enough to declare a reversal of trends, so we believe our use of baseline 1999 for extrapolating about future impacts is the most reasonable choice.

Economic Impact and Valuation Model. Figure 4 illustrates the overall steps of the economic impact and valuation model for the recreation industry in the CINMS. The model starts with the estimates of person-days of activity for each of the consumptive and nonconsumptive creation activities for year 1999. The person-days are mapped in 1-by-1 minute grid cells for the area within the CINMS. The mapped data is in a geographic information system using ArcView. All the maps are included in Appendix C. All data collection and estimation methods are described in Appendix B. The economic impact and valuation model is a set of linked spreadsheets using the software Microsoft Excel Version 97.

> **Definition**: ***Person-day***: is one person undertaking an activity for any part of a day or a whole day.

In 1999, we estimated 437,908 total person-days of consumptive recreation in the CINMS (Table 1.16). Fishing from a private household boat was the top activity with over 214 thousand person-days (49% of the consumptive recreation activity) followed by about 159 thousand person-days of fishing from charter/party boats (36% of the consumptive recreation activity). Consumptive diving accounted for the remaining 15 percent of consumptive recreation activity. In 1999, 21 percent of the private household boat fishing and about 26 percent of the charter/party boat fishing in Southern California was done in the CINMS.

In 1999, we estimated 42,008 person-days of nonconsumptive recreation from "for hire" operations in the CINMS. As mentioned above, we were not able to estimate the amount of nonconsumptive recreation activity from private household boats. Whale Watching was the top nonconsumptive recreational activity with about 26 thousand person-days (62% of all nonconsumptive recreation activity) followed by nonconsumptive diving with almost 11 thousand person-days (26% of all nonconsumptive recreation activity). Sailing and Kayaking/Island Sightseeing accounted for the remaining 13 percent of nonconsumptive recreation activity.

Figure 4. Economic Impact Model and Valuation Model for the Recreation Industry in the CINMS

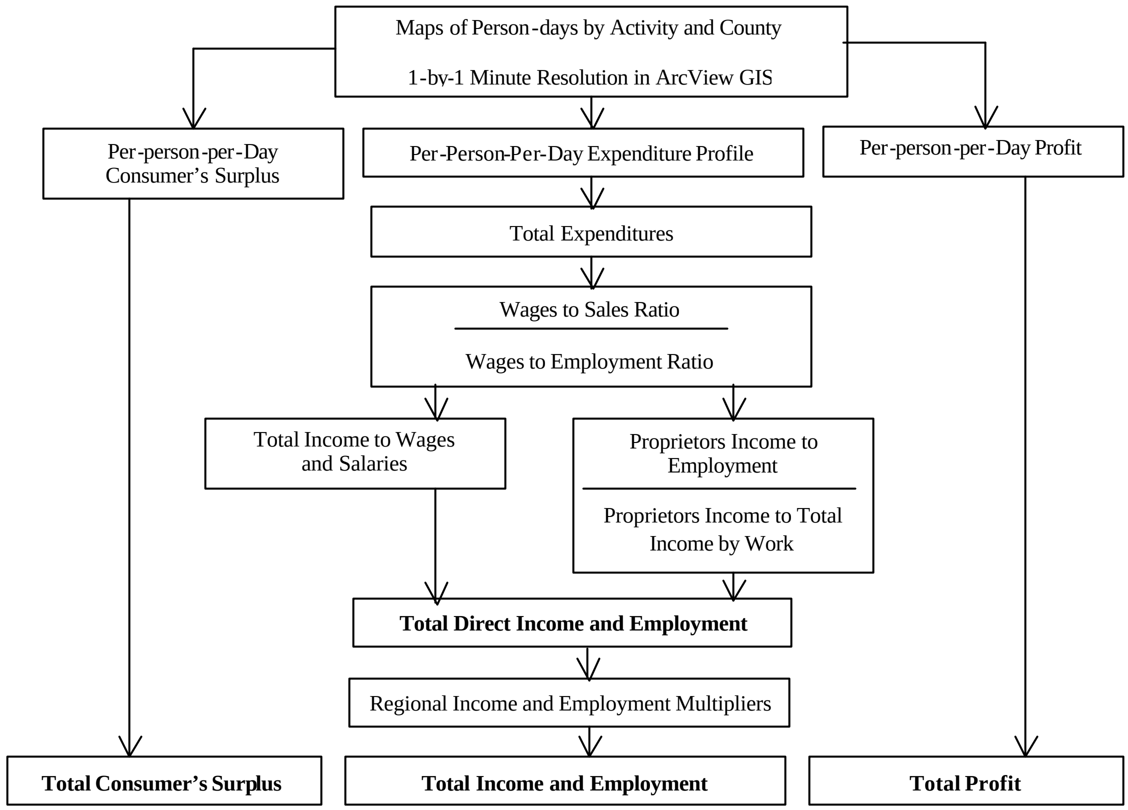


Table 1.16 Person-days of Recreation Activity in the CINMS, 1999

	Person-days (number)	Person-days (percent)
Consumptive Activities		
Charter/Party Boat Fishing	158,768	36%
Charter/Party Boat Consumptive Diving	17,935	4%
Private Boat Fishing	214,015	49%
Private Boat Consumptive Diving	47,190	11%
Total Consumptive	**437,908**	**100%**
Non-consumptive Activities		
Whale Watching	25,984	62%
Non-consumptive Diving	10,776	26%
Sailing	4,015	10%
Kayaking/Island Sightseeing	1,233	3%
Total Non-consumptive	**42,008**	**100%**

In 1999, the recreation industry included a total of 479,916 person-days of consumptive and nonconsumptive recreation. Consump tive recreation was 91.25 percent of all recreation activity in the CINMS. The "for hire" industry (51 charter/party boat/guide operations) accounted for almost 46 percent of all the person-days of recreation activity. This is important because the estimates of use from this industry were based on a census, not a sample, of all operators who operate in the CINMS (see Appendix B). Table 1.17 shows the total number of operators, person-days, revenues, costs and profits for this industry from activities in the CINMS. It is important to note that adding up the number of operators across activities would add to more than 51 because some operators provide services for multiple activities.

Table 1.17 Charter/Party Operations in the CINMS, 1999

	Number of Operators[1]	Total Person-days	Total Revenue	Total Cost	Total Profit
Consumptive Activities					
Charter/Party Boat Fishing	18	158,768	$ 7,692,525	$ 7,316,229	$ 376,296
Charter/Party Boat Consumptive Diving	10	17,935	$ 1,089,839	$ 1,045,835	$ 44,004
Total Consumptive	**25**	**176,703**	**$ 8,782,364**	**$ 8,362,064**	**$ 420,300**
Non-consumptive Activities					
Whale Watching	8	25,984	$ 1,508,049	$ 1,498,828	$ 9,221
Non-consumptive Diving	7	10,776	$ 687,585	$ 641,272	$ 46,313
Sailing	8	4,015	$ 264,700	$ 246,618	$ 18,082
Kayaking/Island Sightseeing	4	1,233	$ 125,558	$ 116,337	$ 9,221
Total Non-consumptive	**26**	**42,008**	**$ 2,585,892**	**$ 2,503,055**	**$ 82,837**

1. The totals do not equal the sums of the individual activities because operators have customers who participate in more than one activity.

Expenditure Profiles. The next step in the economic impact model was the development of expenditure profiles for each recreation activity. During the MRWG process, we reviewed the literature and most of the studies we found were related to fishing in Southern California with one study for all of California party boat fishing (NMFS, 1980; Wegge, Hanemann and Strand, 1983; Rowe, Morey, and Ross, 1985; Hanemann, Wegge and Strand, 1991; and Thompson and Crooke, 1991). For consumptive diving and the non-consumptive activities, we supplemented this information with a visitor's study for Santa Barbara County (Santa Barbara County Conference & Visitors Bureau and Film Commission, 1999) for lodging and food and beverage expenditures, and a study on diving in Northwest, Florida for some dive related costs (Bell, Bonn and Leeworthy, 1998). Also, from the charter/party operations (Table 1.17), we derived the boat fee per person-day by county. From all this information we constructed expenditure profiles for these activities. Because we relied on mostly regional studies, the expenditure profiles do not differ by county except for the charter/party boat fees category.

The expenditure profiles used for charter/party boat and private boat fishing were taken from Gentner, Price and Steinback (2001). At the time we started the MRWG process in 1999, this expenditure report was not yet available. We knew the study was underway but were not aware the estimates were available to apply to the current six alternatives analyzed in this report. During the review process, we obtained the revised expenditure profile and re-ran the recreation model. Results in this report are based on the revised expenditure profile. See Appendix H for a discussion of issues brought up by the publication of the report sponsored by the American Sportfishing Association, including the use of this expenditure profile.

Table 1.18 shows the expenditure profiles we developed for each activity/boat mode. Low food, beverage and lodging costs would indicate a low percentage of users being overnight visitors or dominated by local users. In 1999, coastal residents accounted for 86.7% of charter/party boat trips and 96.86% of private household boat trips for fishing in Southern California (NMFS, MRFSS 1999). Not all the profiles we found had consistent categories, sometimes food and beverage was reported separately and sometimes they were aggregated together. When reported separately, we used the separated categories in the impact analysis.

The next step for calculating economic impact was to multiply the person-days of activity by the expenditures per person-day to get total direct sales impact. These direct sales estimates by expenditure category were mapped into the appropriate standard industry categories (SICs or NAICs under the new system) in the 1997 Economic Census of Business for each county. Direct sales estimates are translated into direct wages & salaries impact by multiplying the direct sales estimate by the appropriate wages-to-sales ratio specific to each category in each county. Estimated direct wages & salaries are then divided by the wages-to-employment ratios specific to each category in each county to get an estimate of the direct number of full and part-time employees directly supported.

Table 1.18 Expenditure Profiles for Recreation Activities in the CINMS, 1999

	Expenditures Per Person-day (1999 $)			
Expenditure	Fishing Charter/Party Boat	Fishing Private Boat	Diving Charter/Party Boat	Diving Private Boat
Boat Fees[1]	$47.62 - 60.74	n/a	$40.21 - 92.56	n/a
Boat Fuel	n/a	$ 12.74	n/a	$ 19.00
Food, Bev, Lodging	n/a	n/a	$82.00	$ 11.00
Food	$ 15.47	$ 7.60	n/a	n/a
Lodging	$ 8.65	$ 1.20	n/a	n/a
Transportation	n/a	n/a	$10.00	$ 9.00
Private Transportation	$ 16.64	$ 8.90	n/a	n/a
Public Transportation	$ 33.07	$ 1.89	n/a	n/a
Equipment/Equip. Rental	$ 6.01	$ 0.91	n/a	$ 5.00
Miscellaneous	n/a	n/a	$15.00	$ 10.50
Access/Boat Launch Fees	$ 1.18	$ 1.52	n/a	n/a
Air Refills	n/a	n/a	n/a	$ 7.00
Bait/Ice	$ 0.52	$ 6.77	n/a	$ 2.50
Total[2]	$129.16-$142.28	$ 41.53	$132.21-$184.56	$64.00

Expenditure	Whale Watching Charter/Party Boat	Non-consumptive Diving	Sailing Charter/Party Boat	Kayaking/Island Sightseeing
Lodging	$ 53.00	$ 53.00	$ 53.00	$ 53.00
Eating & Drinking	$ 29.00	$ 29.00	$ 29.00	$ 29.00
Transportation	$ 10.00	$ 10.00	$ 10.00	$ 10.00
Charter Boat Fee[1]	$53.43-60.19	$40.56-81.78	$61.99-177.61	$50.77-104.67
Miscellaneous	$ 15.00	$ 15.00	$ 15.00	$ 15.00
Total[2]	$160.43-167.19	$147.56-188.78	$168.99-284.61	$157.77-211.67

1. Boat fees used were actual by county and activity from the Kolstad survey. They are:

	SB	Ventura	LA
Charter/Party Boat Fishing	$ 60.74	$ 47.62	$ 59.95
Charter/Party Boat Diving	$ 40.21	$ 64.50	$ 92.56
Whale Watching	$ 53.43	$ 60.19	n/a
Non-Consumptive Diving	$ 40.56	$ 81.78	$ 48.48
Sailing	n/a	$ 61.99	$ 177.61
Kayaking/Island Sightseeing	$ 104.67	$ 50.77	n/a

2. The total varies because we used the actual charter/party boat fee by activity

Direct wages & salaries are then translated into total direct income by multiplying direct wages & salaries by the ratio of total income to wages & salaries income specific to each county. This adjustment accounts for proprietor's income. The ratio of proprietor's income to proprietor's employment is then used to derive proprietor's employment, which is then and added to wages & salaries employment to get total direct employment supported.

The final step is to calculate the multiplier impacts. Because we don't have estimates of the proportion of local residents to nonresidents in each activity in each county, we use a range of 2.0 to 2.5 for income multipliers and 1.5 to 2.0 for employment multipliers. These ranges of multipliers are consistent for economies in the impact area. Direct income and direct employment times the multipliers yields estimates of the total income impacts (Appendix C contains a printed version of the economic impact model for each activity and county). When we report only one estimate for income or employment, it is the upper range estimate, which we use for our ***maximum potential loss estimate*** in our Step 1 analyses of marine reserve alternatives.

Residents vs. Nonresidents. In local or regional economic impact analysis, the inclusion of resident spending impact is usually not done because it is already accounted for in the multiplier analyses of basic or export industries. Although data exists on the proportion of residents and nonresidents who access the Channel Islands, we did not have the proportion of residents of each county in the study area who accessed the Channel Islands from their county of residence. In this analysis we used the assumption that 50% of those who participated in recreation activities are residents of the county from which they accessed the Channel Islands. This assumption still most likely overstates the impacts from recreational uses given that 87% of charter/party boat fishing and 97% of private household/rental boat fishing in Southern California is done by coastal residents. But as we noted above, we don't have precise enough information on county of residence.

Import Substitution/Double Counting Economic Impact. Nonresident fishermen that bring new dollars into a county spend money, which is received by local businesses and they spend it on inputs of production, including wages and salaries for labor and a return to the business as profit. These workers and business owners spend a portion of their incomes in the local economy and thus the ripple or multiplier impacts. Some of the workers and business owners that received income through this multiplier impact will spend it locally on fishing trips in the CINMS. So this portion of resident spending would be double-counted.

We recognize that by including resident spending impacts, even only the direct impacts, does involve double counting. The reason for including it has to do with the "***import substitution***" argument. Import substitution means that the multiplier impact would be reduced from all basic or export industry spending, if the fishermen would substitute to fishing sites outside the local county. The multiplier impacts would be less without this spending. Local businesses have an incentive to keep this activity in the local area. So, this is another reason that supports our calling our Step 1 analysis estimates "maximum potential loss".

There is a gray area where resident direct impacts may not be double counting and which may not require the assumption of import substitution to count the impact. This would be the case of income earned from sources unrelated to work in the county of residence and spending. A good example is retirement and pension income. This source of income represents new dollars into the community and is thus a basic or export industry. Dollars of spending here have their own multiplier impacts that are not double counted. To the extent that local residents are spending from these sources of income for recreational fishing in the CINMS it is appropriate to include not only the direct impacts, but also the multiplier impacts of such spending.

As mentioned above, our Step 1 analyses simply add up the activity currently taking place within the proposed marine reserve areas and apply the assumption that all is lost. No account is taken of people's ability to substitute or relocate their fishing activities to other fishing sites. Under the preferred alternative, only 25% of the CINMS waters are included in the proposed network of marine reserves leaving 75% of the CINMS plus all the areas outside the CINMS for people to find other fishing sites. Additionally, there will be those who decided to participate in some other activity – these users would still be spending money in the local economy and therefore the income and employment dependent on this spending would not be lost. Thus, we would expect that our Step 1 estimates are overestimates of impact. We don't have a model to tell us how much substitution might take place, and what the net impact will be either in the short or long term. However, some substitution is likely, and to the extent people are able to find suitable substitute fishing sites, this will lower estimates of impact that we make in our Step 1 analyses.

As the above discussion indicates, our Step 1 analyses will tend to overestimate economic impacts of marine reserves on the recreational fishing community and associated industries in the local and regional economies. This is true even with our assumption of 50% local residency.

Consumer's Surplus. We conducted a review of literature for studies that have estimated the consumer's surplus values for the various recreational uses in the CINMS. We were able to obtain five studies for California or Southern California, however only one of these provided enough information on values that could be used (the values were for fishing) (Table 1.20). The average value in 1999 dollars for charter/party boats was $36.09 per person-day and the average value for private boats was $34.75 per person-day. The values represent loss of access to all of Southern California. Using these values for the CINMS overstates the values for the CINMS, since values would be expected to decline as the scope of access is reduced. This will also apply to different marine reserve alternatives. Those alternatives with larger geographic scope will have larger values. We use these value for all consumptive and nonconsumptive recreation activities and note that it is only a rough approximation. The fact that there is no differentiation between consumptive and nonconsumptive recreation activities for this measurement limits our ability to analyze trade-offs in maximizing the economic value of CINMS resources. This would not be adequate information for a formal benefit-cost analysis.

Table 1.19. Economic Impact of Charter/Party Boat Fishing in Ventura County from Activity in the CINMS, 1999

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	2,299,428	0.171537003	394,437	11740.46679	33.6
Lodging	8.65	1,285,718	0.213109652	273,999	14138.05668	19.4
Private Transportation	16.64	2,473,334	0.166580417	412,009	21582.30187	19.1
Public Transportation	33.07	4,915,455	0.166580417	818,818	21582.30187	37.9
Boat Fuel	0.00	0	0.037661501	0	13082.33276	0.0
Access/Boat launch Fees	1.18	175,393	0.197079821	34,566	26686.02901	1.3
Equipment Rental	6.01	893,314	0.24102252	215,309	26205.88235	8.2
Bait and Ice	0.52	77,292	0.105851657	8,181	19902.47277	0.4
Charter Boat fee	47.62	7,078,154	0.229005998	1,620,940	24,860	65.2
Total	129.16	**19,198,086**		**3,778,260**		**185.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salaries	2.338143047			8,834,111		254.3
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**13,251,167**	Lower	**317.8**
Upper 2.5			Upper	**15,459,695**	Upper	**381.4**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.388%
to Employment	21027.31293			0.127%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.072%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu\pm$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta\pm$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
$\mu\pm$ = Regional income multipliers (upper and lower range).
$\delta\pm$ = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Ethnographic Data Survey. As noted in the section above on the commercial fisheries, the CINMS had an ethnographic data survey conducted prior to the beginning of their management plan revision process (Kronman et al, 2000). The number of people surveyed included four (4) operators of commercial passenger-carrying fishing vessels (what we call here the "for hire" industry or charter/party boat operators), four (4) operators of commercial passenger-carrying dive vessels, five (5) recreational fishermen, five (5) recreational divers, one (1) kayaker, two (2) operators of commercial passenger-carrying whale watching vessels, one (1) surfer and one (1) birdwatcher. Information from this survey provides some information that will aid in Step 2 analyses.

Table 1.20 Consumers' Surplus Estimates for Recreation Activities

Mode	Activity	Geographic Coverage	Method	Per day Value	
Charter/Party Boat	Fishing	Northern border of San Luis Obispo County to Mexican border and 40 miles inland (by zip code).	TC[2]		
				Charter boat-day trip	
				Boat Owners (1984$)	$ 22.00
				Do not own boat (1984$)	$ 49.00
				Charter boat-more than one day[3]	
				Boat Owners (1984$)	$ 12.35
				Do not own boat (1984$)	$ 15.25
			CV[2]	Charter boat-all trips[4] (1984$)	$ 13.97
				Average[5] (1984$)	**$ 22.51**
				Adjusted to 1999 dollars	**$ 36.09**
Private Boat			TC[2]		
				Charter boat-day trip	
				Boat Owners[5] (1984$)	$ 24.67
				Do not own boat[5] (1984$)	$ 20.33
			CV[2]	Charter boat-all trips (1984$)	$ 20.00
				Average[6] (1984$)	**$ 21.67**
				Adjusted to 1999 dollars	**$ 34.75**

1. Source: Wegge, et. al. 1984 (see the References section for full citations).
2. TC=Travel Cost Model, CV=Contingent Valuation Method
3. Travel cost values given for multi-day trip estimates in the report were person-trip estimates. TC multi-day estimates were translated into person-day estimates by dividing by the multi-day average number of trips (4.13).
4. We did not have the breakdown of length of trips associated with this estimate, therefore we assumed that half of trips were day trips and half were multi-day trips and calculated a weighted average. This is consistent with our assumption that half of the consumptive users are residents and half are from out of the study area.
5. Length of trip for private trips was given in terms of hours fished, with an average of 22. We assumed the length of an average day was 6 to 8 hours and so divided these person-trip estimates by three (3) to get a person days estimate.
6. The report also included travel cost values based on a time demand model. We did not include these here because the method of incorporating the value of time did not perform will and had a large influence on the results.

Table 1.21 Baseline Consumptive Recreation Activity

	Charter/Party Boat Fishing	Charter/Party Boat Diving	Private Boat Fishing	Private Boat Diving
Person-days	158,768	17,934	214,015	47,190
Market Impact				
Direct Sales	$ 20,638,407	$ 3,008,782	$ 8,888,043	$ 2,595,450
Direct Wages and Salaries	$ 9,475,042	$ 1,449,065	$ 2,499,255	$ 683,447
Direct Employment	279	48	85	24
Total Income				
Upper Bound	$ 16,581,324	$ 2,535,864	$ 4,373,697	$ 1,196,032
Lower Bound	$ 14,212,564	$ 2,173,598	$ 3,748,883	$ 1,025,171
Total Employment				
Upper Bound	418	72	127	37
Lower Bound	348	60	106	31
Non-Market Impact				
Consumer's Surplus[1]	$ 5,730,586	$ 647,294	$ 7,436,397	$ 1,639,715
Profit[2]	$ 376,295	$ 44,004	n/a	n/a

1. Consumer's Surplus is calculated by multiplying the consumer's surplus per person per day averages from Table 1.20 by the number of person days in this table.
2. Profit is used as a proxy for producer's surplus.

Table 1.22. Baseline Non-consumptive Recreation Activity

	Whale Watching	NC Diving	Sailing	Kayaking/ Sightseeing
Person-days	25,984	10,776	4,015	1,233
Market Impact				
Direct Sales	$ 4,288,337	$ 1,858,879	$ 694,305	$ 257,489
Direct Wages and Salaries	$ 2,084,969	$ 899,833	$ 326,370	$ 129,259
Direct Employment	72	31	10	5
Total Income				
Upper Bound	$ 3,648,695	$ 1,574,708	$ 571,147	$ 226,203
Lower Bound	$ 3,127,453	$ 1,349,750	$ 489,554	$ 193,888
Total Employment				
Upper Bound	108	47	16	8
Lower Bound	90	39	13	7
Non-Market Impact				
Consumer's Surplus [1]	$ 937,866	$ 388,931	$ 144,917	$ 44,504
Profit[2]	$ 157,235	$ 46,313	$ 18,020	$ 2,767

1. Consumer's Surplus is calculated by multiplying the consumer's surplus per person per day averages from Table 1.20 by the number of person days in this table.
2. Profit is used as a proxy for producer's surplus.

A Note on our Baseline Estimates. Above we discussed our choices of the 1996-1999 annual averages for the commercial fisheries and the 1999 estimates of use for the recreational consumptive users as baselines and for extrapolating future impacts. Scholz (2001) has questioned our selection of the 1996-1999 averages for extrapolating about future impacts and argues that our 1996-1999 averages are too high. Scholz cites the declining trends in the value of the entire California commercial fishery over the last 20 years, noting an average annual decline of 6.6%. Scholz also cites recent changes in fishing regulations in the limited entry fixed gear fishery off California by the NMFS to conclude our 1996-1999 baseline is not sustainable. Also cited is a CDFG recommended emergency closure of all offshore rockfish and lingcod sport fisheries south of Cape Mendocino, which would suggest that our baseline 1999 estimates for the recreational or sports fisheries are also not sustainable. Scholz also discusses the noted differences in the overall trends of the commercial fisheries in the CINMS versus the State of California (included here in Appendix C) and concludes that this represents a shift of effort from other California waters suffering from declining stocks and increasing regulations. In addition to being driven by changes in resource availability and regulation along the mainland, changes in fishing technology that have enabled fishermen to venture further from port, and the development of shore-side receiving and processing infrastructure have facilitated the further exploration and increased use of these fishing grounds (Pomeroy et. al. in press). Here the point is about the possibility of there being excess capacity in the commercial fisheries and whether the current capacity is sustainable in the future. Of course Scholz (2001) did not offer an alternative estimate of baselines for extrapolation because any estimate about the future as we noted above is fraught with uncertainty and could be just as vigorously criticized as our estimates. However, these are important issues and will be addressed in our Step 2 analyses.

Chapter 2

Step 1 Analysis of Alternatives

Description of Alternatives

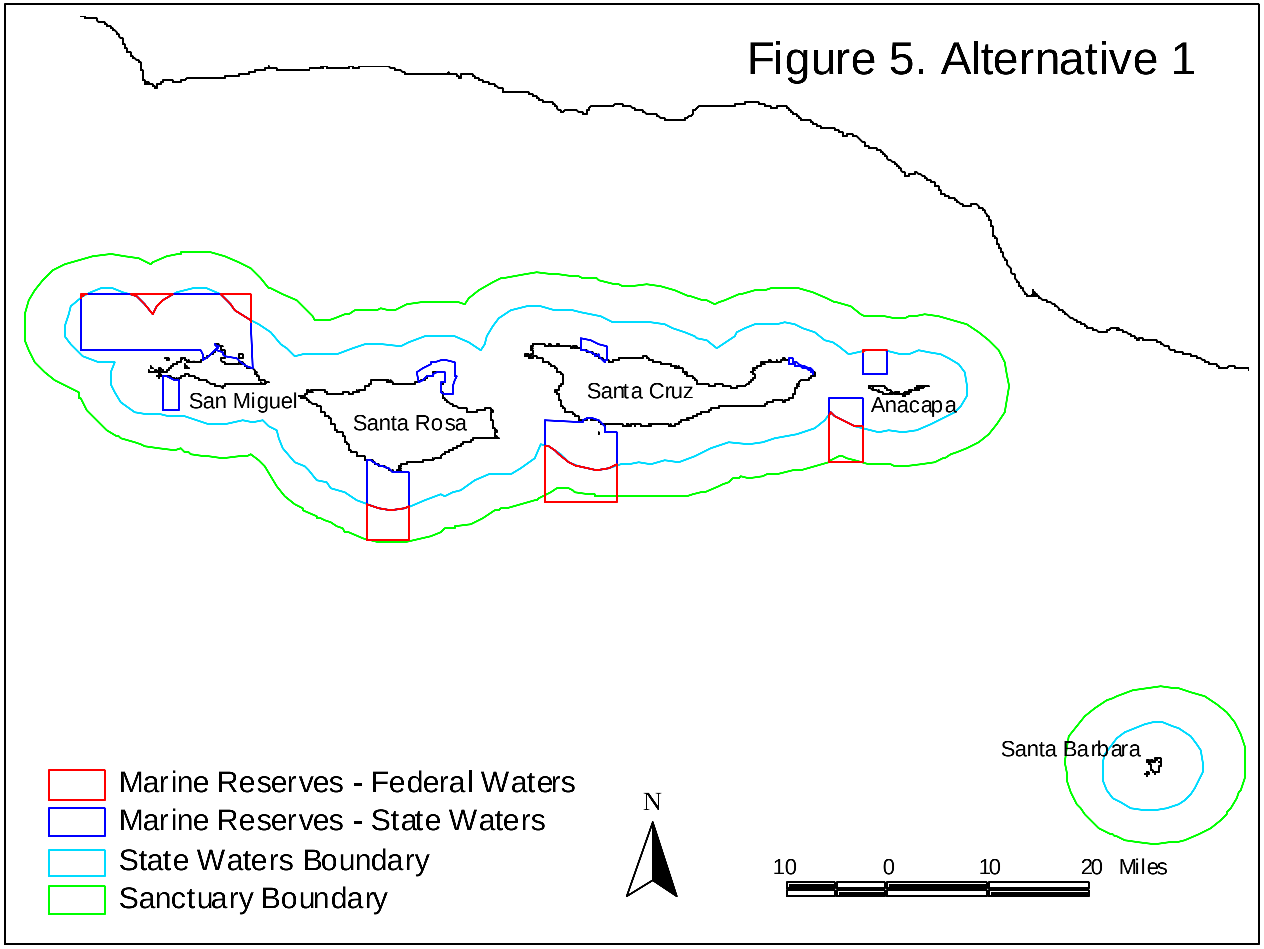
> **Definitions:**
>
> ***Marine Reserve***: No take area. All consumptive uses are displaced.
>
> ***Marine Park***: These areas are restricted to State waters and allow recreational lobster fishing.
>
> ***Marine Conservation Area***: These areas allow the take of recreational lobster and pelagic finfish, and the commercial take of lobster, crab, pelagic finfish, urchin and squid. These areas are not always restricted to State waters.

The CINMS and the State of California, as represented by the CDFG, have forwarded to us six alternatives for a network of marine reserves in the CINMS. One is labeled the Preferred Alternative i.e., the one preferred by the CINMS and the CDFG. Each alternative includes multiple areas with specific designations (e.g., marine reserves, marine conservation areas and marine parks). Marine reserves are complete "no take areas", while marine conservation areas and marine parks allow some consumptive activities. Areas also are segmented into those portions in State waters (under State jurisdiction) and those portions in Federal waters (under federal jurisdiction). Actually, the jurisdictional issue is more complicated in that there are multiple-jurisdictions over the same areas. The first nautical mile from the shoreline seaward on most islands is under the jurisdiction of the National Park Service, the State of California and the CINMS. The next two nautical miles seaward are under the joint jurisdiction of the State of California and the CINMS. From three nautical miles out to six nautical miles seaward are under the jurisdiction of CINMS and for purposes of Federal fishing regulations, the Pacific Fishery Management Council and the National Marine Fisheries Service. To complicate matters further, some species of fish are managed by the State of California in Federal waters (e.g. squid and some rockfishes), some are managed by the Federal government (Pacific Fishery Management Council and NMFS) in state waters (e.g. sardine and other rockfishes), and still others are managed by both state and federal authorities. We are not able to provide details on all these complex relationships. We simply use the geographic information system (GIS) to distinguish between State and Federal waters and provide separate estimates of activity within State and Federal waters.

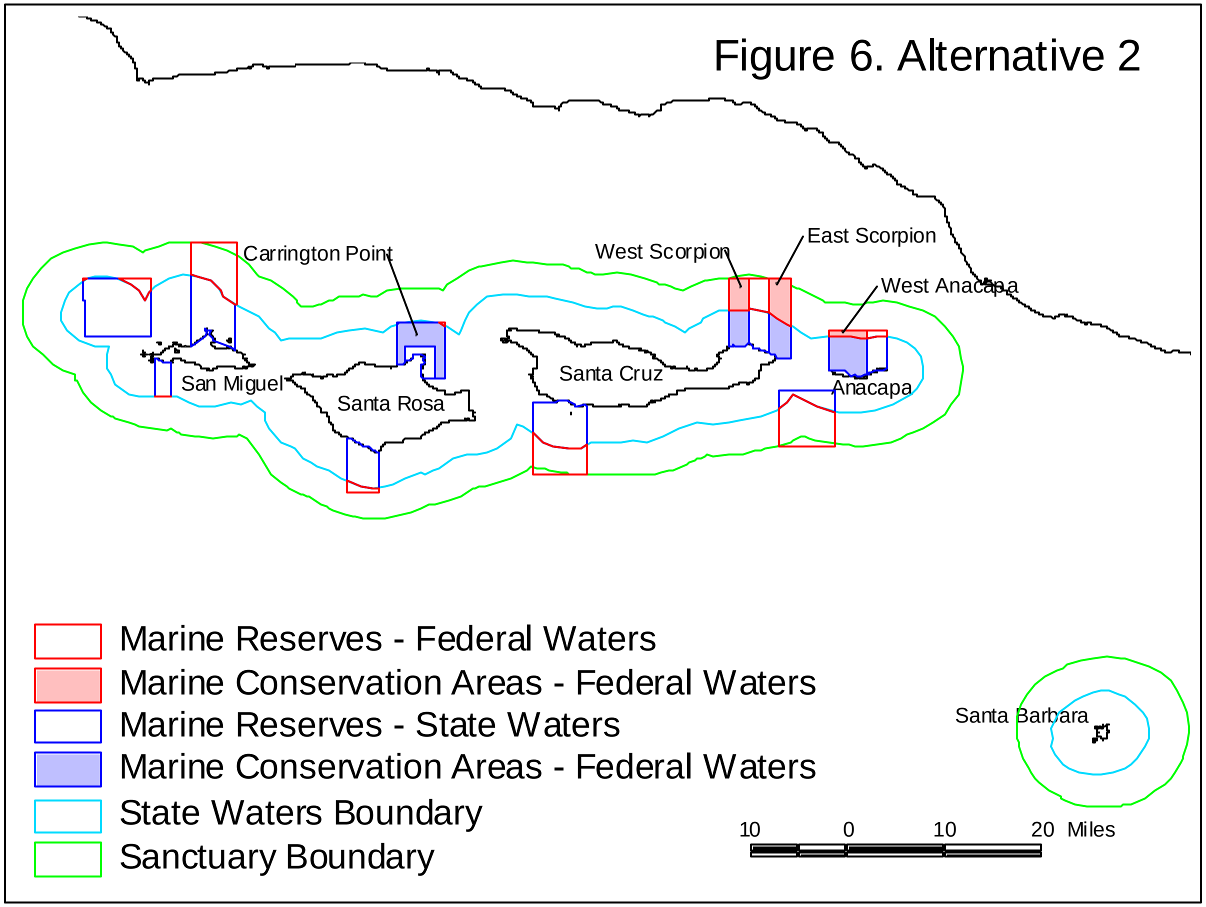
The following areas are closed to fishing, except as noted:

- West Anacapa SMCA (under the Preferred Alternative): allows commercial and recreational lobster fishing and recreational fishing for pelagic finfish.
- Carrington Point SMCA: allows commercial set net for halibut and white sea bass and commercial fishing for lobster, crab and urchin.
- Scorpion SMCA: allows recreational fishing for pelagic finfish, including yellowtail, tuna, mackerel, sardine, anchovy, and barracuda, and commercial fishing for wetfish, squid, and lobster.
- West Anacapa SMCA (under Alternative 2): allows recreational fishing for pelagic finfish, including yellowtail, tuna, mackerel, sardine, anchovy, and barracuda and commercial fishing for wetfish, squid and lobster.

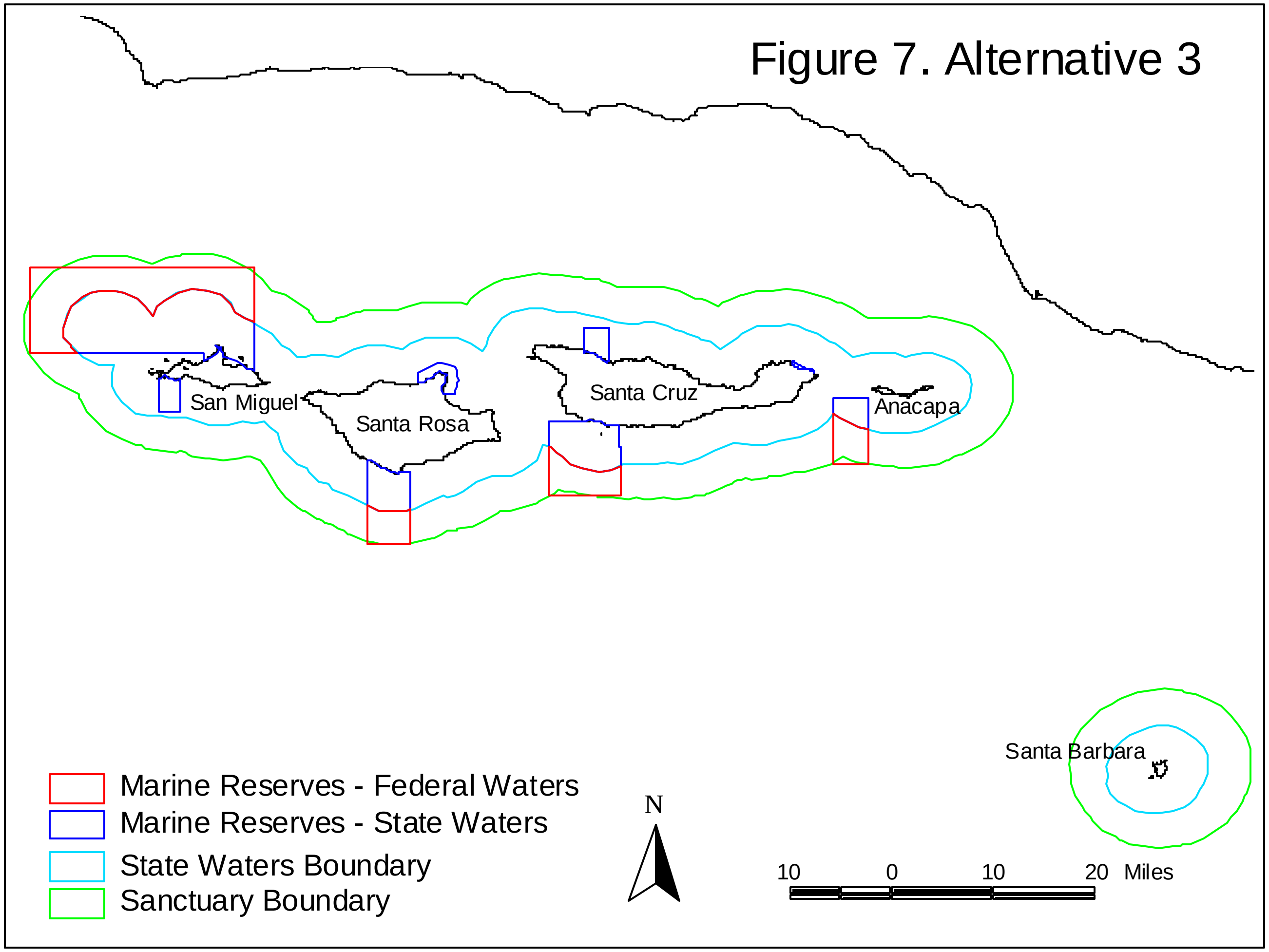
Alternative 1 – This alternative is comprised of eight areas and is approximately 186.5 nautical square miles in size, which is approximately 12 percent of all CINMS waters. All eight areas are marine reserves or no take areas. About 72 percent of the marine reserves are in State waters and 28 percent in Federal waters (Figure 5).



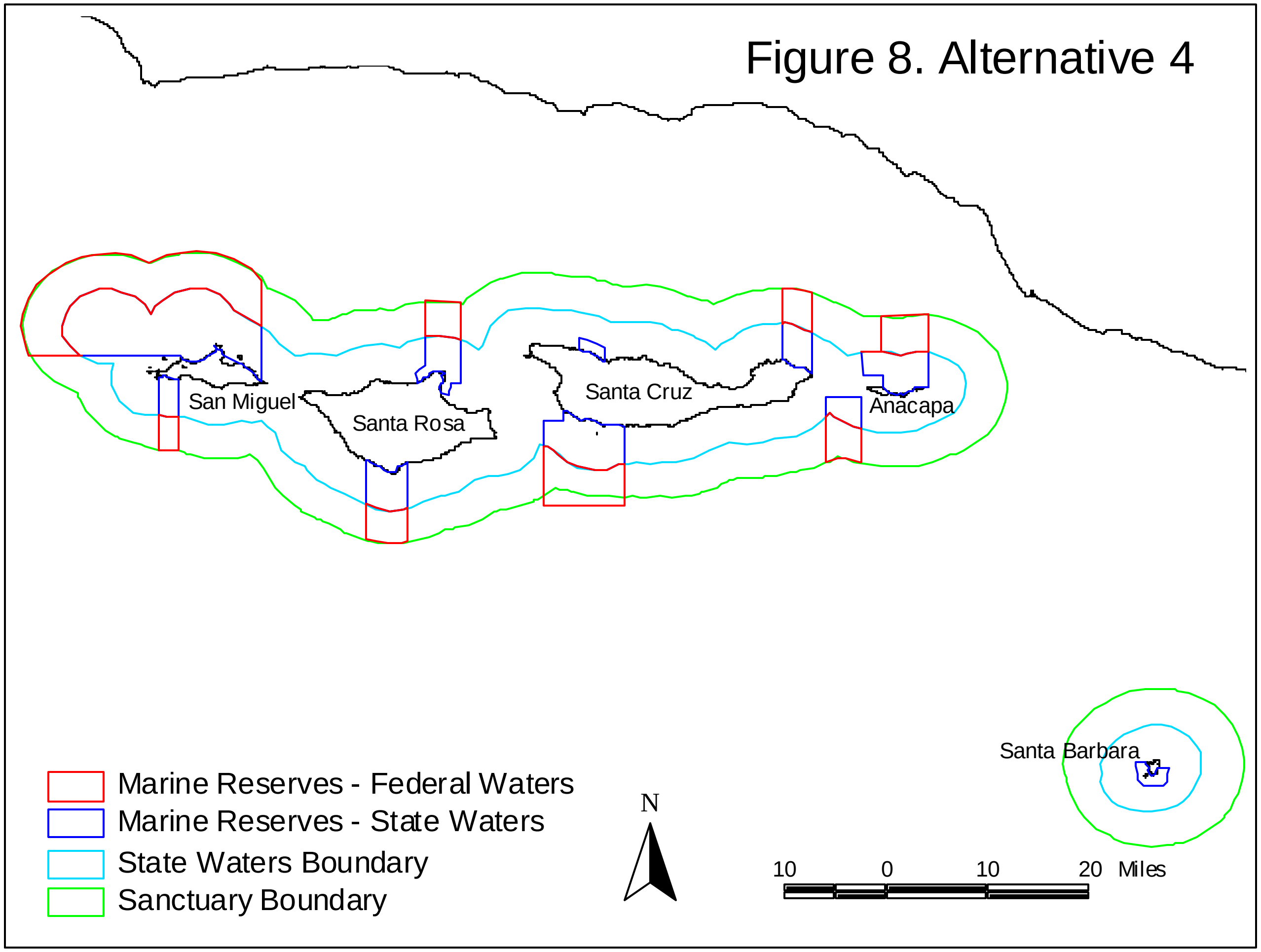
Alternative 2 – This alternative is comprised of 12 areas and is approximately 213.1 nautical square miles in size, which is approximately 14 percent of all CINMS waters. Eight of the areas are marine reserves and five of the areas are marine conservation areas. About 63 percent of the marine reserves are in State waters and 37 percent are in Federal waters. About 83 percent of the marine conservation areas are in State waters and 17 percent are in Federal waters. Overall, 67 percent of this alternative is in State waters and 33 percent is in Federal waters (Figure 6).



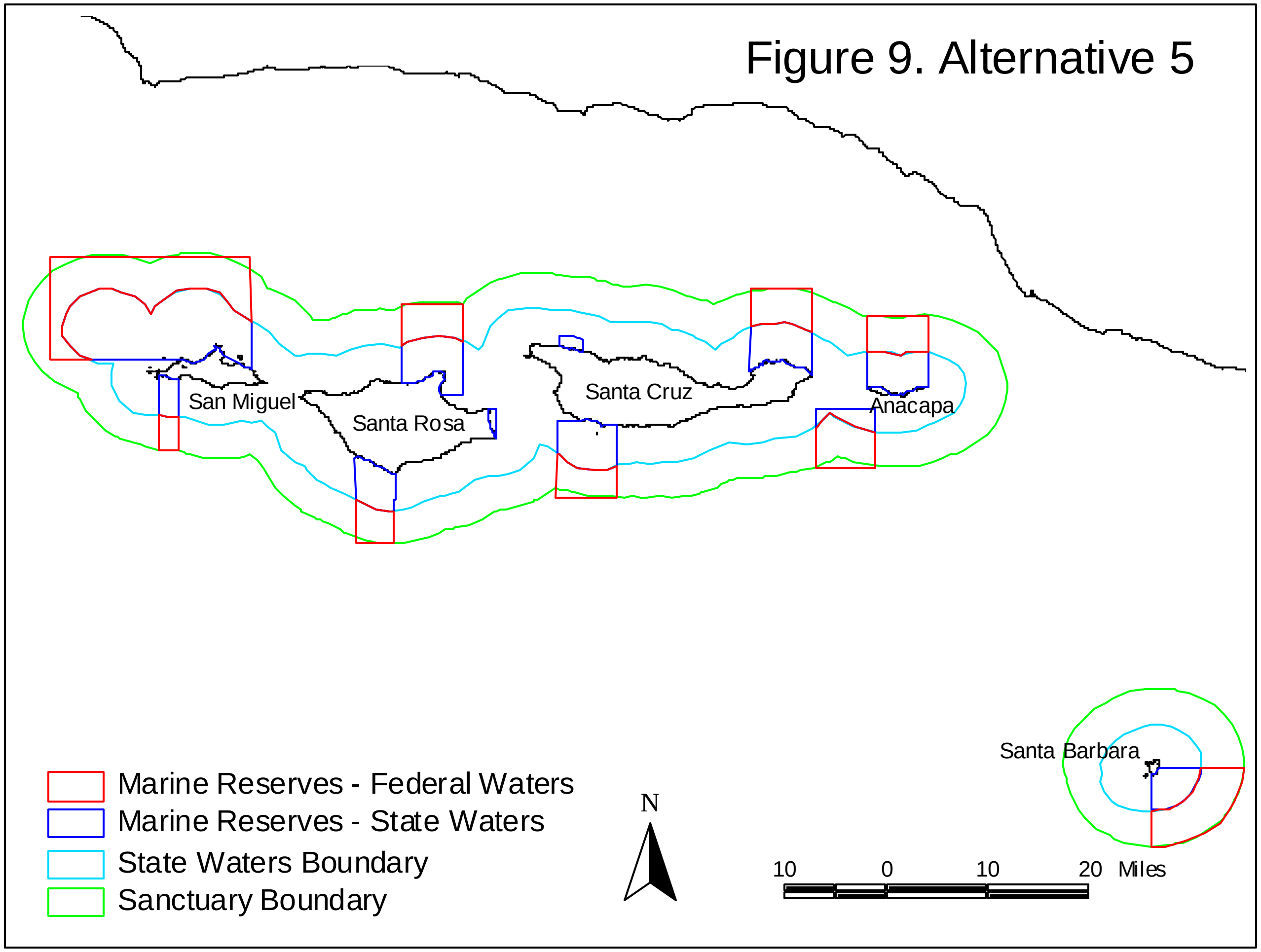
Alternative 3 – This alternative is comprised of seven areas all of which are marine reserves. The marine reserves cover 306.5 nautical square miles or approximately 21 percent of all CINMS waters. About 59 percent of the marine reserves are in State waters and 41 percent in Federal waters.



Alternative 4 – This alternative is comprised of 11 areas all of which are marine reserves. The marine reserves cover 450.1 nautical square miles or approximately 29 percent of all CINMS waters. About 52 percent of the marine reserves are in State waters and 48 percent are in Federal waters.

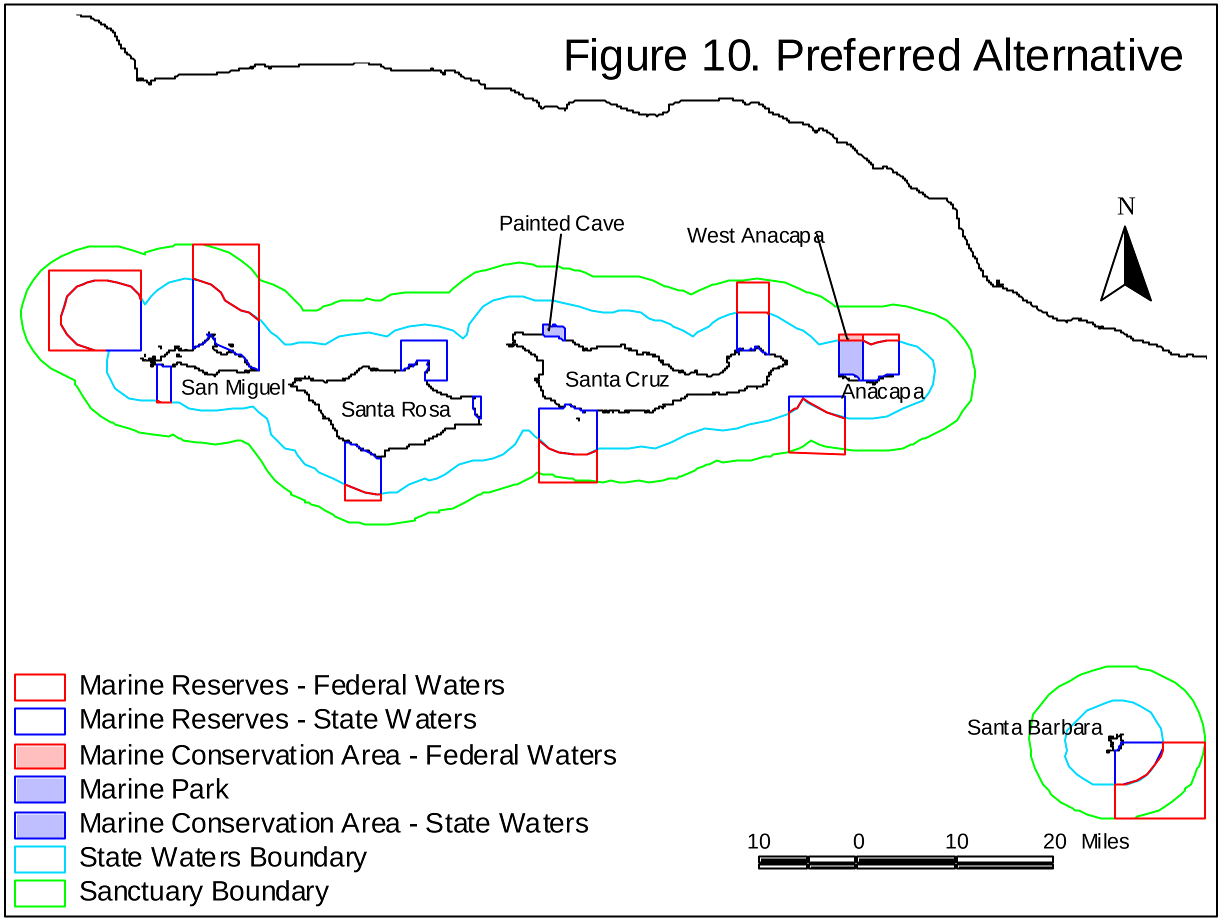


Alternative 5 – This alternative is comprised of 11 areas all of which are marine reserves. The marine reserves cover 516.5 nautical square miles or approximately 34 percent of all CINMS waters. About 50 percent of the marine reserves are in State waters and 50 percent are in Federal waters.



Preferred Alternative – This alternative is comprised of 13 areas covering 369.6 nautical square miles or approximately 25 percent of all CINMS waters. 11 of the areas are marine reserves, one is a marine conservation area and one is a State Marine Park. About 66 percent of the marine reserves are in State waters and 34 percent are in Federal waters. About 84 percent of the marine conservation area (West Anacapa) is in State waters and 16 percent is in Federal Waters. The Painted Cave State Marine Park is located on the northwestern portion of Santa Cruz Island. Overall, 54 percent of the areas are in State waters and 46 percent are in Federal waters.

Figure 10. Preferred Alternative



Introduction - Step 1 Analysis

In the introduction, we discussed what is included and not included in Step 1 of our two step analyses. As a reminder, Step 1 of our analyses adds up the activities that are impacted by the various proposed marine reserve alternatives and translates these activities into the socioeconomic measures via the models outlined in Chapter 1. The assumption of Step 1 Analyses is that all revenues associated with the areas closed are lost. Any factor that could mitigate, offset, or increase the level of impact on any use is not addressed. In most cases, Step 1 impacts are thought of as "***maximum potential losses***" because humans have proven to be very adaptive, resilient and quite ingenious in responding to changes and rarely does society fail to at least mitigate or off-set most losses. Also, Step 1 analyses are limited to the cost side of the benefits and costs ledger. The "***potential"*** costs, or the impacts on current users/uses that will be displaced are the focus of Step 1. The benefits of marine reserves that were outlined in the introduction, along with the factors that might mitigate, offset or increase these potential costs are addressed in our Step 2 analyses.

Step 1 Analyses are presented here for the six alternatives described above. One alternative not specifically included in any tables is the "***no action alternative*** " or the status quo. The way to interpret the no action alternative is to assess it with respect to the other alternatives. Any costs of an alternative are costs avoided or benefits of the no action alternative. Likewise any benefits of an alternative are costs or opportunities lost by the no action alternative.

As part of the two-year Marine Reserve Working Group (MRWG) process of designing a network of marine reserves, we have analyzed many alternatives. Analyses for six of these alternatives are posted on the CINMS World Wide Web site in portable document format (downloadable pdfs). The alternatives were A, B, C, D, E, and I. Alternative A was the Science Panel's 50 percent alternative and Alternative B was the Science Panel's 30 percent alternative. Alternatives C, D, E, and I were developed by or presented to the MRWG. See http://www.cinms.nos.noaa.gov/MRWGsocioec/panel.html. We also conducted a day long workshop in Santa Barbara with commercial fishermen and some representatives of environmental groups that constructed five alternatives (most were some variant of Alternative C, which is posted on the Web site), for which we provided Step1 analyses at that time. We have also conducted Step 1 analyses for many other alternatives, some of which were referenced by letters (e.g., G and J) and others that did not have letters to guide where they fit in chronology. We have archived all the results of alternatives we have analyzed for different groups and the results are available from the authors upon request.

Commercial Fishing and Kelp – Step 1 Analysis

Given the six alternatives, 14 species/species groups, two jurisdictions (State waters and Federal waters), 12 ports of landing and seven counties in the impact area, Step 1 analyses produce many tables with a great deal of detail. We try to provide information that will fairly represent each user group and provide detail for management and policy decision-makers that must address the concerns of their constituencies. Here we present 29 tables of information in the body of the report and seven more detailed tables in Appendix D. Table 2.25 provides a summary of the Step 1 analyses for all six alternatives. Definitions of all terms and baseline estimates for the entire CINMS were included in Chapter 1 and are not repeated here. Most of the percents presented in the tables for ex vessel revenue, income or employment are the amount of impact as a percent of the CINMS baseline 1996-1999 annual average, except in the tables of ex vessel revenue by port. For ex vessel revenue by port, the percents are the impacted amounts as a percent of the entire port 1996-1999 annual average of ex vessel revenue from catch from all areas, not just the CINMS. This was done to help the ports address their concern about loosing dredging appropriations based on reduced amounts of commercial fishing.

Alternative 1. This alternative potentially impacts over $2.1 million in ***ex vessel revenue*** or 7.69 percent of all CINMS ex vessel revenue. Most of the impact is from catch in State waters (93%). All of the impact on harvest of kelp and catch of urchins, spiny lobsters, rockfish, crab, California sheephead, and sea cucumbers is in the State waters portion of the CINMS. Most of the impact on prawn and tuna catch is in Federal waters. As a percent of total CINMS catch, the largest impacts are on prawn (24.78%), urchins (13.96%), rockfish (13.28%) and sea cucumbers (12.76%). The smallest impacts are on kelp (4.43%), tuna

(4.71%), wetfish (4.91%), squid (5.46%) and flatfishes (5.53%). See Table 2.1 for the details on ex vessel revenue by species/species groups.

Table 2.1 Commercial Fishing & Kelp: Impact of Alternative 1 on Ex Vessel Value by Species Group - Step 1 Analysis

Species Group	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
Squid	$ 661,722	5.07	$ 51,227	0.39	$ 712,950	5.46
Kelp[2]	$ 265,568	4.43	$ -	0.00	$ 265,568	4.43
Urchins	$ 735,214	13.96	$ -	0.00	$ 735,214	13.96
Spiny Lobster	$ 81,627	8.85	$ -	0.00	$ 81,627	8.85
Prawn	$ 94,170	13.39	$ 80,095	11.39	$ 174,265	24.78
Rockfish	$ 72,964	13.28	$ -	0.00	$ 72,964	13.28
Crab	$ 26,331	7.66	$ -	0.00	$ 26,331	7.66
Tuna	$ 5,007	1.64	$ 9,382	3.07	$ 14,389	4.71
Wetfish	$ 9,994	3.31	$ 4,800	1.59	$ 14,794	4.91
CA Sheepshead	$ 24,024	10.18	$ -	0.00	$ 24,024	10.18
Flatfishes	$ 9,562	5.20	$ 600	0.33	$ 10,162	5.53
Sea Cucumbers	$ 21,406	12.76	$ -	0.00	$ 21,406	12.76
Sculpin & Bass	$ 4,435	7.35	$ 624	1.03	$ 5,059	8.39
Shark	$ 3,058	8.80	$ 144	0.41	$ 3,202	9.21
Total	$ 2,015,082	7.17	$ 146,873	0.52	$ 2,161,955	7.69

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.
2. Kelp is processed value from ISP Alginates in San Diego.

Another view of impact is ex vessel revenue by port (Table 2.2). The greatest potential impact of this alternative is on the ports in Santa Barbara (9.98% of all ex vessel revenue of all landings at the port). In terms of dollar value of landings, Port Hueneme would potentially lose the next greatest amount (almost $604 thousand). However, Port Hueneme would potentially lose 4.43% of all ex vessel revenue, while Channels Islands Harbor would potentially lose 4.83%. Ventura Harbor would potentially lose 1.5% of the ex vessel value of all landings. All the other ports would potentially lose well under 1% in ex vessel revenue.

Table 2.2 Commercial Fishing & Kelp: Impacts of Alternative 1 on Ex Vessel Value by Port - Step 1 Analysis

Port	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
1. Moss Landing	3	N/A	1	N/A	4	N/A
2. Morro Bay	39	0.76	0	0.00	39	0.76
3. Avila/Port San Luis	17	0.00	1	0.00	19	0.00
4. Santa Barbara	852,406	9.92	5,116	0.06	857,523	9.98
5. Ventura Harbor	70,409	1.31	10,287	0.19	80,696	1.50
6. Channel Islands	170,227	3.48	65,863	1.35	236,090	4.83
7. Port Hueneme	553,819	4.06	49,954	0.37	603,773	4.43
8. San Pedro	66,681	0.48	5,938	0.04	72,618	0.52
9. Terminal Island	20,534	0.11	9,481	0.05	30,015	0.17
10. Avalon & Other LA	107	0.01	7	0.00	113	0.01
11. Newport Beach	5	0.00	7	0.00	12	0.00
12. San Diego	4,001	0.12	52	0.00	4,053	0.12

1. Percents are the amount of ex vessel value as a percent of the total ex vessel value of landings at the Port (1996-1999 Average Annual Value).

The impact on total income (Table 2.3) is over $5.7 million across all seven counties in the impact area. Most of the impacts are concentrated in Ventura and Santa Barbara counties. The impact in San Diego County is primarily from kelp harvesting and processing activities. Employment impacts mirror the income impacts with 168 full- and part-time jobs potentially impacted (Table 2.4).

Table 2.3 Commercial Fishing & Kelp: Impact of Alternative 1 on Total Income by County - Step 1 Analysis

County	State Waters Income	Federal Waters Income	Total Income
1. Monterey	$481,271	$37,261	$518,532
2. San Luis Obispo	$14,383	$32	$14,416
3. Santa Barbara	$1,679,016	$12,112	$1,691,129
4. Ventura	$2,279,347	$312,044	$2,591,391
5. Los Angeles	$481,003	$33,225	$514,227
6. Orange	$12	$16	$28
7. San Diego	$427,929	$168	$428,097
All Counties	$5,362,962	$394,857	$5,757,819

Table 2.4 Commercial Fishing & Kelp: Impacts of Alternative 1 on Total Employment by County - Step 1 Analysis

County	State Waters Employment	Federal Waters Employment	Total Employment
1. Monterey	14	1	15
2. San Luis Obispo	1	0	1
3. Santa Barbara	55	0	55
4. Ventura	69	9	79
5. Los Angeles	13	1	14
6. Orange	0	0	0
7. San Diego	4	0	4
All Counties	156	12	168

Alternative 2. This alternative potentially impacts over $2.2 million in ***ex vessel revenue*** or 7.9 percent of all CINMS ex vessel revenue. Most of the impact is from catch in State waters (94.7%). All of the impact on harvest of kelp and catch of urchins, spiny lobsters, crab, California Sheephead, and sea cucumbers is in the State waters portion of the CINMS. Most of the impact on prawn and tuna catch is in Federal waters. As a percent of total CINMS catch, the largest impacts are on prawn (19.41%), California Sheephead (18.76%), sea cucumbers (17.09%), sculpin & bass (14.74%), urchins (13.39%) and rockfish (12.6%). The smallest impacts are on tuna (5.36%), kelp (5.55%), and squid (5.56%). This alternative included some attempts to further limit impact by creating four Marine Conservation Areas (e.g., Carrington Point, Scorpion East, Scorpion West and Anacapa West). These MCAs or SMCAs, for those portions in State waters, allow commercial take of squid, spiny lobster, crab, urchin, and for selected pelagic finfish (tuna and wetfish). The impact on ex vessel revenue without these exemptions would have been over $3.3 million or 11.79 percent of all ex vessel revenue from the CINMS. The exemptions resulted in a reduction of potential impact of this alternative by one-third. See Table 2.5 for the details on ex vessel revenue by species/species groups.

Table 2.5 Commercial Fishing & Kelp: Impact of Alternative 2 on Ex Vessel Value by Species Group - Step 1 Analysis

Species Group	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
Squid	$ 712,953	5.46	$ 12,807	0.10	$ 725,760	5.56
Kelp[2]	$ 332,794	5.55	$ -	0.00	$ 332,794	5.55
Urchins	$ 704,761	13.39	$ -	0.00	$ 704,761	13.39
Spiny Lobster	$ 83,425	9.05	$ -	0.00	$ 83,425	9.05
Prawn	$ 63,271	9.00	$ 73,248	10.42	$ 136,519	19.41
Rockfish	$ 60,731	11.06	$ 8,458	1.54	$ 69,189	12.60
Crab	$ 26,943	7.84	$ -	0.00	$ 26,943	7.84
Tuna	$ 5,467	1.79	$ 10,910	3.57	$ 16,377	5.36
Wetfish	$ 12,573	4.17	$ 6,186	2.05	$ 18,759	6.22
CA Sheepshead	$ 44,262	18.76	$ -	0.00	$ 44,262	18.76
Flatfishes	$ 20,152	10.96	$ 2,775	1.51	$ 22,927	12.47
Sea Cucumbers	$ 28,667	17.09	$ -	0.00	$ 28,667	17.09
Sculpin & Bass	$ 6,004	9.95	$ 2,886	4.78	$ 8,890	14.74
Shark	$ 1,773	5.10	$ 450	1.29	$ 2,223	6.40
Total	$ 2,103,776	7.48	$ 117,720	0.42	$ 2,221,495	7.90

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.
2. Kelp is processed value from ISP Alginates in San Diego.

Another view of impact is ex vessel revenue by port (Table 2.6). The greatest potential impact of this alternative is on the ports in Santa Barbara (9.71% of all ex vessel revenue of all landings at the port). In absolute amount, Port Hueneme would potentially lose the next greatest amount (almost $616 thousand or 4.52% of all ex vessel revenue of landings at the port). Channels Islands Harbor would potentially lose about $218.6 thousand or 4.83%. Ventura Harbor would potentially lose 1.7% of the ex vessel revenue of all landings. All the other ports would potentially lose well under 1% in ex vessel revenue.

Table 2.6 Commercial Fishing & Kelp: Impact of Alternative 2 on Ex Vessel Value by Port - Step 1 Analysis

Port	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
1. Moss Landing	$4	N/A	$2	N/A	$6	N/A
2. Morro Bay	$72	1.41	$0	0%	$72	1.41
3. Avila/Port San Luis	$33	0.00	$5	0%	$38	0.00
4. Santa Barbara	$822,512	9.57	$11,574	13%	$834,085	9.71
5. Ventura Harbor	$83,274	1.54	$8,609	16%	$91,883	1.70
6. Channel Islands	$155,890	3.19	$62,714	128%	$218,604	4.47
7. Port Hueneme	$596,426	4.37	$19,445	14%	$615,871	4.52
8. San Pedro	$74,519	0.53	$3,469	2%	$77,987	0.56
9. Terminal Island	$21,819	0.12	$10,126	6%	$31,945	0.18
10. Avalon & Other LA	$114	0.01	$2	0%	$116	0.01
11. Newport Beach	$5	0.00	$8	0%	$13	0.00
12. San Diego	$3,836	0.11	$62	0%	$3,898	0.12

1. Percents are the amount of ex vessel value as a percent of the total ex vessel value of landings at the Port (1996-1999 Average Annual Value).

The impact on total income (Table 2.7) is almost $5.9 million across all seven counties in the impact area. Most of the impacts are concentrated in Ventura and Santa Barbara counties. The impact in San Diego County is primarily from kelp. Employment impacts mirror the income impacts with 169 full and part-time jobs potentially impacted (Table 2.8).

Table 2.7 Commercial Fishing & Kelp: Impact of Alternative 2 on Total Income by County - Step 1 Analysis

County	State Waters Income	Federal Waters Income	Total Income
1. Monterey	$518,533	$9,319	$527,852
2. San Luis Obispo	$12,168	$1,628	$13,796
3. Santa Barbara	$1,625,984	$18,768	$1,644,751
4. Ventura	$2,418,613	$205,779	$2,624,392
5. Los Angeles	$522,535	$13,884	$536,419
6. Orange	$13	$19	$31
7. San Diego	$533,544	$196	$533,740
All Counties	$5,631,389	$249,592	$5,880,981

Table 2.8 Commercial Fishing & Kelp: Impact of Alternative 2 on Total Employment by County - Step 1 Analysis

County	State Waters Employment	Federal Waters Employment	Total Employment
1. Monterey	15	0	16
2. San Luis Obispo	0	0	1
3. Santa Barbara	53	1	53
4. Ventura	74	6	80
5. Los Angeles	14	0	14
6. Orange	0	0	0
7. San Diego	5	0	5
All Counties	161	8	169

Alternative 3. This alternative potentially impacts over $2.3 million in ***ex vessel revenue*** or 8.43 percent of all CINMS ex vessel revenue. Most of the impact is from catch in State waters (90%). All of the impact on harvest of kelp and catch of urchins, spiny lobsters, crab, California Sheephead, and sea cucumbers is in the State waters portion of the CINMS. Most of the impact on prawn and tuna catch is in Federal waters. As a percent of total CINMS catch, the largest impacts are on prawn (29.45%), rockfish (24.17%), urchins (14.32%), sea cucumbers (13.93%) and sculpin & bass (13.91%). The smallest impacts are on wetfish (4.93%), kelp (4.98%), and squid (5.66%). See Table 2.9 for the details on ex vessel revenue by species/species groups.

Table 2.9 Commercial Fishing & Kelp: Impact of Alternative 3 on Ex Vessel Value by Species Group - Step 1 Analysis

Species Group	State Waters Value	% [1]	Federal Waters Value	%	Total Value	%
Squid	$ 695,876	5.33	$ 42,689	0.33	$ 738,566	5.66
Kelp [2]	$ 298,241	4.98	$ -	0.00	$ 298,241	4.98
Urchins	$ 753,956	14.32	$ -	0.00	$ 753,956	14.32
Spiny Lobster	$ 97,403	10.56	$ -	0.00	$ 97,403	10.56
Prawn	$ 94,170	13.39	$ 112,927	16.06	$ 207,097	29.45
Rockfish	$ 88,222	16.06	$ 44,542	8.11	$ 132,764	24.17
Crab	$ 26,278	7.65	$ -	0.00	$ 26,278	7.65
Tuna	$ 5,812	1.90	$ 19,206	6.28	$ 25,019	8.19
Wetfish	$ 10,078	3.34	$ 4,800	1.59	$ 14,878	4.93
CA Sheepshead	$ 26,174	11.09	$ -	0.00	$ 26,174	11.09
Flatfishes	$ 9,562	5.20	$ 3,675	2.00	$ 13,237	7.20
Sea Cucumbers	$ 23,361	13.93	$ -	0.00	$ 23,361	13.93
Sculpin & Bass	$ 4,571	7.58	$ 3,822	6.34	$ 8,393	13.91
Shark	$ 2,906	8.36	$ 882	2.54	$ 3,788	10.90
Total	$ 2,136,610	7.60	$ 232,544	0.83	$ 2,369,154	8.43

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.
2. Kelp is processed value from ISP Alginates in San Diego.

Another view of impact is ex vessel revenue by port (Table 2.10). The greatest potential impact of this alternative is on the ports in Santa Barbara (10.97% of all ex vessel revenue of all landings at the port). In absolute amount, Port Hueneme would potentially lose the next greatest amount (almost $627 thousand). However, Port Hueneme would potentially lose 4.59% of all ex vessel revenue, while Channels Islands Harbor would potentially lose 5.55%. Ventura Harbor would potentially lose 1.65% of the ex vessel value of all landings. All the other ports would potentially lose well under 1% in ex vessel revenue.

Table 2.10 Commercial Fishing & Kelp: Impact of Alternative 3 on Ex Vessel Value by Port - Step 1 Analysis

Port	State Waters Value	% [1]	Federal Waters Value	%	Total Value	%
1. Moss Landing	$3	N/A	$1	N/A	$5	N/A
2. Morro Bay	$43	0.83	$0	0.00	$43	0.83
3. Avila/Port San Luis	$17	0.00	$7	0.00	$24	0.00
4. Santa Barbara	$898,422	10.46	$44,472	0.52	$942,894	10.97
5. Ventura Harbor	$74,260	1.38	$14,607	0.27	$88,867	1.65
6. Channel Islands	$174,353	3.56	$97,396	1.99	$271,749	5.55
7. Port Hueneme	$581,830	4.27	$44,824	0.33	$626,654	4.59
8. San Pedro	$70,180	0.50	$6,937	0.05	$77,117	0.55
9. Terminal Island	$21,943	0.12	$17,937	0.10	$39,880	0.22
10. Avalon & Other LA	$115	0.01	$6	0.00	$121	0.01
11. Newport Beach	$5	0.00	$14	0.00	$20	0.00
12. San Diego	$4,106	0.12	$109	0.00	$4,214	0.12

1. Percents are the amount of ex vessel value as a percent of the total ex vessel value of landings at the Port (1996-1999 Average Annual Value).

The impact on total income (Table 2.11) is over $6.1 million across all seven counties in the impact area. Most of the impacts are concentrated in Ventura and Santa Barbara counties. The impact in San Diego County is primarily fromkelp. Employment impacts mirror the income impacts with 179 full and part-time jobs potentially impacted (Table 2.12).

Table 2.11 Commercial Fishing & Kelp: Impact of Alternative 3 on Total Income by County - Step 1 Analysis

County	State Waters Income	Federal Waters Income	Total Income
1. Monterey	$506,111	$31,051	$537,163
2. San Luis Obispo	$17,315	$8,521	$25,836
3. Santa Barbara	$1,759,886	$61,295	$1,821,181
4. Ventura	$2,386,413	$363,219	$2,749,632
5. Los Angeles	$507,237	$32,523	$539,760
6. Orange	$13	$33	$46
7. San Diego	$479,688	$346	$480,034
All Counties	$5,656,664	$496,988	$6,153,652

Table 2.12 Commercial Fishing & Kelp: Impact of Alternative 3 on Total Employment by County - Step 1 Analysis

County	State Waters Employment	Federal Waters Employment	Total Employment
1. Monterey	15	1	16
2. San Luis Obispo	1	0	1
3. Santa Barbara	57	2	59
4. Ventura	73	11	84
5. Los Angeles	13	1	14
6. Orange	0	0	0
7. San Diego	5	0	5
All Counties	164	15	179

Alternative 4. This alternative potentially impacts over $4.1 million in ***ex vessel revenue*** or 14.74 percent of all CINMS ex vessel revenue. Most of the impact is from catch in State waters (92%). All of the impact on harvest of kelp and catch of urchins, spiny lobsters, crab, California Sheephead, and sea cucumbers is in the State waters portion of the CINMS. Most of the impact on prawn and tuna catch is in Federal waters. As a percent of total CINMS catch, the largest impacts are on prawn (41.11%), rockfish (30.01%), sculpin & bass (22.86%), California Sheephead (20.58%), urchins (20.29%), sea cucumbers (19.62%) and shark (19.61%). The smallest impacts are on kelp (7.81%), tuna (8.88%), and wetfish (9.13%). See Table 2.13 for the details on ex vessel revenue by species/species groups.

Table 2.13 Commercial Fishing & Kelp: Impact of Alternative 4 on Ex Vessel Value by Species Group - Step 1 Analysis

Species Group	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
Squid	$ 1,716,217	13.15	$ 55,496	0.43	$ 1,771,713	13.58
Kelp[2]	$ 467,886	7.81	$ -	0.00	$ 467,886	7.81
Urchins	$ 1,068,453	20.29	$ -	0.00	$ 1,068,453	20.29
Spiny Lobster	$ 150,333	16.30	$ -	0.00	$ 150,333	16.30
Prawn	$ 104,858	14.91	$ 184,214	26.20	$ 289,072	41.11
Rockfish	$ 116,040	21.12	$ 48,796	8.88	$ 164,836	30.01
Crab	$ 48,483	14.11	$ -	0.00	$ 48,483	14.11
Tuna	$ 7,886	2.58	$ 19,270	6.30	$ 27,156	8.88
Wetfish	$ 20,675	6.86	$ 6,853	2.27	$ 27,528	9.13
CA Sheepshead	$ 48,562	20.58	$ -	0.00	$ 48,562	20.58
Flatfishes	$ 20,546	11.17	$ 6,225	3.39	$ 26,771	14.56
Sea Cucumbers	$ 32,909	19.62	$ -	0.00	$ 32,909	19.62
Sculpin & Bass	$ 7,248	12.01	$ 6,543	10.85	$ 13,791	22.86
Shark	$ 5,321	15.31	$ 1,494	4.30	$ 6,815	19.61
Total	$ 3,815,416	13.57	$ 328,891	1.17	$ 4,144,308	14.74

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.
2. Kelp is processed value from ISP Alginates in San Diego.

Another view of impact is ex vessel revenue by port (Table 2.14). The greatest potential impact of this alternative is on Port Hueneme. Port Hueneme potentially could lose almost $1.5 million or about 11 percent of all ex vessel revenue of landings at the port. Santa Barbara could potentially lose over $1.3 million, but this represents about 15.7% of all their ex vessel revenue from landings. Channels Islands Harbor would potentially lose 7.93%. Ventura Harbor would potentially lose almost 3.4% of the ex vessel value of all landings. All the other ports would potentially lose well under 1% in ex vessel revenue.

Table 2.14 Commercial Fishing & Kelp: Impact of Alternative 4 on Ex Vessel Value by Port - Step 1 Analysis

Port	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
1. Moss Landing	$6	N/A	$2	N/A	$8	N/A
2. Morro Bay	$79	1.55	$0	0.00	$79	1.55
3. Avila/Port San Luis	$37	0.00	$11	0.00	$48	0.00
4. Santa Barbara	$1,296,171	15.09	$52,361	0.61	$1,348,532	15.70
5. Ventura Harbor	$158,103	2.93	$22,943	0.43	$181,045	3.36
6. Channel Islands	$229,807	4.70	$158,169	3.23	$387,976	7.93
7. Port Hueneme	$1,425,261	10.45	$60,360	0.44	$1,485,621	10.89
8. San Pedro	$165,356	1.18	$8,986	0.06	$174,342	1.25
9. Terminal Island	$47,183	0.26	$18,543	0.10	$65,726	0.36
10. Avalon & Other LA	$259	0.01	$7	0.00	$267	0.01
11. Newport Beach	$9	0.00	$14	0.00	$23	0.00
12. San Diego	$5,819	0.17	$110	0.00	$5,929	0.18

1. Percents are the amount of ex vessel value as a percent of the total ex vessel value of landings at the Port (1996-1999 Average Annual Value).

The impact on total income (Table 2.15) is about $11.9 million across all seven counties in the impact area. Most of the impacts are concentrated in Ventura and Santa Barbara counties, although impacts to Monterey and Los Angeles counties are over $1.2 million. These larger impacts to Monterey and Los Angeles counties are a result of this alternatives greater impact on squid landings. The impact in San Diego County is primarily from kelp. Employment impacts mirror the income impacts with 346 full and part-time jobs potentially impacted (Table 2.16).

Table 2.15 Commercial Fishing & Kelp: Impact of Alternative 4 on Total Income by County - Step 1 Analysis

County	State Waters Income	Federal Waters Income	Total Income
1. Monterey	$1,248,202	$40,367	$1,288,570
2. San Luis Obispo	$23,310	$9,348	$32,658
3. Santa Barbara	$2,557,664	$75,480	$2,633,144
4. Ventura	$5,377,737	$548,320	$5,926,057
5. Los Angeles	$1,210,094	$41,776	$1,251,870
6. Orange	$22	$33	$55
7. San Diego	$751,107	$350	$751,457
All Counties	$11,168,136	$715,674	$11,883,810

Table 2.16 Commercial Fishing & Kelp: Impact of Alternative 4 on Total Employment By County - Step 1 Analysis

County	State Waters Employment	Federal Waters Employment	Total Employment
1. Monterey	37	1	38
2. San Luis Obispo	1	0	1
3. Santa Barbara	83	2	85
4. Ventura	164	17	180
5. Los Angeles	32	1	33
6. Orange	0	0	0
7. San Diego	8	0	8
All Counties	324	22	346

Alternative 5. This alternative potentially impacts over $5.1 million in ***ex vessel revenue*** or 18.28 percent of all CINMS ex vessel revenue. Most of the impact is fro m catch in State waters (93.5%). All of the impact on harvest of kelp and catch of spiny lobsters, crab, California Sheephead, and sea cucumbers is in the State waters portion of the CINMS. Most of the impact on prawn and tuna catch, as is almost half of the wetfish impact, is in Federal waters. As a percent of total CINMS catch, the largest impacts are on rockfish (32.55%), prawn (29.26%), California Sheephead (26.74%), sea cucumbers (25.93%), sculpin & bass (25.91 %) and urchins (25.48%), and. The sma llest impacts are on kelp (12.2%) and tuna (13.35%). See Table 2.17 for the details on ex vessel revenue by species/species groups.

Table 2.17 Commercial Fishing & Kelp: Impact of Alternative 5 on Ex Vessel Value by Species Group - Step 1 Analysis

Species Group	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
Squid	$ 2,079,098	15.94	$ 76,843	0.59	$ 2,155,941	16.52
Kelp[2]	$ 730,650	12.20	$ -	0.00	$ 730,650	12.20
Urchins	$ 1,338,737	25.43	$ 2,687	0.05	$ 1,341,424	25.48
Spiny Lobster	$ 202,201	21.93	$ -	0.00	$ 202,201	21.93
Prawn	$ 63,271	9.00	$ 142,504	20.27	$ 205,775	29.26
Rockfish	$ 144,957	26.39	$ 33,857	6.16	$ 178,814	32.55
Crab	$ 54,416	15.84	$ -	0.00	$ 54,416	15.84
Tuna	$ 9,495	3.11	$ 31,300	10.24	$ 40,794	13.35
Wetfish	$ 32,924	10.92	$ 31,249	10.36	$ 64,173	21.29
CA Sheepshead	$ 63,098	26.74	$ -	0.00	$ 63,098	26.74
Flatfishes	$ 28,421	15.46	$ 6,750	3.67	$ 35,171	19.13
Sea Cucumbers	$ 43,477	25.93	$ -	0.00	$ 43,477	25.93
Sculpin & Bass	$ 8,611	14.27	$ 7,020	11.64	$ 15,631	25.91
Shark	$ 6,351	18.28	$ 1,620	4.66	$ 7,971	22.94
Total	$ 4,805,706	17.10	$ 333,830	1.19	$ 5,139,536	18.28

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.
2. Kelp is processed value from ISP Alginates in San Diego.

Another view of impact is ex vessel revenue by port (Table 2.18). The greatest potential impact of this alternative, in terms of percent of total port ex vessel revenue, is on the ports in Santa Barbara (19.41%). In absolute amount, Port Hueneme would potentially lose the greatest amount (over $1.8 million or 13.4% of the total port ex vessel revenue). Channels Islands Harbor would potentially lose 7.35%. Ventura Harbor would potentially lose 3.9% and San Pedro could potentially lose over $216 thousand or 1.55% of the ex vessel of all landings. All the other ports would potentially lose well under 1% in ex vessel revenue.

Table 2.18 Commercial Fishing & Kelp: Impact of Alternative 5 on Ex Vessel Value by Port - Step 1 Analysis

Port	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
1. Moss Landing	$10	N/A	$9	N/A	$19	N/A
2. Morro Bay	$103	2.01	$0	0.00	$103	2.01
3. Avila/Port San Luis	$50	0.00	$12	0.00	$62	0.00
4. Santa Barbara	$1,627,439	18.94	$40,122	0.47	$1,667,562	19.41
5. Ventura Harbor	$190,136	3.53	$21,143	0.39	$211,279	3.92
6. Channel Islands	$235,051	4.80	$124,611	2.55	$359,662	7.35
7. Port Hueneme	$1,730,254	12.69	$96,743	0.71	$1,826,997	13.40
8. San Pedro	$201,867	1.44	$14,451	0.10	$216,318	1.55
9. Terminal Island	$57,570	0.32	$30,770	0.17	$88,340	0.49
10. Avalon & Other LA	$320	0.02	$11	0.00	$331	0.02
11. Newport Beach	$10	0.00	$23	0.00	$33	0.01
12. San Diego	$7,288	0.22	$192	0.01	$7,480	0.22

1. Percents are the amount of ex vessel value as a percent of the total ex vessel value of landings at the Port (1996-1999 Average Annual Value).

The impact on total income (Table 2.19) is over $14.6 million across all seven counties in the impact area. Most of the impacts are concentrated in Ventura and Santa Barbara counties, with impacts of over $1.5 million in Monterey and Los Angeles counties. Like alternative 4, the impacts of alternative 5 have broader impact because of the greater impact on squid. The impact in San Diego County is primarily from kelp. Employment impacts mirror the income impacts with 421 full and part-time jobs potentially impacted (Table 2.20).

Table 2.19 Commercial Fishing & Kelp: Impact of Alternative 5 on Total Income by County - Step 1 Analysis

County	State Waters Income	Federal Waters Income	Total Income
1. Monterey	$1,512,132	$55,911	$1,568,043
2. San Luis Obispo	$29,095	$6,517	$35,613
3. Santa Barbara	$3,203,964	$60,523	$3,264,487
4. Ventura	$6,452,097	$622,547	$7,074,645
5. Los Angeles	$1,472,076	$67,284	$1,539,360
6. Orange	$27	$53	$80
7. San Diego	$1,168,775	$598	$1,169,374
All Counties	$13,838,166	$813,434	$14,651,600

Table 2.20 Commercial Fishing & Kelp: Impact of Alternative 5 on Total Employment By County - Step 1 Analysis

County	State Waters Total Employment	Federal Waters Total Employment	Total Total Employment
1. Monterey	45	2	46
2. San Luis Obispo	1	0	1
3. Santa Barbara	104	2	106
4. Ventura	196	19	215
5. Los Angeles	39	2	41
6. Orange	0	0	0
7. San Diego	12	0	12
All Counties	397	25	421

Preferred Alternative. This alternative potentially impacts over $3.3 million in ***ex vessel revenue*** or 12.5 percent of all CINMS ex vessel revenue. Most of the impact is from catch in State waters (93.9%). All of the impact on harvest of kelp and catch of urchins, spiny lobsters, crab, California Sheephead, and sea cucumbers is in the State waters portion of the CINMS. Most of the impact on tuna and wetfish, as is about half the prawn impact, is in Federal waters. As a percent of total CINMS catch, the largest impacts are on rockfish (21.42%), wetfish (20.46%), prawn (16.7%), sculpin & bass (16.67%), sea cucumbers (16.54%), California Sheephead (16.37%), spiny lobsters (16.17%), and urchins (15.82%). The smallest impact is on kelp (5.55%). This alternative included some attempts to further limit impact on the commercial fisheries by one Marine Conservation Area (West Anacapa Island MCA and SMCA). This MCA and SMCA, for those portions in State waters, allow commercial take spiny lobster. The impact on ex vessel revenue without these exemptions would have been over $3.5 million or 12.56 percent of all ex vessel revenue from the CINMS. The exemptions resulted in a reduction of potential impact of this alternative by about 0.03%. See Table 2.21 for the details on ex vessel revenue by species/species groups.

Table 2.21 Commercial Fishing & Kelp: Impact of Preferred Alternative on Ex Vessel Value by Species Group - Step 1 Analysis

Species Group	State Waters Value	%[1]	Federal Waters Value	%	Total Value	%
Squid	$ 1,660,718	12.73	$ 51,230	0.39	$ 1,711,948	13.12
Kelp[2]	$ 332,794	5.55	$ -	0.00	$ 332,794	5.55
Urchins	$ 830,464	15.77	$ 2,687	0.05	$ 833,151	15.82
Spiny Lobster	$ 149,133	16.17	$ -	0.00	$ 149,133	16.17
Prawn	$ 58,615	8.34	$ 58,832	8.37	$ 117,447	16.70
Rockfish	$ 87,985	16.02	$ 29,653	5.40	$ 117,638	21.42
Crab	$ 50,139	14.59	$ -	0.00	$ 50,139	14.59
Tuna	$ 8,544	2.80	$ 31,991	10.47	$ 40,535	13.26
Wetfish	$ 28,511	9.46	$ 33,162	11.00	$ 61,673	20.46
CA Sheepshead	$ 38,622	16.37	$ -	0.00	$ 38,622	16.37
Flatfishes	$ 22,652	12.32	$ 3,000	1.63	$ 25,652	13.95
Sea Cucumbers	$ 27,731	16.54	$ -	0.00	$ 27,731	16.54
Sculpin & Bass	$ 6,865	11.38	$ 3,189	5.29	$ 10,054	16.67
Shark	$ 4,879	14.04	$ 720	2.07	$ 5,599	16.11
Total	$ 3,307,652	11.77	$ 214,463	0.76	$ 3,522,116	12.53

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.
2. Kelp is processed value from ISP Alginates in San Diego.

Another view of impact is ex vessel revenue by port (Table 2.22). The greatest potential impact of this alternative, in terms of percent of total port ex vessel revenue, is on the ports in Santa Barbara (12.6%). In absolute amount, Port Hueneme would potentially lose the greatest amount (over $1.4 million or 10.7% of all ex vessel revenue of landings at the port). Channels Islands Harbor would potentially lose about $218 thousand or 4.7%. Ventura Harbor would potentially lose 2.9% of the ex vessel of all landings, while San Pedro would potentially lose about 1%. All the other ports would potentially lose extremely small amounts.

Table 2.22 Commercial Fishing & Kelp: Impact of Preferred Alternative on Ex Vessel Value by Port - Step 1 Analysis

Port	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
1. Moss Landing	$9	N/A	$10	N/A	$19	N/A
2. Morro Bay	$63	1.23	$0	0.00	$63	1.23
3. Avila/Port San Luis	$40	0.00	$5	0.00	$45	0.00
4. Santa Barbara	$1,050,864	12.23	$31,396	0.37	$1,082,260	12.60
5. Ventura Harbor	$146,603	2.72	$10,240	0.19	$156,843	2.91
6. Channel Islands	$165,905	3.39	$52,642	1.08	$218,547	4.47
7. Port Hueneme	$1,384,342	10.15	$73,517	0.54	$1,457,859	10.69
8. San Pedro	$158,937	1.14	$11,445	0.08	$170,382	1.22
9. Terminal Island	$46,683	0.26	$30,688	0.17	$77,371	0.43
10. Avalon & Other LA	$252	0.01	$8	0.00	$260	0.01
11. Newport Beach	$9	0.00	$24	0.00	$33	0.00
12. San Diego	$4,538	0.13	$194	0.01	$4,732	0.14

1. Percents are the amount of ex vessel value as a percent of the total ex vessel value of landings at the Port (1996-1999 Average Annual Value).

The impact on total income (Table 2.23) is little over 10.6 million across all seven counties in the impact area. Most of the impacts are concentrated in Ventura and Santa Barbara counties, with about $1.2 million in both Monterey and Los Angeles counties. As with alternatives 4 and 5, the Preferred Alternative's broader impact is largely due to the impacts on the squid fishery. The impact in San Diego County is primarily from kelp. Employment impacts mirror the income impacts with 312 full and part-time jobs potentially impacted (Table 2.24).

Table 2.23 Commercial Fishing & Kelp: Impact of Prefered Alternative on Total Income By County - Step 1 Analysis

County	State Waters Income	Federal Waters Income	Total Income
1. Monterey	$1,207,845	$37,284	$1,245,129
2. San Luis Obispo	$17,914	$5,688	$23,602
3. Santa Barbara	$2,085,917	$44,332	$2,130,249
4. Ventura	$5,102,153	$390,763	$5,492,917
5. Los Angeles	$1,174,655	$52,264	$1,226,918
6. Orange	$23	$54	$77
7. San Diego	$535,173	$606	$535,779
All Counties	$10,123,680	$530,992	$10,654,672

Table 2.24 Commercial Fishing & Kelp: Impact of Prefered Alternative on Total Employment By County - Step 1 Analysis

County	State Waters Employment	Federal Waters Employment	Total Employment
1. Monterey	36	1	37
2. San Luis Obispo	1	0	1
3. Santa Barbara	68	1	69
4. Ventura	155	12	167
5. Los Angeles	31	1	32
6. Orange	0	0	0
7. San Diego	5	0	5
All Counties	296	16	312

Summary and Comparative Impacts of Alternatives. In terms of percent of ex vessel revenue, income and employment potentially impacted and ranked from highest impact to lowest impact, the rankings are Alternatives 5, 4, Preferred, 3, 2, 1 (Table 2.25). The Preferred Alternative is in the mid-range of impacts among all alternatives. Another way to view the relative impacts, even in the limited Step 1 context, is to look at the ratio of the percent of CINMS habitat protected to the percent of income lost. The higher the ratio the more protection per dollar of income lost. Alternative 3 has the highest ratio (2.83) followed by Alternative 4 (2.02), Alternative 2 (1.97), The Preferred Alternative (1.95), and Alternative 5 (1.92). Alternative 1 has a ratio of 1.73, and thus the highest cost per unit protection. Even though Alternative 3 is in the mid range with respect to percent of habitat protected (21 percent), it is expected to have the least negative impact (or lowest cost) per unit of resource protected.

Table 2.25 Commercial Fishing & Kelp: Summary of Impacts by Alternative - Step 1 Analysis

	State Waters		Federal Waters		Total	
Alternative	$/#	% [1]	$/#	%	$/#	%
			Ex Vessel Revenue [2]			
1	$2,015,082	7.17	$146,873	0.52	$2,161,955	7.69
2	$2,103,776	7.48	$117,720	0.42	$2,221,495	7.90
3	$2,136,610	7.60	$232,544	0.83	$2,369,154	8.43
4	$3,815,416	13.57	$328,891	1.17	$4,144,308	14.74
5	$4,805,706	17.10	$333,830	1.19	$5,139,536	18.28
Preferred	$3,307,652	11.77	$214,463	0.76	$3,522,116	12.53
			Income [3]			
1	$5,362,962	6.47	$394,857	0.48	$5,757,819	6.94
2	$5,631,389	6.79	$249,592	0.30	$5,880,981	7.09
3	$5,656,664	6.82	$496,988	0.60	$6,153,652	7.42
4	$11,168,136	13.47	$715,674	0.86	$11,883,810	14.33
5	$13,838,166	16.69	$813,434	0.98	$14,651,600	17.67
Preferred	$10,123,680	12.21	$530,992	0.64	$10,654,672	12.85
			Employment [4]			
1	156	6.76	12	0.52	168	7.28
2	161	6.98	8	0.35	169	7.33
3	164	7.11	15	0.65	179	7.76
4	324	14.04	22	0.95	346	15.00
5	397	17.21	25	1.08	422	18.29
Preferred	296	12.82	16	0.69	312	13.51

1. Percents are the percent of total baseline 1996-1999 impacted.
2. Ex vessel Revenue received by fishermen and processed value of kelp, Baseline Annual Average 1996-1999 for the entire CINMS is equal to $28,111,179.
3. Income is total income, including multiplier impacts. Baseline Annual Average 1996-1999 for the entire CINMS is equal to $82, 913,552.
4. Employment is total employment, including multiplier impacts. Baseline Annual Average 1996-1999 for the entire CINMS is equal to 2,307.

Impacts on Individual Fishermen. The above analyses were on the economic dimensions of the potential impacts of alternatives and at a broad level (across the whole fishery). Chapter 1 presented socioeconomic profiles for the Barilotti (Table 1.9) and Pomeroy (Table 1.10) samples. We looked at the profiles of both samples for each alternative. All of the Barilotti sample of fishermen would be impacted by the Preferred Alternative and Alternatives 2, 4, and 5. 55 of the 59 fishermen in the Barilotti sample would be impacted by Alternatives 1 and 3. All the Pomeroy sampled fishermen (squid/wetfish fishermen) would be impacted by all the alternatives. Further, there were no statistically significant differences between the full Barilotti sample and those impacted by any of the alternatives for any socioeconomic characteristic such as experience, age, education, dependency on fishing, crew and family dependent on fishing, ownership and investment in fishing boats and equipment or location of residence or ports used. Appendix D, Table D.7 includes a comparison of socioeconomic profiles by alternatives.

What is different across alternatives is the extent of potential impacts on individual fishermen. We first classified fishermen according to levels of dependence on their total fishing revenue derived from the CINMS. The information is from CDFG trip ticket or PacFIN information for individual fishermen. Information is reported by species and CDFG block where each fisherman catches fish. From our samples, we also obtained the percent of their incomes that come from fishing. We were thus able to calculate the percent of a fisherman's total income from all sources that would be potentially impacted by each alternative. The results for the Barilotti sample are in Table 2.26 and the results for the Pomeroy sample in Table 2.27.

Table 2.26 Summary of Ranges of Potential Losses of Income to Individual Fishermen: Barilotti Sample - Step 1 Analysis

	Percent of Income Loss					
Percent of Revenue Derived from Fishing In CINMS [1]	Alternatives 1	2	3	4	5	Preferred
80 - 100 (N=30)	0.87 - 20.92	2.36 - 19.93	0.87 - 20.92	4.37 - 27.90	6.88 - 30.69	2.36 - 23.71
60 - 80 (N=6)	5.15 - 15.53	7.73 - 18.63	5.15 - 18.63	10.13 - 24.84	12.88 - 31.05	9.02 - 18.63
40 - 60 (N=7)	0.00 - 8.43	0.00 - 9.08	0.00 - 8.43	0.00 - 10.37	3.27 - 14.27	1.09 - 11.68
20 - 40 (N=4)	0.00 - 5.84	2.41 - 6.57	0.00 - 5.84	2.41 - 6.80	1.81 - 10.22	1.20 - 6.01
0 - 20 (N=7)	0.05 - 2.19	0.06 - 2.99	0.05 - 2.04	0.09 - 3.86	0.11 - 4.08	0.06 - 2.99
All (N=54)	0.00 - 20.92	0.00 - 19.93	0.00 - 20.92	0.00 - 27.90	0.11 - 31.05	0.06 - 23.71

1. Percents of fishing revenues show dependency on CINMS. The N-value in parentheses is the number of fishermen from the Barilotti Sample that earn the range of percent of revenues from fishing in the CINMS.
2. Income is total income from all sources.

Table 2.27 Summary of Ranges of Potential Losses of Income to Individual Squid/Wefish Fishermen - Step 1 Analysis

	Percent of Income Loss					
Percent of Revenue Derived from Fishing In CINMS [1]	Alternatives 1	2	3	4	5	Preferred
80 - 100 (N=9)	1.88 - 6.76	6.04 - 14.88	2.81 - 7.44	6.62 - 14.81	9.64 - 17.35	6.62 - 14.52
60 - 80 (N=7)	0.65 - 7.02	1.15 - 16.24	0.94 - 7.61	1.44 - 15.43	1.94 - 21.03	1.66 - 15.83
40 - 60 (N=3)	2.84 - 5.30	6.98 - 11.83	5.23 - 9.54	1.31 - 10.52	8.13 - 14.84	6.66 - 11.83
20 - 40 (N=8)	0.19 - 7.33	0.42 - 9.70	0.16 - 8.09	0.47 - 11.29	0.87 - 13.38	0.87 - 10.22
0 - 20 (N=6)	0.02 - 0.60	0.09 - 1.00	0.03 - 0.63	0.11 - 1.02	0.16 - 1.98	0.12 - 1.06
All (N=33)	0.02 - 7.33	0.09 - 16.24	0.03 - 9.54	0.11 - 15.43	0.16 - 21.03	0.12 - 15.83

1. Percents of fishing revenues show dependency on CINMS. The N-value in parentheses is the number of sampled squid/wetfish fishermen in the sample that earn the range of percent of revenues from fishing in the CINMS.
2. Income is total income from all sources.

The Barilotti sample appears to be highly dependent on the CINMS for their catch with 30 of 54 fishermen or 55.55% deriving 80 to 100 percent of their fishing revenue from the CINMS. The range of potential impacts for this most dependent group rank identically to total ex vessel revenue as discussed in our more aggregate analysis. The same patterns hold for the group that depends on the CINMS for 60 to 80 percent of their fishing revenue. Generally, one can see as the level of dependency on the CINMS for fishing revenues falls, the ranges of percent of income potentially impacted declines as expected. The maximum impact on an individual fisherman's income is 31 percent for Alternative 5, followed by 27.9 percent for Alternative 4 and 23.7 percent for the Preferred Alternative. The maximum was 20.92 for both Alternative 3 and Alternative 1, while the maximum for alternative 2 was 19.9 percent.

The Pomeroy sample (squid/wetfish fishermen) showed less dependency than the Barilotti sample on the CINMS for their total fishing revenue and the maximum impacts on their incomes was only about half that of the Barilotti sample. Nine (9) of the 33 (27%) purse seine and light boat operators that reported full information depended on Channel Islands fisheries for 80 to 100 percent of their fishing revenue. The ranking across alternatives was somewhat different from that of our more aggregated analysis for this group, who are most dependent on Channel Islands fisheries. Alternative 5 had the greatest impact followed by Alternative 2, Alternative 4, the Preferred Alternative, Alternative 3 and Alternative 1. Seven (7) or 21 percent of the Pomeroy sample depend on Channel Islands fisheries for 60 to 80 percent of their fishing revenues. The ranking here was again different for this group across alternatives. Alternatives 5 and 2 still had the greatest impact on this group, whereas the Preferred Alternative had a slightly higher, but not significantly different impact than Alternative 4. Alternatives 3 and 1 had the lowest impact for this group.

In Tables 2.28 and 2.29, we organized the Barilotti and Pomeroy sample according to the ranges of potentially lost income. In these displays, one can see the relative impacts across alternatives. Alternatives 5 and 4 are the only alternative for which any one in either the Barilotti or Pomeroy samples would potentially lose more than 25 percent of their income. Except for Alternative 5, very few fishermen would lose more than 20 percent of their incomes. 57 percent of the Barilotti sample and two-thirds of the Pomeroy sample would potentially lose 10 percent or less of their income under the Preferred Alternative.

Table 2.28 Summary Impact on Income of Individual Fishermen: Barilotti Sample - Step 1 Analysis

	Number of Fishermen in Sample [1]					
	Alternatives					
Percent of Income Potentially Lost	1	2	3	4	5	Preferred
0 - 1.0	9	6	9	5	3	5
1.01 - 5.0	10	9	10	9	6	9
5.01 - 10.0	16	16	16	9	9	17
10.01 - 15.0	11	12	11	14	10	10
15.01 - 20.0	7	11	7	11	8	10
20.01 - 25.0	1	0	1	5	12	3
25.01 - 31.05	0	0	0	1	6	0

1. 54 Fishermen form the Barilotti Sample with reported revenues and household income.

Table 2.29 Summary Impact on Income of Individual Squid/Wefish Fishermen - Step 1 Analysis

Percent of Income Potentially Lost	Number of Fishermen in Sample [1]					
	Alternatives					
	1	2	3	4	5	Preferred
0 - 1.0	9	7	9	5	5	5
1.01 - 5.0	17	3	14	7	5	5
5.01 - 10.0	7	12	10	8	5	12
10.01 - 15.0	0	10	0	12	12	10
15.01 - 17.35	0	1	0	1	6	1

1. 33 Squid/Wetfish fishermen with reported reveneues.

Recreation Industry

The interpretation of the estimates provided in this analysis is critical to understanding the "true" impact of the various alternatives proposed for the Channel Islands Marine Reserve system. As was mentioned above, the estimates from our GIS analysis for the different boundary alternatives (step one) are simply the sum of each measurement within the boundaries for a given alternative. The estimates therefore represent the **maximum total potential loss from displacement of the consumptive recreational activities**. This analysis ignores possible mitigating factors and the possibility of net benefits that might be derived if the proposed marine reserve system has replenishment effects. Although we don't have the ability to quantify either the extent of the mitigating factors or the potential benefits from replenishment, we will discuss these as well as other potential benefits of the proposed marine reserve system after we have presented and discussed the maximum potential losses from displacement of the current consumptive recreational uses.

The analysis is separated into two steps, step 1) costs, and step 2) benefits/mitigating factors. In the step one analysis, maximum potential loss of income for consumptive activities is presented for state waters, for federal waters, and in total for each alternative. For the preferred alternative, in addition to these analyses, a separate step one analysis will be made for each individual reserve. This analysis may be found in Appendix G. In the step two analysis, baseline economic impact is presented for non-consumptive activities for state waters, federal waters, and in total for each alternative.

Recreation: Consumptive Activities – Step 1 Analysis

No-Action Alternative. The no action alternative simply means that the proposed Channel Islands Marine reserve system and corresponding no take regulations would not take place. The no action alternative has a simple interpretation in that any costs of imposing the no take regulations, for any given alternative with no take regulations, would be the benefits of the no action alternative. That is, by not adopting the no-take regulations, the costs are avoided. Similarly, any benefits fromimposing the no take regulations, for any given alternative with no take regulations, would be the costs of the no-action alternative. That is, by not adopting the no take regulations, the costs are the benefits lost by not adopting the no take regulations. Said another way, these are opportunities lost. The impacts of the no action alternative can only be understood by comparing it to one of the proposed alternatives. Thus the impacts of the no action alternative can be obtained by reading the impacts from any of the proposed alternatives in reverse.

The Preferred Alternative. The aggregate maximum potential loss to income for all recreational consumptive activities is about $4.3 million dollars or 17.2% of the income generated by recreational consumptive activities in the study area (See Table 2.30). The magnitude of impact varies by activity depending upon whether it is expressed in terms of direct usage (person-days) or economic impact (i.e. income). In terms of person-days, the activity that is most impacted is private boat fishing with a maximum potential loss of 36,381 person-days, followed by charter/party boat fishing with 25,767 person-days, private boat diving with 12,182 person-days and charter/party boat diving with 3,579 person-days. In terms of total income, the activity that is most impacted is charter/party boat fishing with a maximum potential loss of $2.7 million, followed by private boat fishing with $743 thousand, charter/party boat diving with $506 thousand and private boat diving with $309 thousand.

Table 2.30. Summary: Recreation Consumptive Activities - Preferred Alternative - Step 1 Analysis

	Total	State Waters		Federal Waters	
Person-days	77,908	63,322	81.3%	14,586	18.7%
Market Impact					
Direct Sales	$ 6,139,074	$ 4,824,499	78.6%	$ 1,314,575	21.4%
Direct Wages and Salaries	$ 2,429,728	$ 1,876,605	77.2%	$ 553,123	22.8%
Direct Employment	76	59	78.0%	17	22.0%
Total Income					
Upper Bound	$ 4,252,025	$ 3,284,059	77.2%	$ 967,966	22.8%
Lower Bound	$ 3,644,593	$ 2,814,908	77.2%	$ 829,685	22.8%
Total Employment					
Upper Bound	114	89	78.0%	25	22.0%
Lower Bound	95	74	78.0%	21	22.0%
Non-Market Impact					
Consumer's Surplus	$ 2,746,600	$ 2,229,262	81.2%	$ 517,338	18.8%
Profit[1]	$ 70,419	$ 52,125	74.0%	$ 18,294	26.0%

1. Profit is used as a proxy for producer's surplus.

Table 2.31. Recreation Consumptive Activities - Preferred Alternative - Total - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	25,767	16.23%	3,579	19.95%	36,381	17.00%	12,182	25.81%
Market Impact								
Direct Sales	$ 3,354,260	16.25%	$ 603,913	20.07%	$ 1,510,907	17.00%	$ 669,994	25.81%
Direct Wages and Salaries	$ 1,539,350	16.25%	$ 289,218	19.96%	$ 424,830	17.00%	$ 176,330	25.80%
Direct Employment	45	16.35%	10	19.95%	14	16.77%	6	26.33%
Total Income								
Upper Bound	$ 2,693,862	15.83%	$ 506,132	18.70%	$ 743,453	16.63%	$ 308,578	23.90%
Lower Bound	$ 2,309,024	15.92%	$ 433,827	18.96%	$ 637,245	16.71%	$ 264,496	24.29%
Total Employment								
Upper Bound	68	15.90%	14	18.90%	22	16.77%	9	24.30%
Lower Bound	57	16.05%	12	19.00%	18	16.84%	8	24.68%
Non-Market Impact								
Consumer's Surplus	$ 930,020	16.23%	$ 129,164	19.96%	$ 1,264,137	17.00%	$ 423,279	25.81%
Profit[1]	$ 61,443	16.33%	$ 8,977	20.40%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Reserve Types. The Preferred Alternative includes 12 individual reserve sites (see Appendix G for an analysis by reserve), with three types of reserves. Ten of these reserves are "Marine Reserves," which are *no-take areas*, meaning that consumptive activity of any kind is prohibited. One of the reserves, Anacapa Island, is a "Marine Conservation Area." This type of reserve allows for the taking of spiny lobster (*panulirus interruptus*) and pelagic finfish. Although recreational fishing or consumptive diving data were not collected by species, the Recreational Fisheries Information Network (RecFIN) fishing location add-on to the Marine Recreational Fisheries Statistics Survey (MRFSS) was used to estimate the proportion of recreational pelagic finfish by California Department of Fish and Game (CDFG) fish block. Using this proportion to eliminate pelagic finfish from the analysis, the model only takes into account prohibited species of finfish for this alternative. Unfortunately, the sample did not include data for recreational take of spiny lobster. As a result, this analysis may be an overestimate of actual maximum potential impact. The final reserve type is "Marine Park." One of the reserves, Painted Cave, falls in to this category. In this reserve no consumptive activities are permitted except for the recreational take of spiny lobster. As was stated above, the data do not include specific information on the distribution of spiny lobster, therefore this analysis may be an overestimate of actual maximum potential impact.

Preferred Alternative: Breakout by Jurisdiction. Although just over half of the Preferred Alternative lies in state waters, a much higher percentage of consumptive activities take place within the state boundary. Overall, 81.3% of consumptive use, in terms of person-days, takes place in state waters (i.e., areas that are more shallow and closer to shore). Not surprisingly, a higher percentage of diving takes place in state waters (90.4% and 95.4% of charter/party boat and private boat diving, respectively). The proportion of charter/party boat fishing that takes place in state waters is less than the overall percentage (71.1%), while the proportion of private boat fishing is just over the overall proportion (82.9%). See Tables 2.32 and 2.33 for details.

Table 2.32. Recreation Consumptive Activities - Preferred Alternative - State Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	18,312	11.53%	3,236	18.05%	30,148	14.09%	11,625	24.63%
Market Impact								
Direct Sales	$ 2,387,756	11.57%	$ 545,336	18.12%	$ 1,252,048	14.09%	$ 639,359	24.63%
Direct Wages and Salaries	$ 1,094,442	11.55%	$ 261,768	18.06%	$ 352,032	14.09%	$ 168,364	24.63%
Direct Employment	32	11.68%	9	18.06%	12	13.96%	6	24.91%
Total Income								
Upper Bound	$ 1,915,274	11.55%	$ 458,094	18.06%	$ 616,055	14.09%	$ 294,636	24.63%
Lower Bound	$ 1,641,663	11.55%	$ 392,652	18.06%	$ 528,047	14.09%	$ 252,545	24.63%
Total Employment								
Upper Bound	49	11.66%	13	18.06%	18	14.07%	9	24.92%
Lower Bound	41	11.67%	11	18.06%	15	14.03%	8	24.51%
Non-Market Impact								
Consumer's Surplus	$ 660,970	11.53%	$ 116,811	18.05%	$ 1,047,556	14.09%	$ 403,925	24.63%
Profit[1]	$ 44,074	11.71%	$ 8,051	18.30%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Table 2.33. Recreation Consumptive Activities - Preferred Alternative - Federal Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	7,454	4.69%	342	1.91%	6,233	2.91%	557	1.18%
Market Impact								
Direct Sales	$ 966,504	4.68%	$ 58,577	1.95%	$ 258,860	2.91%	$ 30,635	1.18%
Direct Wages and Salaries	$ 444,907	4.70%	$ 27,450	1.89%	$ 72,799	2.91%	$ 7,967	1.17%
Direct Employment	13	4.67%	1	1.89%	2	2.89%	0	1.19%
Total Income								
Upper Bound	$ 778,588	4.70%	$ 48,038	1.89%	$ 127,398	2.91%	$ 13,942	1.17%
Lower Bound	$ 667,361	4.70%	$ 41,176	1.89%	$ 109,198	2.91%	$ 11,950	1.17%
Total Employment								
Upper Bound	19	4.66%	1	1.89%	4	2.91%	0	1.19%
Lower Bound	16	4.66%	1	1.89%	3	2.90%	0	1.17%
Non-Market Impact								
Consumer's Surplus	$ 269,050	4.69%	$ 12,353	1.91%	$ 216,581	2.91%	$ 19,354	1.18%
Profit[1]	$ 17,369	4.62%	$ 925	2.10%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

***Alternative 1*.** In terms of impact on consumptive activities this is the least costly marine reserve alternative. It is significantly smaller that the preferred alternative in terms of both market and non-market impacts. The aggregate maximum potential loss to income for all consumptive recreation activities is about $2.4 million dollars or 9.7% of the income generated by recreational consumptive activities in the study area (See Table 2.34). The magnitude of impact varies by activity depending upon whether it is expressed in terms of direct usage (person-days) or economic impact (e.g. income). In terms of person-days, the activity that is most impacted is private boat fishing with a maximum potential loss of 20,469 person-days, followed by charter/party boat fishing with 16,345 person-days, private boat diving with 2,409 person-days and charter/party boat diving with 1,456 person-days. In terms of total income, the activity that is most impacted is charter/party boat fishing with a maximum potential loss of $1.7 million, followed by private boat fishing with $418 thousand, charter/party boat diving with $203 thousand and private boat diving with $61 thousand.

Table 2.34. Summary: Recreation Consumptive Activities - Alternative 1 - Step 1 Analysis

	Total	State Waters		Federal Waters	
Person-days	40,679	32,585	80.1%	8,093	19.9%
Market Impact					
Direct Sales	$3,352,951	$ 2,682,838	80.0%	$ 670,114	20.0%
Direct Wages and Salaries	$1,372,910	$ 1,097,074	79.9%	$ 275,836	20.1%
Direct Employment	43	34	80.4%	8	19.6%
Total Income					
Upper Bound	$2,402,592	$ 1,919,879	79.9%	$ 482,713	20.1%
Lower Bound	$2,059,364	$ 1,645,610	79.9%	$ 413,754	20.1%
Total Employment					
Upper Bound	64	51	80.4%	13	19.6%
Lower Bound	53	43	80.4%	10	19.6%
Non-Market Impact					
Consumer's Surplus	$1,437,436	$ 1,151,218	80.1%	$ 286,218	19.9%
Profit[1]	$ 42,086	$ 33,439	79.5%	$ 8,647	20.5%

1. Profit is used as a proxy for producer's surplus.

Table 2.35. Recreation Consumptive Activities - Alternative 1 - Total - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	16,345	10.29%	1,456	8.12%	20,469	9.56%	2,409	5.10%
Market Impact								
Direct Sales	$ 2,131,987	10.33%	$ 238,408	7.92%	$ 850,074	9.56%	$ 132,482	5.10%
Direct Wages and Salaries	$ 983,138	10.38%	$ 115,823	7.99%	$ 239,051	9.56%	$ 34,897	5.11%
Direct Employment	29	10.54%	4	8.27%	8	9.48%	1	5.20%
Total Income								
Upper Bound	$ 1,720,492	10.11%	$ 202,691	7.49%	$ 418,340	9.36%	$ 61,069	4.73%
Lower Bound	$ 1,474,708	10.17%	$ 173,735	7.59%	$ 358,577	9.40%	$ 52,345	4.81%
Total Employment								
Upper Bound	44	10.25%	6	7.83%	12	9.41%	2	4.80%
Lower Bound	37	10.35%	5	7.87%	10	9.44%	2	4.95%
Non-Market Impact								
Consumer's Surplus	$ 589,959	10.30%	$ 52,544	8.12%	$ 711,235	9.56%	$ 83,698	5.10%
Profit[1]	$ 38,674	10.28%	$ 3,412	7.75%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Alternative 1: Breakout by Jurisdiction. The proportion of consumptive usage in the state waters of Alternative 1 is similar to the proportion of the Preferred Alternative consumptive usage taking place within state waters. Overall, 80.1% of consumptive usage, in terms of person-days, takes place in state waters. A higher percentage of diving takes place in state waters (91.8% and 92.5% of charter/party boat and private boat diving, respectively). The percentage of fishing that takes place in state waters is less than the overall percentage of fishing (78% and 79.5 percent of charter/party boat and private boat respectively). See Tables 2.36 and 2.37 for details.

Table 2.36. Recreation Consumptive Activities - Alternative 1 - State Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	12,752	8.03%	1,337	7.46%	16,267	7.60%	2,229	4.72%
Market Impact								
Direct Sales	$ 1,666,068	8.07%	$ 218,625	7.27%	$ 675,571	7.60%	$ 122,574	4.72%
Direct Wages and Salaries	$ 768,553	8.11%	$ 106,221	7.33%	$ 189,973	7.60%	$ 32,327	4.73%
Direct Employment	23	8.29%	4	7.60%	6	7.54%	1	4.81%
Total Income								
Upper Bound	$ 1,344,968	8.11%	$ 185,887	7.33%	$ 332,452	7.60%	$ 56,572	4.73%
Lower Bound	$ 1,152,829	8.11%	$ 159,332	7.33%	$ 284,959	7.60%	$ 48,490	4.73%
Total Employment								
Upper Bound	35	8.27%	5	7.60%	10	7.60%	2	4.81%
Lower Bound	29	8.27%	5	7.60%	8	7.57%	1	4.73%
Non-Market Impact								
Consumer's Surplus	$ 460,287	8.03%	$ 48,260	7.46%	$ 565,233	7.60%	$ 77,438	4.72%
Profit[1]	$ 30,310	8.05%	$ 3,130	7.11%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Table 2.37. Recreation Consumptive Activities - Alternative 1 - Federal Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	3,593	2.26%	119	0.66%	4,202	1.96%	180	0.38%
Market Impact								
Direct Sales	$ 465,919	2.26%	$ 19,783	0.66%	$ 174,503	1.96%	$ 9,908	0.38%
Direct Wages and Salaries	$ 214,585	2.26%	$ 9,602	0.66%	$ 49,078	1.96%	$ 2,570	0.38%
Direct Employment	6	2.25%	0	0.67%	2	1.95%	0	0.39%
Total Income								
Upper Bound	$ 375,524	2.26%	$ 16,804	0.66%	$ 85,887	1.96%	$ 4,498	0.38%
Lower Bound	$ 321,878	2.26%	$ 14,403	0.66%	$ 73,618	1.96%	$ 3,855	0.38%
Total Employment								
Upper Bound	9	2.25%	0	0.67%	2	1.96%	0	0.39%
Lower Bound	8	2.25%	0	0.67%	2	1.96%	0	0.38%
Non-Market Impact								
Consumer's Surplus	$ 129,673	2.26%	$ 4,284	0.66%	$ 146,002	1.96%	$ 6,259	0.38%
Profit[1]	$ 8,364	2.22%	$ 283	0.64%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

One other important point to mention is that due to there not being a reserve in the Santa Barbara region of the study area, the impact of this alternative on Los Angeles County will be lower (7% in terms of person-days of activity). Because of the distance to the distance to San Miguel, Santa Rosa, Santa Cruz, and Anacapa Islands, the relative proximity of Santa Barbara Island makes it the primary destination of consumptive recreational users from Los Angeles County. The maximum potential loss to this group of users, will therefore be less than it will be for other groups of recreational fishers.

Alternative 2. In terms of impact on consumptive activities Alternative 2 is slightly smaller than the preferred marine reserve alternative. The aggregate maximum potential loss to income for all consumptive activities is about $3.9 million dollars or 15.8% of the income generated by recreational consumptive activity in the study area (See Table 2.38). The magnitude of impact varies by activity depending upon whether it is expressed in terms of direct usage (person-days) or economic impact (e.g. income). In terms of person-days, the activity that is most impacted is private boat fishing with a maximum potential loss of 33,956 person-days, followed by charter/party boat fishing with 22,981 person-days, private boat diving with 11,299 person-days and charter/party boat diving with 3,639 person-days. In terms of total income, the activity that is most impacted is charter/party boat fishing with a maximum potential loss of $2.4 million, followed by private boat fishing with $694 thousand, charter/party boat diving with $520 thousand and private boat diving with $286 thousand.

Table 2.38. Summary: Recreation Consumptive Activities - Alternative 2 - Step 1 Analysis

	Total	State Waters		Federal Waters	
Person-days	71,875	59,451	82.7%	12,424	17.3%
Market Impact					
Direct Sales	$5,632,831	$ 4,527,946	80.4%	$ 1,104,886	19.6%
Direct Wages and Salaries	$2,234,694	$ 1,769,845	79.2%	$ 464,849	20.8%
Direct Employment	70	56	80.0%	14	20.0%
Total Income					
Upper Bound	$3,910,714	$ 3,097,229	79.2%	$ 813,485	20.8%
Lower Bound	$3,352,040	$ 2,654,767	79.2%	$ 697,273	20.8%
Total Employment					
Upper Bound	105	84	80.0%	21	20.0%
Lower Bound	87	70	80.0%	17	20.0%
Non-Market Impact					
Consumer's Surplus	$2,533,299	$ 2,092,763	82.6%	$ 440,536	17.4%
Profit[1]	$ 62,683	$ 47,436	75.7%	$ 15,247	24.3%

1. Profit is used as a proxy for producer's surplus.

Table 2.39. Recreation Consumptive Activities - Alternative 2 - Total - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	22,981	14.47%	3,639	20.29%	33,956	15.87%	11,299	23.94%
Market Impact								
Direct Sales	$ 2,988,969	14.48%	$ 612,212	20.35%	$ 1,410,210	15.87%	$ 621,440	23.94%
Direct Wages and Salaries	$ 1,377,478	14.54%	$ 297,005	20.50%	$ 396,555	15.87%	$ 163,656	23.95%
Direct Employment	41	14.62%	10	20.35%	13	15.65%	6	24.43%
Total Income								
Upper Bound	$ 2,410,587	14.16%	$ 519,759	19.20%	$ 693,971	15.52%	$ 286,397	22.18%
Lower Bound	$ 2,066,217	14.24%	$ 445,508	19.47%	$ 594,832	15.60%	$ 245,483	22.55%
Total Employment								
Upper Bound	61	14.21%	15	19.28%	20	15.65%	9	22.55%
Lower Bound	51	14.35%	12	19.38%	17	15.72%	7	22.90%
Non-Market Impact								
Consumer's Surplus	$ 829,460	14.48%	$ 131,349	20.29%	$ 1,179,887	15.87%	$ 392,604	23.94%
Profit[1]	$ 53,942	14.34%	$ 8,741	19.86%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Alternative 2: Breakout by Jurisdiction. About 67% of Alternative 2 lies in state waters, although a higher percentage of fishing and a significantly higher percentage of diving occurs within the state boundary. Overall, 82.7% of consumptive usage, in terms of person-days, takes place in state waters. A higher percentage of diving takes place in state waters (90.4% and 95.4% of charter/party boat and private boat diving, respectively). The proportion of charter/party boat fishing is less than the overall percentage (71.1%) and the proportion of private boat fishing is slightly higher than the overall percentage (82.9%). See Table 2.40 and 2.41 for details.

Table 2.40. Recreation Consumptive Activities - Alternative 2 - State Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	16,615	10.46%	3,447	19.22%	28,385	13.26%	11,004	23.32%
Market Impact								
Direct Sales	$ 2,164,101	10.49%	$ 579,796	19.27%	$ 1,178,848	13.26%	$ 605,200	23.32%
Direct Wages and Salaries	$ 997,646	10.53%	$ 281,282	19.41%	$ 331,484	13.26%	$ 159,432	23.33%
Direct Employment	30	10.64%	9	19.28%	11	13.15%	6	23.59%
Total Income								
Upper Bound	$ 1,745,881	10.53%	$ 492,244	19.41%	$ 580,097	13.26%	$ 279,006	23.33%
Lower Bound	$ 1,496,469	10.53%	$ 421,924	19.41%	$ 497,226	13.26%	$ 239,148	23.33%
Total Employment								
Upper Bound	44	10.62%	14	19.28%	17	13.25%	9	23.59%
Lower Bound	37	10.63%	12	19.28%	14	13.21%	7	23.20%
Non-Market Impact								
Consumer's Surplus	$ 599,684	10.46%	$ 124,423	19.22%	$ 986,312	13.24%	$ 382,344	23.17%
Profit[1]	$ 39,158	10.41%	$ 8,279	18.81%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Table 2.41. Recreation Consumptive Activities - Alternative 2 - Federal Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	6,366	4.01%	192	1.07%	5,571	2.60%	295	0.63%
Market Impact								
Direct Sales	$ 824,868	4.00%	$ 32,416	1.08%	$ 231,362	2.60%	$ 16,239	0.63%
Direct Wages and Salaries	$ 379,832	4.01%	$ 15,723	1.09%	$ 65,071	2.60%	$ 4,224	0.62%
Direct Employment	11	3.98%	1	1.07%	2	2.58%	0	0.63%
Total Income								
Upper Bound	$ 664,706	4.01%	$ 27,515	1.09%	$ 113,874	2.60%	$ 7,391	0.62%
Lower Bound	$ 569,748	4.01%	$ 23,584	1.09%	$ 97,606	2.60%	$ 6,335	0.62%
Total Employment								
Upper Bound	17	3.97%	1	1.07%	3	2.60%	0	0.63%
Lower Bound	14	3.97%	1	1.07%	3	2.59%	0	0.62%
Non-Market Impact								
Consumer's Surplus	$ 229,775	4.01%	$ 6,926	1.07%	$ 193,575	2.60%	$ 10,259	0.63%
Profit[1]	$ 14,784	3.93%	$ 463	1.05%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Because this alternative does not have a reserve in the Santa Barbara region, one would expect the impact of this alternative on Los Angeles County users to be lower. Because of the distance to San Miguel, Santa Rosa, Santa Cruz, and Anacapa Islands, the relative proximity of Santa Barbara Island makes it the primary destination of consumptive recreational users from Los Angeles County. However, because this alternative encompasses the entire region in which users from Los Angeles operate, and users from Los Angeles do operate in the proximity of Santa Cruz and Anacapa Islands, the relative impacts to Los Angeles County and the study area in general are similar (about 16% in terms of person-days).

Reserve Types. The Alternative 2 includes 11 individual reserve sites, with two types of reserves. Eight of these reserves are Marine Reserves. Three of the reserves, Carrington Point, Scorpion (East and West), and Anacapa Island, are Marine Conservation Areas. This type of reserve allows for the taking of spiny lobster and pelagic finfish. Although recreational fishing or consumptive diving data by species was not collected, the RecFIN fishing location add-on to the MRFSS was used to estimate the proportion of recreational pelagic finfish by CDFG fish block. Using this proportion to eliminate pelagic finfish from the analysis, the model only takes into account prohibited species of finfish for these reserves. Unfortunately, the sample did not include data for recreational taking of spiny lobsters. As a result, this analysis may be an overestimate of actual maximum potential impact.

Alternative 3. In terms of impact on consumptive activities Alternative 3 is smaller than the preferred marine reserve alternative. The aggregate maximum potential loss to income for all consumptive activities is about $2.9 million dollars or 11.6% of the income generated by recreational consumptive activity in the study area (See Table 2.42). The magnitude of impact varies by activity depending upon whether it is expressed in terms of direct usage (person-days) or economic impact (e.g. income). In terms of person-days, the activity that is most impacted is private boat fishing with a maximum potential loss of 21,890 person-days, followed by charter/party boat fishing with 20,028 person-days, private boat diving with 2,667 person-days and charter/party boat diving with 1,689 person-days. In terms of total income, the activity that is most impacted is charter/party boat fishing with a maximum potential loss of $2.1 million, followed by private boat fishing with $447 thousand, charter/party boat diving with $236 thousand and private boat diving with $68 thousand.

Table 2.42. Summary: Recreation Consumptive Activities - Alternative 3 - Step 1 Analysis

	Total	State Waters		Federal Waters	
Person-days	46,273	34,113	73.7%	12,160	26.3%
Market Impact					
Direct Sales	$3,943,786	$2,800,674	71.0%	$1,143,113	29.0%
Direct Wages and Salaries	$1,632,707	$1,143,952	70.1%	$ 488,756	29.9%
Direct Employment	50	36	71.0%	15	29.0%
Total Income					
Upper Bound	$2,857,238	$2,001,916	70.1%	$ 855,322	29.9%
Lower Bound	$2,449,061	$1,715,928	70.1%	$ 733,133	29.9%
Total Employment					
Upper Bound	76	54	71.0%	22	29.0%
Lower Bound	63	45	71.0%	18	29.0%
Non-Market Impact					
Consumer's Surplus	$1,637,119	$1,205,036	73.6%	$ 432,084	26.4%
Profit[1]	$ 51,263	$ 34,738	67.8%	$ 16,525	32.2%

1. Profit is used as a proxy for producer's surplus.

Table 2.43. Recreation Consumptive Activities - Alternative 3 - Total - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	20,028	12.61%	1,689	9.42%	21,890	10.23%	2,667	5.65%
Market Impact								
Direct Sales	$ 2,610,434	12.65%	$ 277,598	9.23%	$ 909,087	10.23%	$ 146,667	5.65%
Direct Wages and Salaries	$ 1,203,580	12.70%	$ 134,838	9.31%	$ 255,649	10.23%	$ 38,641	5.65%
Direct Employment	36	12.87%	5	9.57%	9	10.09%	1	5.80%
Total Income								
Upper Bound	$ 2,106,265	12.38%	$ 235,967	8.72%	$ 447,385	10.01%	$ 67,621	5.24%
Lower Bound	$ 1,805,370	12.45%	$ 202,257	8.84%	$ 383,473	10.06%	$ 57,961	5.32%
Total Employment								
Upper Bound	54	12.51%	7	9.07%	13	10.09%	2	5.36%
Lower Bound	45	12.64%	6	9.12%	11	10.14%	2	5.44%
Non-Market Impact								
Consumer's Surplus	$ 722,878	12.62%	$ 60,973	9.42%	$ 760,609	10.23%	$ 92,659	5.65%
Profit[1]	$ 47,291	12.57%	$ 3,972	9.03%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Alternative 3: Breakout by Jurisdiction. Although about 59% of Alternative 3 lies in state waters, almost 74% of consumptive usage, in terms of person-days, takes place in state waters. Like Alternatives 1 and 2, a higher percentage of diving takes place in state waters (85.6% and 89.6% of charter/party boat and private boat diving, respectively). The percentage of charter/party boat fishing that takes place in state waters is less than the overall percentage of fishing (65.8%) while for private boat fishing, the percentage taking place in state waters is greater than the overall proportion (78.1%). See Tables 2.44 and 2.45 for details.

Table 2.44. Recreation Consumptive Activities - Alternative 3 - State Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	13,180	8.30%	1,446	8.06%	17,098	7.99%	2,390	5.06%
Market Impact								
Direct Sales	$ 1,722,352	8.35%	$ 236,790	7.87%	$ 710,081	7.99%	$ 131,451	5.06%
Direct Wages and Salaries	$ 794,563	8.39%	$ 115,036	7.94%	$ 199,680	7.99%	$ 34,672	5.07%
Direct Employment	24	8.57%	4	8.21%	7	7.92%	1	5.16%
Total Income								
Upper Bound	$ 1,390,486	8.39%	$ 201,313	7.94%	$ 349,440	7.99%	$ 60,677	5.07%
Lower Bound	$ 1,191,845	8.39%	$ 172,554	7.94%	$ 299,520	7.99%	$ 52,009	5.07%
Total Employment								
Upper Bound	36	8.55%	6	8.21%	10	7.98%	2	5.16%
Lower Bound	30	8.56%	5	8.21%	8	7.96%	2	5.08%
Non-Market Impact								
Consumer's Surplus	$ 475,706	8.30%	$ 52,177	8.06%	$ 594,107	7.99%	$ 83,046	5.06%
Profit[1]	$ 31,349	8.33%	$ 3,389	7.70%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Table 2.45. Recreation Consumptive Activities - Alternative 3 - Federal Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	6,848	4.31%	244	1.36%	4,792	2.24%	277	0.59%
Market Impact								
Direct Sales	$ 888,082	4.30%	$ 40,808	1.36%	$ 199,005	2.24%	$ 15,217	0.59%
Direct Wages and Salaries	$ 409,017	4.32%	$ 19,802	1.37%	$ 55,968	2.24%	$ 3,968	0.58%
Direct Employment	12	4.30%	1	1.37%	2	2.22%	0	0.59%
Total Income								
Upper Bound	$ 715,779	4.32%	$ 34,654	1.37%	$ 97,945	2.24%	$ 6,944	0.58%
Lower Bound	$ 613,525	4.32%	$ 29,703	1.37%	$ 83,952	2.24%	$ 5,952	0.58%
Total Employment								
Upper Bound	18	4.29%	1	1.37%	3	2.24%	0	0.59%
Lower Bound	15	4.29%	1	1.37%	2	2.23%	0	0.58%
Non-Market Impact								
Consumer's Surplus	$ 247,172	4.31%	$ 8,796	1.36%	$ 166,502	2.24%	$ 9,614	0.59%
Profit[1]	$ 15,942	4.24%	$ 583	1.32%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

One other important point to mention is that due to there not being a reserve in the Santa Barbara region of the study area, the impact of this alternative on Los Angeles County will be lower (8% in terms of person-days of activity). Because of the distance to San Miguel, Santa Rosa, Santa Cruz, and Anacapa Islands, the relative proximity of Santa Barbara Island makes it the primary destination of consumptive recreational users from Los Angeles County. The maximum potential loss to this group of users, will therefore be less.

Alternative 4. In terms of impact on consumptive activities Alternative 4 is larger than the preferred marine reserve alternative. The aggregate maximum potential loss to income for all consumptive activities is about $5 million dollars or 20.3% of the income generated by recreational consumptive activities in the study area (See Table 2.46). The magnitude of impact varies by activity depending upon whether it is expressed in terms of direct usage (person-days) or economic impact (e.g. income). In terms of person-days, the activity that is most impacted is private boat fishing with a maximum potential loss of 40,660 person-days, followed by charter/party boat fishing with 31,962 person-days, private boat diving with 12,088 person-days and charter/party boat diving with 3,751 person-days. In terms of total income, the activity that is most impacted is charter/party boat fishing with a maximum potential loss of $3.3 million, followed by private boat fishing with $831 thousand, charter/party boat diving with $531 thousand and private boat diving with $306 thousand.

Table 2.46. Summary: Recreation Consumptive Activities - Alternative 4 - Step 1 Analysis

	Total	State Waters		Federal Waters	
Person-days	88,462	69,182	78.2%	19,279	21.8%
Market Impact					
Direct Sales	$7,142,126	$ 5,298,977	74.2%	$ 1,843,149	25.8%
Direct Wages and Salaries	$2,862,600	$ 2,070,691	72.3%	$ 791,910	27.7%
Direct Employment	89	65	73.4%	24	26.6%
Total Income					
Upper Bound	$5,009,550	$ 3,623,708	72.3%	$ 1,385,842	27.7%
Lower Bound	$4,293,900	$ 3,106,036	72.3%	$ 1,187,865	27.7%
Total Employment					
Upper Bound	133	98	73.4%	35	26.6%
Lower Bound	111	82	73.4%	29	26.6%
Non-Market Impact					
Consumer's Surplus	$3,121,889	$ 2,436,333	78.0%	$ 685,555	22.0%
Profit[1]	$ 85,268	$ 58,280	68.3%	$ 26,988	31.7%

1. Profit is used as a proxy for producer's surplus.

Table 2.47. Recreation Consumptive Activities - Alternative 4 - Total - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	31,962	20.13%	3,751	20.92%	40,660	19.00%	12,088	25.62%
Market Impact								
Direct Sales	$ 4,159,819	20.16%	$ 628,832	20.90%	$ 1,688,613	19.00%	$ 664,862	25.62%
Direct Wages and Salaries	$ 1,909,430	20.15%	$ 303,296	20.93%	$ 474,802	19.00%	$ 175,073	25.62%
Direct Employment	56	20.27%	10	21.01%	16	18.74%	6	26.15%
Total Income								
Upper Bound	$ 3,341,502	19.63%	$ 530,767	19.61%	$ 830,904	18.58%	$ 306,377	23.73%
Lower Bound	$ 2,864,145	19.75%	$ 454,944	19.89%	$ 712,203	18.67%	$ 262,609	24.12%
Total Employment								
Upper Bound	85	19.70%	15	19.90%	24	18.74%	9	24.14%
Lower Bound	70	19.90%	13	20.01%	20	18.83%	8	24.52%
Non-Market Impact								
Consumer's Surplus	$ 1,153,630	20.13%	$ 135,403	20.92%	$ 1,412,819	19.00%	$ 420,036	25.61%
Profit[1]	$ 76,111	20.23%	$ 9,157	20.81%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Alternative 4: Breakout by Jurisdiction. Like the preferred alternative, about half of Alternative 4 lies in state waters, however, 78.2% of overall consumptive usage, in terms of person-days, takes place in state waters. A higher percentage of diving (89.8% and 96.9% of charter/party boat and private boat diving, respectively) and private boat fishing (82.1%) takes place in state waters, while the proportion of charter/party boat fishing (64.8%) is lower than the overall percentage. See Table 2.48 and 2.49 for details.

Table 2.48. Recreation Consumptive Activities - Alternative 4 - State Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	20,726	13.05%	3,368	18.78%	33,373	15.59%	11,716	24.83%
Market Impact								
Direct Sales	$ 2,704,517	13.10%	$ 564,107	18.75%	$ 1,385,993	15.59%	$ 644,360	24.83%
Direct Wages and Salaries	$ 1,239,357	13.08%	$ 271,899	18.76%	$ 389,711	15.59%	$ 169,724	24.83%
Direct Employment	37	13.26%	9	18.87%	13	15.46%	6	25.13%
Total Income								
Upper Bound	$ 2,168,875	13.08%	$ 475,823	18.76%	$ 681,994	15.59%	$ 297,016	24.83%
Lower Bound	$ 1,859,036	13.08%	$ 407,848	18.76%	$ 584,566	15.59%	$ 254,585	24.83%
Total Employment								
Upper Bound	55	13.23%	14	18.87%	20	15.58%	9	25.13%
Lower Bound	46	13.24%	11	18.87%	17	15.53%	8	24.72%
Non-Market Impact								
Consumer's Surplus	$ 748,077	13.05%	$ 121,547	18.78%	$ 1,159,625	15.59%	$ 407,085	24.83%
Profit[1]	$ 50,046	13.30%	$ 8,233	18.71%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Table 2.49. Recreation Consumptive Activities - Alternative 4 - Federal Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	11,236	7.08%	384	2.14%	7,287	3.40%	373	0.79%
Market Impact								
Direct Sales	$ 1,455,302	7.05%	$ 64,726	2.15%	$ 302,620	3.40%	$ 20,501	0.79%
Direct Wages and Salaries	$ 670,072	7.07%	$ 31,397	2.17%	$ 85,091	3.40%	$ 5,349	0.78%
Direct Employment	19	7.01%	1	2.14%	3	3.38%	0	0.79%
Total Income								
Upper Bound	$ 1,172,627	7.07%	$ 54,945	2.17%	$ 148,910	3.40%	$ 9,361	0.78%
Lower Bound	$ 1,005,109	7.07%	$ 47,096	2.17%	$ 127,637	3.40%	$ 8,023	0.78%
Total Employment								
Upper Bound	29	6.99%	2	2.14%	4	3.40%	0	0.79%
Lower Bound	24	7.00%	1	2.14%	4	3.39%	0	0.78%
Non-Market Impact								
Consumer's Surplus	$ 405,553	7.08%	$ 13,856	2.14%	$ 253,194	3.40%	$ 12,952	0.79%
Profit[1]	$ 26,064	6.93%	$ 924	2.10%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Alternative 5. In terms of impact on consumptive activities Alternative 5 is significantly larger than the preferred marine reserve alternative. The aggregate maximum potential loss to income for all consumptive activities is about $5.9 million dollars or 23.9% of the income generated in the study area (See Table 2.50). The magnitude of impact varies by activity depending upon whether it is expressed in terms of direct usage (person-days) or economic impact (e.g. income). In terms of person-days, the activity that is most impacted is private boat fishing with a maximum potential loss of 47,460 person-days, followed by charter/party boat fishing with 36,568 person-days, private boat diving with 15,341 person-days and charter/party boat diving with 5,128 person-days. In terms of total income, the activity that is most impacted is charter/party boat fishing with a maximum potential loss of $3.8 million, followed by private boat fishing with $970 thousand, charter/party boat diving with $728 thousand and private boat diving with $389 thousand.

Table 2.50. Summary: Recreation Consumptive Activities - Alternative 5 - Step 1 Analysis

	Total	State Waters		Federal Waters	
Person-days	104,497	81,716	78.2%	22,781	21.8%
Market Impact					
Direct Sales	$ 8,437,525	$ 6,289,616	74.5%	$ 2,147,909	25.5%
Direct Wages and Salaries	$ 3,378,264	$ 2,460,811	72.8%	$ 917,454	27.2%
Direct Employment	105	78	73.9%	27	26.1%
Total Income					
Upper Bound	$ 5,911,963	$ 4,306,419	72.8%	$ 1,605,544	27.2%
Lower Bound	$ 5,067,397	$ 3,691,216	72.8%	$ 1,376,181	27.2%
Total Employment					
Upper Bound	157	116	73.9%	41	26.1%
Lower Bound	131	97	73.9%	34	26.1%
Non-Market Impact					
Consumer's Surplus	$ 3,687,129	$ 2,877,611	78.0%	$ 809,518	22.0%
Profit[1]	$ 99,431	$ 68,324	68.7%	$ 31,107	31.3%

1. Profit is used as a proxy for producer's surplus.

Table 2.51. Recreation Consumptive Activities - Alternative 5 - Total - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	36,568	23.03%	5,128	28.60%	47,460	22.18%	15,341	32.51%
Market Impact								
Direct Sales	$ 4,757,769	23.05%	$ 865,003	28.75%	$ 1,971,015	22.18%	$ 843,737	32.51%
Direct Wages and Salaries	$ 2,186,026	23.07%	$ 415,873	28.70%	$ 554,220	22.18%	$ 222,145	32.50%
Direct Employment	64	23.19%	14	28.61%	19	21.87%	8	33.18%
Total Income								
Upper Bound	$ 3,825,545	22.48%	$ 727,778	26.88%	$ 969,886	21.69%	$ 388,754	30.10%
Lower Bound	$ 3,279,039	22.61%	$ 623,810	27.27%	$ 831,331	21.80%	$ 333,218	30.61%
Total Employment								
Upper Bound	97	22.55%	21	27.10%	28	21.87%	12	30.63%
Lower Bound	81	22.77%	17	27.25%	24	21.98%	10	31.11%
Non-Market Impact								
Consumer's Surplus	$ 1,319,884	71.80%	$ 185,103	89.14%	$ 1,649,098	66.55%	$ 533,044	97.56%
Profit[1]	$ 86,727	23.05%	$ 12,704	28.87%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Alternative 5: Breakout by Jurisdiction. Although about 54% of Alternative 5 lies in state waters, 81.3% of consumptive usage, in terms of person-days, takes place in state waters. Like Alternative 4, a higher percentage of diving (90.4% and 95.4% of charter/party boat and private boat diving, respectively) and private boat fishing (82.9%) takes place in state waters, while the proportion of charter/party boat fishing (71.1%) is lower than the overall percentage. See Tables 2.52 and 2.53 for details.

Table 2.52. Recreation Consumptive Activities - Alternative 5 - State Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	23,744	14.96%	4,626	25.79%	38,603	18.04%	14,744	31.24%
Market Impact								
Direct Sales	$ 3,096,409	15.00%	$ 779,126	25.90%	$ 1,603,166	18.04%	$ 810,914	31.24%
Direct Wages and Salaries	$ 1,421,247	15.00%	$ 375,186	25.89%	$ 450,785	18.04%	$ 213,593	31.25%
Direct Employment	42	15.19%	12	25.83%	15	17.88%	8	31.62%
Total Income								
Upper Bound	$ 2,487,182	15.00%	$ 656,576	25.89%	$ 788,874	18.04%	$ 373,787	31.25%
Lower Bound	$ 2,131,870	15.00%	$ 562,779	25.89%	$ 676,178	18.04%	$ 320,389	31.25%
Total Employment								
Upper Bound	63	15.15%	19	25.83%	23	18.02%	11	31.62%
Lower Bound	53	15.17%	15	25.83%	19	17.97%	10	31.11%
Non-Market Impact								
Consumer's Surplus	$ 857,016	14.96%	$ 166,960	25.79%	$ 1,341,328	18.04%	$ 512,307	31.24%
Profit[1]	$ 56,935	15.13%	$ 11,389	25.88%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Table 2.53. Recreation Consumptive Activities - Alternative 5 - Federal Waters - Step 1 Analysis

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area	Boundary Alternative	% of Study Area
Person-days	12,824	8.08%	503	2.80%	8,857	4.14%	597	1.26%
Market Impact								
Direct Sales	$ 1,661,360	8.05%	$ 85,877	2.85%	$ 367,849	4.14%	$ 32,823	1.26%
Direct Wages and Salaries	$ 764,779	8.07%	$ 40,687	2.81%	$ 103,435	4.14%	$ 8,553	1.25%
Direct Employment	22	8.00%	1	2.78%	4	4.10%	0	1.27%
Total Income								
Upper Bound	$ 1,338,363	8.07%	$ 71,202	2.81%	$ 181,011	4.14%	$ 14,967	1.25%
Lower Bound	$ 1,147,169	8.07%	$ 61,030	2.81%	$ 155,153	4.14%	$ 12,829	1.25%
Total Employment								
Upper Bound	33	7.98%	2	2.78%	5	4.14%	0	1.27%
Lower Bound	28	7.99%	2	2.78%	4	4.12%	0	1.25%
Non-Market Impact								
Consumer's Surplus	$ 462,868	8.08%	$ 18,144	2.80%	$ 307,770	4.14%	$ 20,737	1.26%
Profit[1]	$ 29,792	7.92%	$ 1,315	2.99%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.

Table 2.54 Summary of Impacts on Consumptive Recreation - Step 1 Analysis

Alternative	State Waters Amount	State Waters % [1]	Federal Waters Amount	Federal Waters %	Total Amount	Total %
			Person-days [2]			
1	32,585	7.4%	8,093	1.8%	40,678	9.3%
2	59,451	13.6%	12,424	2.8%	71,875	16.4%
3	34,113	7.8%	12,160	2.8%	46,273	10.6%
4	69,182	15.8%	19,279	4.4%	88,461	20.2%
5	81,716	18.7%	22,781	5.2%	104,497	23.9%
Preferred	63,322	14.5%	14,586	3.3%	77,908	17.8%
			Income [3]			
1	$1,919,879	7.8%	$482,713	2.0%	$2,402,592	9.7%
2	$3,097,229	12.5%	$813,485	3.3%	$3,910,714	15.8%
3	$2,001,916	8.1%	$855,322	3.5%	$2,857,238	11.6%
4	$3,623,708	14.7%	$1,385,842	5.6%	$5,009,550	20.3%
5	$4,306,419	17.4%	$1,605,544	6.5%	$5,911,963	23.9%
Preferred	$3,284,059	13.3%	$967,966	3.9%	$4,252,025	17.2%
			Employment [4]			
1	51	7.8%	13	2.0%	64	9.8%
2	84	12.8%	21	3.2%	105	16.1%
3	54	8.3%	22	3.4%	76	11.6%
4	98	15.0%	35	5.4%	133	20.3%
5	116	17.7%	41	6.3%	157	24.0%
Preferred	89	13.6%	25	3.8%	114	17.4%

1. Percents are the percent of total baseline amounts from the recreation data.
2. Total Person-days of consumptive activities is equal to 437,907
3. Total income, including multiplier impacts, is equal to $24,686,919
4. Total employment, including multiplier impacts, is equal to 654 jobs.

Aggregate Consumptive Impacts – Step 1 Analysis

Table 2.55 presents step 1 income and employment impacts for the sum of all consumptive activities for each alternative. Percentages in the table are of the baseline aggregate consumptive activities.

Table 2.55. Aggregate Consumptive Activities: Summary of Impacts by Alternative - Step 1 Analysis

	State Waters		Federal Waters		Total	
Alternative	Amount	% [1]	Amount	%	Amount	%
			Income [2]			
1	$7,282,841	6.8%	$877,570	0.8%	$8,160,411	7.6%
2	$8,728,618	8.1%	$1,063,077	1.0%	$9,791,695	9.1%
3	$7,658,580	7.1%	$1,352,310	1.3%	$9,010,890	8.4%
4	$14,791,844	13.7%	$2,101,516	2.0%	$16,893,360	15.7%
5	$18,144,585	16.9%	$2,418,978	2.2%	$20,563,563	19.1%
Preferred	$13,407,739	12.5%	$1,498,958	1.4%	$14,906,697	13.9%
			Employment [3]			
1	207	7.0%	25	0.8%	232	7.8%
2	245	8.3%	29	1.0%	274	9.3%
3	218	7.4%	37	1.2%	255	8.6%
4	422	14.3%	57	1.9%	479	16.2%
5	513	17.3%	66	2.2%	579	19.6%
Preferred	385	13.0%	41	1.4%	426	14.4%

1. Percents are the percent of total baseline amounts from the aggregate data.
2. Total income, including multiplier impacts, is equal to $107,600,471 (Baseline Study Area Total).
3. Total employment, including multiplier impacts, is equal to 2,961 jobs (Baseline Study Area Total).

Habitat Protection per Dollar of Impact. One way to judge the relative efficiency of marine reserve alternatives is to estimate the amount of resource protection that is derived for every dollar in income impact associated with the alternative. In a way, this estimate can be considered the “bang for the buck” derived from the alternative. This method does not take into account the type of habitat preserved or the differences among alternatives of habitats encompassed, in terms of quality or diversity, but it is a starting point in the process of integrating the protection gained from marine reserves and the impact resulting from their establishment. It should be noted that, like all of the estimates in this chapter, these calculations are based on step 1 of the analysis only.

As can be seen in Table 2.56, the highest level of protection per unit of income lost occurs under Alternative 3, with 2.51 percent of the sanctuary protected for every one percent of income impact. This is followed by Alternative 4 (1.85), the Preferred Alternative (1.80), Alternative 5 (1.78), Alternative 1 (1.58) and Alternative 2 (1.54).

Table 2.56 Habitat Protection per Dollar of Impact on Income

Alternative	Percent of Sanctuary Protected	Percent Impact on Income	Habitat Protection [1]
Alternative 1	12.0	7.6%	1.58
Alternative 2	14.0	9.1%	1.54
Alternative 3	21.0	8.4%	2.51
Alternative 4	29.0	15.7%	1.85
Alternative 5	34.0	19.1%	1.78
Preferred Alternative	25.0	13.9%	1.80

1. Calculated by dividing the percentage of area in the sanctuary protected by the percentage of income impact.

Chapter 3 – Step 2 Analysis

Chapter 2 provided our Step 1 analysis of alternatives. Many tables, which contained many numbers, were presented. Here our approach is more comprehensive, but also much less quantitative since all the benefits and costs of marine reserves cannot be quantified. Even though we are not able to exactly quantify the benefits to nonconsumptive users or the nonuse/passive use value of marine reserves, we do try and provide a range of possible values using some conservative ranges of estimates and some assumptions. The problem with arriving at a net assessment, as in a formal benefit-cost analysis, is that we don't always have a common metric across different uses or user groups. What we do try and do here is address the question of 1) how likely is it that the Step 1 Analysis results are real? (Under what conditions and time frames might they be underestimates or overestimates of impact of costs or might short-term costs turn into long-term benefits) and 2) Once we look at the benefits side of the ledger, even with rough quantification, Can we say anything about net benefits or costs?

As mentioned in the introduction to this report, there is a lot of uncertainty about forecasting the future biophysical responses and socioeconomic behavioral responses that will determine outcomes. The Science Panel has not provided quantitative forecasts of biophysical conditions, for which we could then quantify the socioeconomic dimensions. There is simply a limitation in data and models and as the Science Panel has recognized, it would be an overwhelming task to address species-by-species the biophysical responses to protection strategies. But as we also mentioned in the introduction, adaptive management is the institutional response to uncertainty and what we provide here is information and what is known from our theoretical literature on what are the important factors to understand. We hope all this will better inform the adaptive management process.

Before launching into our analyses, we first discuss the many issues, mitigating and offsetting factors and some theoretical literature that may provide some guidance in interpreting or understanding how the many factors interact and the qualitative direction of outcomes under various conditions.

Current Status of Exploited Fishing Stocks. One of the basis assumptions of our Step 1 analysis for the consumptive activities is that our baseline estimates of impact can be used as an approximation of the average impact in the future. This assumes that the current levels of exploitation are sustainable in the future. The Science Panel did not rely on single species stock assessments to develop their design criteria. Formal stock assessments have been done on a few species or are underway (e.g., sardine, squid, cowcod, blackgill rockfish and bocaccio). Some data are available for sea cucumber. No data (or limited data) is available for red sea urchin, spiny lobster, prawn, abalone, crab, and California sheephead.

In developing our baseline estimates we looked at the trends in catch of the 14 species/species groups in our commercial fishing analysis (Appendix C). Table 3.1 summarizes the trends found in Appendix C, along with the trends and status of some species/species groups as summarized by the Science Panel. As noted above, few stock assessments have been completed. The only widely recognized species/species groups that are considered to be in overfished status are rockfish and abalone. Rockfish made up 2.45% of our estimate of baseline 1996-1999 ex vessel value and abalone was not in our baseline since harvest was halted in 1997. Eight of the 14 species/species groups in our baseline for the commercial fisheries show no trends in catch, four have upward trends and two downward trends (rockfish and kelp) in the CINMS. Statewide, nine had no trends, four had downward trends and one (wetfish) had a slight upward trend. Kelp, and the interaction of many species and kelp, has been noted and kelp and seaweed have been heavily impacted by warm water El Nino events. Kelp is assigned a general downward trend, but with expectations of recovery as warm water events subside. We have not been able to find any information saying there is an overharvesting of kelp. Given the current state of knowledge about the status of the exploited stocks, and the fact that trends within the CINMS and Statewide are mixed (but on balance more upward in the CINMS and more downward Statewide), we believe the current status of stocks provide no information to suggest whether our overall baseline estimates are overestimates or underestimates of impact.

Table 3.1. Commercial Fishing and Kelp: Trends and Status of Stocks

Factors	Trends in CINMS	Trends in CA	Trends/Status Science Panel Status Report
Squid	None	None	None/Assessment Underway, Not Clear
Wetfish	Upward	Upward	- /Not Assessed
Rockfish	Downward	Downward	Downward/ Overfished[1]
Urchins	None	Downward	Downward/Unclear
Crab	None	None	None/Not Assessed
Spiny Lobsters	None	None	None/Stable
Flatfish	Upward	Downward	-
Sea Cucumber	Upward	None	Downward/Underway
Sculpin and Bass	None	None	-
Tuna	None	None	-
Shark	None	None	-
CA Sheepshead	None	-	-
Prawn	Upward	-	Ridgeback downward spot Prawn not Well Studied
Kelp	Downward	Downward	Downward, highly influenced by ElNino events, recovering

1. See Science Panel Report.

Replenishment Effect/Stock Effects. This refers to the notion that stocks of currently exploited species will increase in biomass if the stocks are protected by marine reserves. The issues can be complex, but for our purposes it only matters if there is a net increase in biomass and aggregate harvest in the remaining open areas due to the marine reserve protection. Some species of rockfish have long and slow growing life cycles and therefore replenishment effects will take place over much longer time frames. Replenishment effects will generally take place over longer periods of time and this factor should yield increasing mitigation of costs over time, and under certain conditions, could be expected to yield net benefits sometime in the future. For consumptive users, there may be mitigation of costs even in the short-term. Many consumptive users have been observed lining up along the edges of marine reserves in the Florida Keys National Marine Sanctuary (FKNMS Research and Monitoring Report, 2001). In a recent issue of *Science*, Roberts et al (2001) show the edge effects of the Merritt Island National Wildlife Refuge at Cape Canaveral, Florida on recreational fishing records maintained by the International Game and Fish Association (IGFA). There were more recreational fishing records set on the edge of this reserve than in all of the rest of Florida and the number of records is increasing faster on the edge of the reserve than in all the rest of Florida. Also, net increase in biomass and aggregate harvests were two criteria Sanchirico and Wilen (2001) addressed for commercial fisheries, which will be discussed in more detail below.

Substitution/Relocation. For commercial fishing and kelp harvesting, a mitigating or offsetting factor would be the ability to relocate effort to others areas and be just as successful (no loss) or be able to at least mitigate losses to some degree. For the recreation consumptive users (recreational fishing and consumptive diving), the issue is similar, except the recreation consumptive users are the final consumer's of the services from the natural environment. Can this group of users find perfect substitutes by relocating to other sites (no loss) or will they find less than perfect substitutes involving either increased costs (travel to more distant sites) or reduced quality (catch per unit of effort, different species mix, rougher or less protected waters). This will be discussed further in the section on Recreation Consumptive use.

For consumptive users displaced from current sites, a fundamental issue is the current status of the stocks of species, for which they pursue in the areas outside the protected areas. Also, as discussed in the benefits and costs section of the introduction to this report, the impact will be contingent on how the areas outside the marine reserves respond ecologically/biologically. And following Sanchirico and Wilen (2001) one can see that the net effects depend on both the ecological/biological responses and the human responses. Generally, the larger the area included in marine reserves, the lower the probability that substitution and relocation will be successful in mitigating or offsetting Step 1 impacts.

Crowding/Congestion Effects. Displacement of consumptive users means we have to address what happens to this displaced effort. The net result of crowding or congestion effects is to increase estimates of negative impact beyond those estimated in Step 1. This is the most important exception to our references to baseline estimates as representing maximum potential losses.

The Science Panel concluded that the effort displaced from the marine reserves must not be allowed to relocate to the remaining open areas or the catch in the remaining open areas must remain constant. Under this scenario, estimates in our Step 1 analyses would remain our best estimates. In the Nearshore Fishery Management Plan, there is also recognition that the fisheries management plan will have to be integrated with the Marine Life Protection Act (MLPA) closed areas and this will mean holding catch and/or effort in the remaining open areas at current levels when implementing closed areas. This is to avoid the damaging effect of relocating effort and resulting reduced catches in the remaining open areas. Again, our Step 1 analysis estimates would be applicable in this situation. But if catch is not held constant in the remaining open areas or effort not reduced to match the displace effort from the closed areas, and the stocks are at MSY or below, then the released effort would simply be crowded into a smaller remaining space and will drive the fisheries in the remaining open areas to sub-optimal conditions, perhaps resulting in the collapse of these fisheries. If crowding and congestion lead to reductions in harvest from the remaining open areas, then our Step 1 estimates are under estimates. It is important to note that there is not one study of marine reserves that demonstrates that crowding or congestion effects have occurred. It does, however, remain a theoretical possibility.

Quality Increases in Marine Reserves. The Science Panel's review of the literature points to the tremendous amount of research showing the increases in many dimensions of the quality of sites that have been protected by no take regulations. Often the changes that occur on the sites protected are noticeable in a year or less (Florida Keys National Marine Sanctuary Monitoring Report, 1999). Increases in the numbers and average size of animals are a common finding. Changes in biodiversity, community structure, and general habitat conditions have been known to take place even in the short-term and would be expected to improve further over time. For nonconsumptive users, nonusers or those with passive use values there would be growing benefits over time. There are also the scientific and education benefits of studying and observing changes and having control sites, which help in interpreting the relative causes of the changes observed.

Other Regulations. Other regulations can work towards mitigating, offsetting, avoiding costs, or in increasing the costs. Some regulations are known to have short-term costs with long-term benefits to the fishermen. But because many fisheries are open access, fishermen that suffer the short-term costs (make an investment) are not guaranteed that they will receive the benefits (the return on investment).

Most regulations are a response to a problem, which if not addressed, would presumably get worse. The status quo would result in increasing losses. So the assumption that any changes in current activities are always losses doesn't take into account that the future path may be lower levels of current activity without the regulatory intervention. In this case, our baseline estimates of loss are over estimates because the levels of activity are not sustainable. We addressed this issue above in the status of the stocks.

Many fishery regulations are what economists describe as regulated inefficiency. Sometimes inefficiencies are imposed to more equitably spread out the benefits of a fishery by forcing all involved to adopt more economically inefficient methods of harvest. But in the commercial fisheries, fish is mostly a food product that competes with many food products. Over the long run, pressure builds and market forces work to the detriment of those that produce inefficiently. These are forces beyond the control of fishermen or fishery managers. Most economists recommend against using inefficiency, except as a temporary transition strategy. Regulations that make the fisheries inefficient will lead towards a status quo (without marine reserves) downward path in the regulated activity. This would mean that our baseline estimates in Step 1 are overestimates of potential costs. The weekend closure of the squid fishery is a good example of regulated inefficiency and will be discussed further below.

Regulations may be designed to benefit one group at the expense of another group. Allocation between user groups of total allowable catch is an example. California Proposition 132 restricted the use of gill nets within one mile from shore. This has reduced catch to gill net fishermen and some are claiming that this has been a benefit to recreational fishermen (Kronman, 2001). As we showed in Chapter 1, the top 20 recreationally caught species changed significantly in both numbers caught and species mix in years 1999 and 2000. And, number of fishing trips ended their long decline (1993 – 1999) and increased, in 2000, almost to their 1996 level. One year of data isn't enough to forecast a new trend, however, it does raise the possibility that our baseline recreational fishing estimates are under estimates of the impacts in the future.

Some measures are taken only when the fisheries have collapsed or are at near collapse. The cowcod closures and the Nearshore Fishery Management Plan for rockfish are good examples. The efforts here are on rebuilding stocks. Many have joked that the development of a fishery management plan is the beginning of the end of a fishery. An obvious overstatement, but there have been many more failures than successes in fishery management in the marine environment. In the MRWG process, some viewed the cowcod closure as a substitute for marine reserves in the CINMS. We think the cowcod closure falls into that category of a regulation that requires investment to get a future return. But with many rockfish (because of their noted slow growth rates and longer life cycles) this may require a long-term investment to get an even longer-term return on investment. Given the open access nature of the fishery, we would predict that fishermen would heavily discount future benefits, since they don't expect to see the returns. They would not want to make further investments in more closed areas. The impacts that we have estimated in Step 1 are in addition to the impacts already felt from the cowcod closure. There is no additional impact beyond what we have estimated. We don't see the cowcod closure as a factor making the impact of the marine reserves greater than we have estimated in Step 1. If the cowcod closure works, it should be a long-term mitigating and offsetting factor making our estimates of impact overestimates in the long-term. The stripped bass closures on the East Coast of the U.S. were a great success after five years. Both the commercial and recreational fisheries have benefited greatly. The CDFG has proposed to open some of the currently closed areas to compensate for the closed areas in the CINMS. Some of the areas were just the nearshore areas closed to invertebrates, so the offsets will be limited to those consumptive user groups pursuing invertebrates. Opening up the cowcod closure areas will offset the losses to those pursuing species restricted by the cowcod closure. So even in the short-term our Step 1 analyses will overstate the costs when the cowcod closure and the Nearshore Fishery Management Plan is considered.

MLPA Process. The Marine Life Protection Act (MLPA) is a California law directing the establishment of a network of marine protected areas (including no take areas) throughout the State. The CINMS areas in State waters are the first to be considered in this process. Other efforts that were simultaneously underway have been delayed. Establishment of these areas would additionally impact consumptive users. In establishing additional areas outside the CINMS, it will be important to recognize the cumulative impact that these areas will have. However, there is not a specific set of proposed areas right now, so there is no way we can add impact now. We can only recognize that these areas may present additional impact in the future. If data and analyses are done, as was done here for the CINMS sites, one should be able to estimate the impacts of future closed areas. The MLPA process may also be used to implement the concept of phasing marine reserves. This will be discussed further under the phasing section .

MLMA Process. The Marine Life Management Act (MLMA) is a California law directing the establishment of fishery management plans. Above we mentioned the Nearshore Fishery Management Plan. Another plan currently under development that will be highly relevant in the squid plan. The squid plan is not final, but some of the options include a limited entry program and a reduction in current capacity. As mentioned above with respect to the crowding issue and the Science Panel's recommendation of catch and/or effort reductions in the remaining open areas, matching displaced catch and effort from the marine reserves would be a requirement that would need to be incorporated in all the management plans if stocks are at or below MSY or else the crowding effects could make losses greater than our Step 1 analyses. However, there are conditions for which the crowding effects won't occur. Until other fisheries management plans are finalized, we can't assess their impacts.

There have been limited discussions of the use of individual transferable quotas (ITQs) in developing fishery management plans. ITQs are preferred by a large majority of economists because they can be designed to take advantage of market efficiencies. ITQs address the fundamental problems of open access, common property resources. They allow users to benefit from investments in the fisheries. Issues of equity and efficiency can be addressed in initial assignments of quotas. ITQs would no doubt result in much greater initial reductions in capacity, income and employment in the commercial fisheries. But over the long-term this approach would most likely yield sustainable commercial fisheries that would have the best chance of competing with other food products. This kind of rationalization of the fisheries would lead to very high offsets in losses estimated in our baseline Step 1 analysis. However, so far there appears to be no serious efforts in this direction.

How ITQs would affect the recreational fishing community is unknown without addressing the details of one of the key first steps, allocation of a given allowable catch between the commercial and recreational fisheries. The usual approach is historical proportions. There is usually a dearth of data and analysis to support an economic approach i.e., one that maximizes the value of the use of the resources.

One approach to ITQs that has been overlooked by most attempting to implement ITQs is the possible double payoff of letting nonusers buy ITQs and then not harvesting their allotment. This allows the stocks to grow to a larger size. User group allocations and ITQs are stated in terms of a share of the allowable catch. Allowable catch grows over time and each user group is a beneficiary. Nonusers get to put their money where their mouth is, so to speak, and everyone benefits.

If ITQs were implemented in the commercial fisheries, our estimates of impact from marine reserves would be over estimates since implementation of the ITQs would result in much lower capacity in the fisheries[5]. For the recreational fisheries, the impacts would be dependent on the allocations of allowable take. If nonusers were allowed to purchase ITQs and not harvest their share, our estimates for all consumptive user groups would be over estimates.

Existing Area and Temporal Closures. Above we addressed the cowcod closure and to some extent the closure of nearshore areas to gill nets and to taking of invertebrates. The U.S. Department of Interior's Fish and Wildlife Service and Channel Islands National Park has seasonal area closures to protect nesting birds. These regulations may have some additional impacts from what we have estimated. Those regulations that were already in effect in areas that will now be marine reserves will mean no additional impact than we already estimated in Step 1 i.e., they were already accounted for in our Step 1 analysis. For those areas outside the marine reserves, the impacts would be in addition just as in other area closures discussed above.

Pendleton, Cai and Lutz (2001) analyzed temporal closures (weekend closures) in the Southern California squid fishery. They found that temporal closures resulted in fishermen taking more risks by fishing in bad weather conditions. This raises the cost of harvest (accidents go up with possible injury to crew and loss of life and/or property and insurance rates go up) as crew and equipment are put at greater risk. This is an unintended cost of the effort-reduction regulation. Pendleton, Cai and Lutz (2001) cite an abundance of the economic literature documenting and commenting on the unintended economic costs of effort-limiting regulations.

The interaction of temporal closures and geographic closures could have a compounding effect which would make our estimates of impact under estimates as the squid fishermen take more risks by fishing in bad weather conditions, while crowded into smaller remaining open areas.

Economic Conditions and Other Outside Forces and Internal Forces. Many fishermen, especially commercial fishermen, have expressed concerns about the many outside forces and internal forces that they believe are affecting their ability to maintain sustainable fisheries. Many issues were gleaned from the ethnographic data survey conducted for the CINMS. See Kronman et al (2001). We summarize the issues below.

Outside Forces

- Poor Asian economy
- Strong dollar

- International competition
- Increased cost-of-living in coastal areas
- El Nino events
- Pollution and habitat destruction from coastal development
- Conflicts over environmental allocations (sea otters, seals and sea lions, birds)
- Conflicts among user groups

Internal forces

- Aging workforce
- Industrial organization (buyers and processors with monopoly power over fishermen)
- Open access and overcapitalization and biological and/or economic overfishing

Outside Forces. Before the recessions in the Asian economies, California fisheries were benefiting from Asian demands for Live Fish and Spiny Lobster, for which fishermen were receiving significantly higher prices. The Chinese demand for squid raised prices to fishermen. Urchins primary market is Japan. The combination of the recent strong dollar and economic slow down in Asia has put strong downward pressures on demand and prices for some of the most valuable fisheries in California. As we showed in Chapter 2, CINMS catch of squid and urchins were only a small percent of world supply and fishermen face strong international competition. The strong dollar puts California fishermen at a competitive disadvantage.

Coastal development increases the general cost-of-living. Commercial fishermen must compete for limited dock space at local ports and harbors with costs of berthing their boats on the rise. Many feel that coastal development is also destroying important habitat and increases pollution that effects the fish stocks on which their livelihoods depend.

Fishermen find themselves in conflict with environmental groups that represent the interests of Americans that value the protection of various wildlife species (e.g., sea otters, seals and sea lions and birds) that compete for the seafood they are harvesting.

There are also conflicts between commercial fishermen and recreational fishermen over allocations of limited stocks of fish.

El Nino events have had enormous impacts on the fisheries.

InternalForces. Even though most of the factors we label as internal are factors not under the control of fishermen, they are more directly involved with these factors from an industry perspective, so we label them as internal. They are additional factors, for which fishermen perceive they cannot control and thus raise uncertainty about the future. Some fishermen in the MRWG process mentioned the aging workforce in their industry and were concerned about the loss of a way of life and community. Some fishermen have complained of the buyer/processors and their monopoly power. This allows buyers/processors to hold prices to fishermen artificially low and capture more of the benefits for themselves. And as we have already discussed above, some fishermen recognize the problem with open access common property and the incentives leading to overcapitalization and overfishing (both biological and economic).

Fishermen seem to view all of these factors coming together as an overwhelming set of forces. Marine Reserves are regarded as simply "the straw that broke the camels back". Whether these perceptions are accurate is not that important for understanding one dimension of social costs. People's behavior is often driven by perceptions. Education and outreach efforts can be utilized to educate people about the facts and lessen some of the costs of actions taken based on incorrect information. However, there can be significant social transaction costs of people challenging regulations, which they perceive as having undue impact. Molotch and Freudenburg (1996) and Paulsen, Molotch and Freudenburg (1996) conducted two studies on Santa Barbara and Ventura Counties for the U.S. Department of Interior's Minerals Management Service. Their reports provided profiles of the county populations and discussed the socioeconomics and political economic aspects of how the communities might respond to issues of oil and gas development. An important aspect of these studies was the identification of "social multipliers". The authors argued that the economic multipliers could not explain the relative power of oil and gas interests in the area. Instead, one had to understand the social multipliers (how groups work together in coalitions) to understand the public policy outcomes and the costs in arriving at those outcomes.

The point of this discussion is that no matter how accurate or how large or small our estimates of impact, the perceptions of impact from cumulative sources may result in social multipliers that stimulate actions which have large transactions costs. 85% of squid fishermen oppose closed areas (Pomeroy and Fitzsimmons 2001) and 95% of the Barilotti sample opposed closed areas. These social costs are not included in our Step 1 analysis.

Phasing of Marine Reserves. The phasing in of marine reserves is similar to the issue of substitution in that the more time people have to learn and adjust to changes, the greater their ability to mitigate or offset the costs. This was an issue discussed by the MRWG, but never implemented in any formal alternatives. It is not included in any of the alternatives that we were asked to analyze here. In "The Proactive Fishermen's Plan" (Miller and Liquornik, 2001), the idea of phasing is recommended to lower the costs to the fishermen. The MLPA process has been delayed. There is an opportunity to use the concept of phasing by delaying any additional closed areas in state waters currently fished by CINMS fishermen. This strategy would lower additional costs imposed by closed areas beyond those being considered in the CINMS.

Pelagic or Highly Migratory Species. Some species such as swordfish, tuna and possibly wetfish may not be impacted by closed areas, since fishermen are likely able to capture them when they move through the adjacent open areas. This has proven to be the case in the Florida Keys National Marine Sanctuary. Even though squid and shark are pelagic species, from what we have read, we are less certain whether the same conclusion applies. We would expect no impacts to swordfish, tuna and wetfish and therefore our estimates for Step 1 are over estimates. This varies by alternative from a 1.32% reduction in impact for alternative 4 to a 3.1% reduction for the preferred alternative.

Commercial Fisheries and Kelp – Step 2 Analysis

Sanchirico and Wilen (2001) provide a theoretical bioeconomic model that incorporates new ecological developments with respect to patchy environments. The authors use the model to address the issue of marine reserves. These authors addressed closed systems, sink-source systems and density dependent systems. They generally assume a Smith (1968) rent dissipation type bioeconomic model and assume spatial arbitrage i.e., fishermen relocate and equilibrium is reached when economic rents are equalized across space. They do not address outcomes in terms of net economic benefits (consumer's surplus plus economic rents). Instead, they limit their conclusions as to what would happen to aggregate biomass and aggregate harvest under varying conditions. We limit the discussion here to their discussion of sink-source systems and density dependent systems because the CINMS and surrounding areas are more likely to be some combination of sink-source and density dependent systems.

Sanchirico and Wilen (2001) provide the following propositions (renumbered here because we don't include their discussion of closed systems):

A. Sink – Source Systems

Proposition 1. "In a sink-source system with unidirectional density dependent flow, closing the sink will increase aggregate biomass and decrease aggregate harvest. A loss in harvest from the sink without any gain from harvest to the source", thus a net loss to the commercial and recreational fisheries.

Proposition 2. "In a sink-source system with unidirectional density dependent flow, closing the source will unequivocally increase aggregate biomass. Aggregate harvest will also increase if the increase from dispersal due to large biomass is greater than the loss in pre-reserve harvest from the closed area."

This double-payoff in increased biomass and harvest is more likely under the following conditions:

1. Source patch cost/price ratios are very low
2. Dispersal rates cannot be too low or too high
3. Growth rate of the stock in the source is greater than the dispersal rate

B. Density Dependent Systems

"Reserve creation in a density dependent system will always increase aggregate biomass".

Proposition 3. "In a density-dependent system, creating a reserve by closing a patch will increase aggregate biomass". Aggregate harvest will also increase if:

1. Patch closed is at a low level before closing (low opportunity costs – not much harvest lost)
2. If cost/price ratios between open and closed areas are not too dissimilar (close)

The Sanchirico and Wilen (2001) model then predicts that there are conditions under which there can be benefits of marine reserves to the commercial fisheries, but these benefits are conditioned on both ecological/biological and human behavioral conditions and responses.

Commercial Fishing and Kelp, Analysis of Alternatives – Step2

Above we discussed the various factors that could mitigate or offset costs or that would result in benefits to commercial fishermen. Impacts were judged relative to our estimates from Step 1 analyses, as presented in Chapter 2. So a neutral score means no change to our Step 1 estimates of impact. A score of increased costs means we would expect the factor to increase our estimates of impact beyond what was estimated in Step 1 or our impacts in Step 1 were under estimates. A score of decreased costs mean this factor would be expected to decrease the expected impact from what we estimated in our Step 1 analyses or that we over estimated the impacts in Step 1. Finally, a score indicating benefits means this factor would contribute to net benefits (no losses) and thus the impacts estimated in Step 1 are not real or would not be expected to occur. There is a time dimension to the evaluation. We limit this to a short-term (1 to 5 years) and a long-term (5 to 20 years). The results are summarized in Table 3.2.

Table 3.2. Commercial Fishing & Kelp: Impacts Relative to Step 1 Analysis

Factors	Short-term	Long-term
1. Status of Fishing Stocks	O to ● (rockfish)	O to ● (rockfish)
2. Replenishment Effects	□	■
3. Substitution/Relcoation	□	□
4. Crowding/Congestion Effects	●	●
5. Quality Increases in Marine Reserves	O	O
6. Other Regulations		
a) Regulated Inefficiency	□	□
b) Proposition 132 (Gillnet Restriction)	O	O
c) Allocations to Other User Groups	●	●
d) Cowcod Closure	●	■
e) Opening up some Cowcod Closure Areas	□	□
f) MLPA - Closed Areas	O	O
g) MLMA Fishery Management Plans	O	O
h) ITQs currently not being considered	O to □	O to □
I) Existing Area Closures	O	O
j) Temporal Closures	●	●
k) Economic Conditions and Outside and Internal Forces	●	●
7. Pelagic Species	□	□
8. Phasing	□	□
All Factors	O to ●	□ to ■

O = Neutral Impact
● = Increase in costs from Step 1
□ = Decrease in costs from Step 1
■ = No costs from Step 1 - instead, benefits

For the short-term, our net assessment for commercial fishing and kelp ranges between a neutral impact to an increase in costs beyond Step 1. The most important factors influencing this assessment are the current status of stocks (neutral except for rockfish), regulated inefficiency (decrease costs) and the Science Panel's recommendation that catch and/or effort be held constant in the remaining open areas is not implemented (increases cost). The Science Panel's recommendation requires that the effort displaced must exit the fisheries i.e., the assumption of our Step 1 analysis. There is uncertainty about whether such catch and effort recommendations will be included in current and future fishery management plans. If not, the problem of crowding and congestion would probably result in increased costs (beyond Step 1 costs) in the short-term. In addition, the social costs of not excepting regulations, which might result in increased enforcement costs, which could increase costs beyond those estimated in Step 1.

For the long-term, assuming replenishment effects (benefits), substitution/relocation (decrease costs), cowcod closure (benefits) and regulated inefficiency (decrease costs) lead to a conclusion that impacts in Step 1 were over estimated and there are possibilities of net benefits, per the discussion of the Sanchirico and Wilen (2001) analysis. Over the long-term, people have a chance to learn and adjust to changes and there is more time for the biophysical responses to protection to come to fruition. Management plans can be adjusted to respond to any negative outcomes (adaptive management).

The issues of phasing, ITQs, MLPA closed areas and MLMA fishery management plans are actions, which are not fully specified at this time or are not seriously being considered (ITQs). We are forced to simply give them a neutral score at this time.

Below we give our net assessments by alternative for commercial fishing and kelp, since size of an alternative matters for many of the mitigating and offsetting factors.

Alternative 1. This is the smallest among the marine reserves in both size and impact on commercial fishing and kelp. There will be a high probability of relocating effort and a low probability of crowding and congestion effects both of which should decrease costs relative to our Step 1 analysis. The ability to catch tuna and wetfish in surrounding areas lowers Step 1 estimates by about 1.35%. The relatively low impact to squid (5.46%) means the possible additional costs of the interaction with weekend closures will result in no additional costs beyond Step 1. There is some possibility that this low level of catch reduction in squid could be made-up from catch in other areas, to the extent that squid move around and they can be caught in the remaining open areas. The kelp impacts are also relatively low for this alternative (4.43%), however it is not clear that this can be made up by additional harvest in other areas. This alternative has a relatively high estimated impact on prawn fishermen (24.78%). It is not clear whether this cost could in anyway be mitigated. In the short-term, the overall impacts estimated in Step 1 are most likely over estimates. If the squid catch losses could be replaced from other areas, the reduction in impacts would be as much as $742,133 (34% of step 1 estimated loss of $2,161,955), since squid accounts for about 33 percent of the step 1 impact, while pelagics (tuna and wetfish) account for 1.35%. These reductions in impact would bring the average annual impact down to $1.4 million in ex vessel revenue or 5% of the 1996-1999 baseline.

In the long-term, the replenishment effects are likely to be minimal since the marine reserves only cover about 12 percent of the CINMS, with only two of the 15 habitat types in the Science Panel report receiving protection levels of 20 percent or higher. The benefits to areas outside the marine reserves are probably minimal for this alternative and the long-term mitigation of costs lower. Whether replenishment effects are greater than crowding or congestion effects will determine if this alternative's long-term cost can be transformed into long-term benefits.

Alternative 2. This is the second smallest among the marine reserves in both size and impact on commercial fishing and kelp. There will be a high probability of relocating effort and a low probability of crowding and congestion effects both of which should decrease costs relative to our Step 1 analysis. The ability to catch tuna and wetfish in surrounding areas lowers Step 1 analysis costs by 1.58 %. Like alternative 1, this alternative has a relatively low impact on the squid fishery (5.56%). Kelp impacts are also relatively low for this alternative (5.55%), but just as with alternative 1, we are not certain kelp harvest can be increased from other areas. This alternative has a relatively high impact on prawn fishermen (19.41%) and it is not clear how or if this impact could be mitigated. As in alternative 1, it might be possible that squid catch could be replaced from other areas. Since squid represents about one-third of the lost ex vessel value of catch from alternative 2, it is possible that our Step 1 analysis estimates could be reduced by over 34 percent, even in the short-term. These reductions in impact would bring the average annual impact down to about $1.46 million in ex vessel revenue or 5.17% of the 1996-1999 baseline

In the long-term, the replenishment effects are likely to be minimal since the reserves only cover about 14 percent of the CINMS, with only four of the 15 habitat types in the Science Panel report receiving protection levels of 20 percent or higher. The benefits to areas outside the marine reserves are probably minimal for this alternative and the long-term mitigation of costs lower. Whether replenishment effects are greater than crowding or congestion effects will determine if this alternative's long-term costs can be transformed into long-term benefits.

Alternative 3. This is the third smallest among the marine reserves in both size and impact on commercial fishing and kelp, however, this alternative covers 21 percent of the CINMS. There will be a high probability of relocating effort and a low probability of crowding and congestion effects both of which should decrease costs relative to our Step 1 analysis, but less so than alternatives 1 and 2. The ability to catch tuna and wetfish in surrounding areas lowers Step 1 analysis costs by 1.58 %. Like alternatives 1 and

2, this alternative has a relatively low impact on the squid fishery (5.66%). Kelp impacts are also relatively low for this alternative (4.98%), but just as with alternatives 1 and 2, we are not certain kelp harvest can be increased from other areas. This alternative has a relatively high impact on prawn fishermen (29.45%) and it is not clear how or if this impact could be mitigated. As in alternative 1 and 2, it might be possible that squid catch could be replaced from other areas. Since squid represents about 31 percent of the lost ex vessel value of catch from alternative 3, it is possible that our Step 1 analysis estimates could be reduced by about 33 percent, even in the short-term. These reductions in impact would bring the average annual impact down to about $1.59 million in ex vessel revenue or 5.63% of the 1996-1999 baseline

In the long-term, the replenishment effects are of medium likelihood since the reserves cover about 21 percent of the CINMS, with six of the 15 habitat types in the Science Panel report receiving protection levels of 20 percent or higher. The benefits to areas outside the marine reserves are higher than alternatives 1 and 2, and the long-term mitigation of costs greater than for alternatives 1 and 2. Whether replenishment effects are greater than crowding or congestion effects will determine if this alternative's long-term costs can be transformed into long-term benefits.

***Alternative 4*.** This is the second largest among the marine reserves in both size and impact on commercial fishing and kelp. This alternative covers 29 percent of the CINMS. There will be a medium probability of relocating effort and a low probability of crowding and congestion effects both of which should decrease costs relative to our Step 1 analysis, but less so than alternatives 1, 2,3 and the preferred alternative. The ability to catch tuna and wetfish in surrounding areas lowers Step 1 analysis costs by 1.32 %. This alternative has a more significant impact on the squid fishery (13.58%). Kelp impacts are still relatively low for this alternative (7.81%). We are not certain if squid harvest could be increased enough to fully offset the losses from this alternative. If half of the estimated losses could be replaced, then 21.37% of the total impact on ex vessel value of this alternative would be mitigated. As with other alternatives, we are not certain if kelp harvest can be increased from other areas. This alternative has the highest impact on prawn fishermen (41.11%) and it is not clear how or if this impact could be mitigated. If half the squid losses could be replaced from other areas, it is possible that our Step 1 analysis estimates could be reduced by about 23 percent, even in the short-term. These reductions in impact would bring the average annual impact down to about $3.2 million in ex vessel revenue or 11.35% of the 1996-1999 baseline.

In the long-term, the replenishment effects are of high likelihood since the reserves cover about 29 percent of the CINMS, with 14 of the 15 habitat types in the Science Panel report receiving protection levels of 20 percent or higher. Seven habitat types receive more than 30 percent protection. The benefits to areas outside the marine reserves are higher than alternatives 1,2,3 and the preferred alternative, and the long-term mitigation of costs greater than for alternatives 1, 2, 3 and the preferred alternative. Whether replenishment effects are greater than crowding or congestion effects will determine if this alternative's long-term costs can be transformed into long-term benefits.

Alternative 5. This is the largest among the marine reserves in both size and impact on commercial fishing and kelp. This alternative covers 34 percent of the CINMS. There will be a low probability of relocating effort and a high probability of crowding and congestion effects, the net effect is more likely to be an increase in costs relative to our Step 1 analysis. The ability to catch tuna and wetfish in surrounding areas lowers Step 1 analysis costs by 2.04 %. This alternative has the highest impact on the squid fishery (16.52%) and on kelp harvesting (12.2%). As with other alternatives, we are uncertain if kelp harvests could be increased from other areas. As with alternative 4, we are not certain if squid harvest could be increased in outside areas enough to fully offset the losses from this alternative. If half of the estimated losses could be replaced, then 21% of the total impact on ex vessel value of this alternative would be mitigated. This alternative has relatively high impact on prawn fishermen (29.26%) and it is not clear how or if this impact could be mitigated. If half the squid losses could be replaced from other areas, it is possible that our Step 1 analysis estimates could be reduced by about 24 percent, even in the short-term.

In the long-term, the replenishment effects are of high likelihood since the reserves cover about 34 percent of the CINMS, with all 15 habitat types in the Science Panel report receiving protection levels of 24 percent or higher. Ten habitat types receive 30 percent or more of protection. The benefits to areas outside the marine reserves are higher than all other alternatives, and the long-term mitigation of costs greater than for all other alternatives. Whether replenishment effects are greater than crowding or congestion effects will determine if this alternative's long-term costs can be transformed into long-term benefits.

Preferred Alternative. This alternative is mid-ranged among the marine reserves in both size and impact on commercial fishing and kelp. This alternative covers 25 percent of the CINMS. There will be a medium probability of relocating effort and a low probability of crowding and congestion effects, the net effect is more likely to be decrease in costs relative to our Step 1 analysis. The ability to catch tuna and wetfish in surrounding areas lowers Step 1 analysis costs by 2.09 %. This alternative has medium imp act on the squid fishery (13.12%) and a relatively low impact on kelp harvesting (5.55%). As with other alternatives, we are uncertain if kelp harvests could be increased from other areas. As with alternatives 4 and 5, we are not certain if squid harvest could be increased in outside areas enough to fully offset the losses from this alternative. If half of the estimated losses could be replaced, then 24.3% of the estimated step 1 total impact on ex vessel value of this alternative would be mitigated. This alternative has the lowest impact among all alternatives on prawn fishermen (16.7%), but it is not clear how or if this impact could be mitigated. If half the squid losses could be replaced from other areas, it is possible that our Step 1 analysis estimates could be reduced by about 27 percent, even in the short-term. These reduction in impact would bring the average annual impact down to about $2.6 million in ex vessel revenue or 9.08% of the 1996-1999 baseline.

In the long-term, the replenishment effects are of high likelihood since the reserves cover about 25 percent of the CINMS, with all 15 habitat types in the Science Panel report receiving protection levels of 21 percent or higher. Eight habitat types receive 30 percent or more of protection. The benefits to areas outside the marine reserves are lower than the benefits from alternatives 4 and 5, but higher than those from alternatives 1, 2 and 3. The long-term mitigation of costs would be expected to be lower than those for alternatives 4 and 5, but greater than those for alternatives 1, 2 and 3. Whether replenishment effects are greater than crowding or congestion effects will determine if this alternative's long-term costs can be transformed into long-term benefits.

In our review of the literature and discussions with the Small Business Administration, we could find no standard of comparison, in terms of percent of revenue or income loss, for which we could provide guidance as to the future success or failure of commercial fishing businesses. The rates of small business failures are extremely high and no reliable relationships have been established between revenue or income losses due to regulations and business failures. So we cannot provide guidance on how to translate the potential impacts into the magnitude of possible business failures.

The commercial fishermen participating in the MRWG process had their own standard for judging the impact of the marine reserves. The fishermen adapted a 10% standard. In the many alternative marine reserve designs that we analyzed for the fishermen, the fishermen were using the 10% or less impact on ex vessel revenue as their standard. We are not exactly sure what the standard means except that it seems to mean the amount of impact that they could live with. We might interpret this to mean the amount of impact that they could adjust to and still maintain a viable fishing business.

If we use the commercial fishermens' 10% standard and the step 1 estimates of potential loss in ex vessel revenue, Alternatives 1, 2, and 3 had estimated impacts less than 10% (7.69%, 7.90% and 8.43%, respectively). The Preferred Alternative and Alternatives 4 and 5 have potential impacts of 12.53%, 14.74% and 18.28%, respectively. If we use the commercial fishermens' 10% standard and our adjusted step 1 estmaites of potential loss in ex vessel revenue (assuming no impacts on wetfish, tuna and partial impacts on squid), Alternatives 1,2,3 and the Preferred Alternative have impacts less than 10% (5.02%, 5.17%, 5.63, and 9.08%, respectively). Alternatives 4 and 5 would still exceed the commercial fishermens' standard (11.35% and 14.00% respectively).

Recreation: Consumptive Activities – Step 2 Analysis

In the above analysis losses were discussed as maximum potential losses. The assumption was made that those losses were real and there was no way to recover from being displaced from the respective marine reserve alternatives. In this section we investigate the effect of possible mitigating factors on these losses to consumptive users and benefits to non-consumptive users and non-users. Although these issues are addressed quantitatively where possible, the discussion is largely qualitative because it is generally not possible for us to quantify mitigating factors and benefits. Even though we discussed substitution and the long-term benefits from replenishment effects in the introduction, for this chapter, we revisit these two important mitigating factors with a more pointed discussion about how they relate to recreation.

Substitution. If displaced users are simply able to relocate their activities, they may be able to fully or partially mitigate their losses. This of course depends on the availability of substitute sites and the qualities thereof. Several scenarios are possible. Even when total activity remains constant (i.e., person-days remain the same as they simply go to other sites), if the quality of the site is lower there could be some loss in consumer's surplus (no change in activity, so no change in income and employment). If it costs more to get to the substitute sites, there could still be increases in costs and thus lower consumer's surplus to users and profits to charter/party businesses. If there is not an adequate supply of substitute sites, then there could be losses in total activity and in all the non-market and market economic measures referenced in our above analysis of displaced use. The possibilities for substitution vary by alternative.

The presence of other closed areas will also effect the ability of displaced users to substitute. There are currently regions of closure in the study area in addition to the reserve areas proposed in this process. However to mitigate the negative impacts of the proposed areas, these are either being completely or partially re-opened. The effect this will have on the ability of users to find adequate substitutes site will vary by alternative. This issue is addressed below, where appropriate.

Long-term benefits from Replenishment Effects. Marine reserve systems may have beneficial effects beyond the direct ecological protection for the sites themselves. That is, both the size and number of fish, lobster and other invertebrates both inside and outside the reserves may increase. The quote from Davis 1998 summarizes some key aspects as they relate to recreation and marine reserve systems (for updated information, see the science panel's report):

> "…we found 31 studies that tested whether protected areas had an effect on the size, reproductive output, diversity, and recruitment of fish in adjacent areas. Fisheries targeted species were two to 25 times more abundant in no-take areas than in surrounding areas for fish, crustaceans, and mollusks on coral and temperate reefs in Australia, New Zealand, the Philippines, Japan, Kenya, South Africa, the Mediterranean Sea, Venezuela, Chile, and the United States (California, Florida and Rhode Island). Mean sizes of fished species protected in no-take zones were 12 to 200 percent larger than those in surrounding areas for all fishes studied and in 75 to 78 percent of the invertebrates. Eighty-six percent of the studies that tested fishery yields found that catches within three kilometers of the marine protected areas were 46 to 50 percent higher than before no-take zones were created. It is clear that fishers all over the world believe no-take zones increase yields because they fish as close to the boundaries as possible."

In addition, a study by Roberts, et. al. (2001) included the effects of no-take areas on recreational fishing specifically, in the Merritt Island National Wildlife Refuge at Cape Canaveral Florida. The refuge was established for security reasons relating to the Kennedy Space Center and includes two areas that have been closed to fishing since 1962. Among the findings in Roberts, et. al. (2001) is the following.

> "This region encompasses only 13% of the Florida coast, but of world record-size fish caught in Florida between 1939 and 1999, it accounted for 62% of 39 records for black drum, 54% of 67 records for red drum, 50% of 32 records for spotted sea trout, but only 2% of 84 records for common snook."

The explanation of the common snook finding is that the reserve is at the margin of its range and it does not spend the entire year in the refuge. The number of records for black and red drum are not only greater around the reserve than the rest of Florida, they are also increasing at a faster rate. Thus, marine reserves can be a benefit to recreational anglers. The study concluded the size and longevity of a reserve is fundamental to its success and that the effects of reserve extend beyond reserve boundaries.

The long-term benefits from the reserve could offset short-term costs from displacement, There would likely be long-term net benefits where short-term costs would be offset by long-term benefits. Again, this conclusion may still vary by alternative.

Table 3.3. Recreational Consumptive Activities: Impacts Relative to Step 1 Analysis

Factors	Short-term	Long-term
1. Status of Fishing Stocks	O	O to □
2. Replenishment Effects	□	■
3. Substitution/Relcoation	O to □	O to □
4. Crowding/Congestion Effects	●	●
5. Quality Increases in Marine Reserves	O	O
6. Other Regulations		
a) Regulated Inefficiency	□	□
b) Proposition 132 (Gillnet Restriction)	●	●
c) Allocations to Other User Groups	●	●
d) Cowcod Closure	●	□
e) Opening up some Cowcod Closure Areas	□	□
f) MLPA - Closed Areas	O	O
g) MLMA Fishery Management Plans	O	O
h) ITQs currently not being considered	O	O
I) Existing Area Closures	O to □	O to □
j) Temporal Closures	●	●
k) Economic Conditions and Outside and Internal Forces	●	●
7. Pelagic Species	□	□
8. Phasing	□	□
All Factors	O to ●	□ to ■

O = Neutral Impact
● = Increase in costs from Step 1
□ = Decrease in costs from Step 1
■ = No costs from Step 1 - instead, benefits

Preferred Alternative. This alternative is mid-ranged among the marine reserves in both size and impact on recreational consumptive activities. It covers 25 percent of the CINMS. In the short-term, complete mitigation by substituting to alternative sites is not likely for the Preferred Alternative because it encompasses areas of intense use. Mitigation by substituting to alternative sites is less likely for the preferred alternative in comparison to Alternatives 1, 2 and 3 because of its relative size and because it encompasses areas of more intense use. The portions of the Preferred Alternative to the north of Anacapa Island and on the northeast side of Santa Cruz Island as well as the area to the immediate southeast of Santa Barbara Island encompass a particularly high usage area for consumptive activities. Mitigation by substituting to alternative sites is more likely for the preferred alternative in comparison to Altematives 4 and 5. In the Santa Barbara Island area, the Cowcod Conservation Area completely encompasses the study area. In addition to the Rockfish and Lingcod Management Area regulations, the Cowcod closure also prohibits the catch of certain species in waters 20 fathoms or greater. Several of these species were in the top twenty recreational species in terms of catch in 2000 (NMFS, 2002). There is a proposal to re-open an area of the Cowcod closure to the northeast of Santa Barbara Island. Because data is not available by species, the effect of this proposed action can not be quantified; however, it is expected that this will have a positive effect on the ability of users to find an adequate substitute site. In the short-term, impacts should be less than estimated in the Step 1 Analysis.

In the long-term, the possibility of net benefits to consumptive users in the establishment of the Preferred Alternative depends upon consumptive users' success in finding substitute sites and the long-term resolution of crowding/congestion effects. As mentioned above, no take areas result in benefits that extend beyond the reserve boundaries (Roberts et. al., 2001). The number of interacting variables in marine ecosystems precludes accurate predictions of the magnitude of potential changes in abundance of target species. However, preliminary attempts to model ecosystems with reserve management have suggested that large reserves provide significantly greater benefits to target species than small reserves and limited-take zones (Salomon et al. 2002). Reserves established in areas of high recreational use are most likely to provide benefits to target species and long-term benefits to recreational fisherman. When intense fishing pressure is reduced in areas of high productivity, target species in reserves are likely to increase rapidly in abundance and individual size, leading to significantly higher reproductive potential. Increases in density and reproductive potential are likely to contribute to export of larvae and spillover of adult fish that will help to offset the loss of recreational fishing grounds.

Alternative 1. This alternative is the smallest of those being considered, both in terms of area and impact to recreational consumptive users. The success of relocation effort and substituting to alternative sites has higher probability for this alternative than for the Preferred Alternative because of the relatively small size of the alternative and because it does not contain a high proportion of heavily used areas for any of the consumptive activities. Furthermore, the highest use areas surrounding Anacapa Island and the east side of Santa Cruz Island are not as heavily impacted as other areas that are less used by consumptive users. The potential for crowding/congestion effects would also be low, again because of the relatively small size and the location of the alternative. One other potentially mitigating factor is the existing Anacapa Island Ecological Reserve, which prohibits the take of invertebrates. There is a proposal to re-open this reserve. This will have a positive effect on the ability of consumptive divers to relocate to adequate substitute sites. In the short-term, impacts should be less than estimated in the Step 1 Analysis.

In the long-term, depending upon consumptive users' success in finding substitute sites combined with an increase in size and quantity of sport fish in areas adjacent to marine reserves, there may actually be a net benefit to consumptive users. The number of interacting variables in marine ecosystems precludes accurate predictions of the magnitude of potential changes in abundance of target species. However, preliminary attempts to model ecosystems with reserve management have suggested that large reserves provide significantly greater benefits to target species than small reserves and limited-take zones (Salomon et al. 2002). Protecting the reserve areas proposed as Alternative 1 is not likely to contribute to recreational fisheries through of larval export and spillover. In other words, export from reserves will be diluted because the reserve area is small relative to the fished area. Individual reserves, particularly those on the north sides of Santa Rosa, Santa Cruz and Anacapa, are not likely to provide sufficient protection to reduce mortality and sustain local populations of some exploited species.

Alternative 2. In the short term, complete mitigation by substituting to alternative sites is less likely for alternative 2 in comparison to Alternative 1 because it encompasses areas of more intense use. Consumptive Fishers (both charter/party and private household boat) are more likely than divers to find a substitute site because Alternative 2 encompass relatively less of their current usage distribution. The portions of Alternative 2 to the north of Anacapa Island and on the northeast side of Santa Cruz Island encompass a particularly high usage area for charter/party and private boat diving. The potential for crowding/congestion effects would also be higher, again because of the relatively larger size and the location of the alternative. In the short-term, impacts should be less than estimated in the Step 1 Analysis.

Because Alternative 2 is of a larger size, the assumption is made that the increases in abundance and size of fish will be higher in magnitude in the long-term. As mentioned above, no take areas result in benefits that extend beyond the reserve boundaries (Roberts et. al., 2001). The number of interacting variables in marine ecosystems precludes accurate predictions of the magnitude of potential changes in abundance of target species. However, preliminary attempts to model ecosystems with reserve management have suggested that large reserves provide significantly greater benefits to target species than small reserves and limited-take zones (Salomon et al. 2002). Protecting the reserve areas proposed as Alternative 2 is not likely to contribute to fisheries through of larval export and spillover. In other words, export from reserves will be diluted because the reserve area is small relative to the fished area. Individual reserves, particularly those on the north sides of Santa Rosa, Santa Cruz and Anacapa, are not likely to provide sufficient protection to reduce mortality and sustain local populations of some exploited species.

Alternative 3. Mitigation of losses from Alternative 3 is more likely than for the Preferred Alternative in the short term. The most important reason for this is the siting of the reserves. The area of intense use for consumptive activities to the north of Anacapa Island and the east side of Santa Cruz Island are not included in this Alternative. For the relatively small number of users operating in Alternative 3, successful substitution is likely. In addition to no encompassing high use areas, Alternative 3 is smaller than the Preferred Alternative, which gives users more options in their choice of substitutes. The potential for crowding/congestion effects would also be low, again because of the relatively small size and the location of the alternative. One other potentially mitigating factor is the existing Anacapa Island Ecological Reserve, which prohibits the take of invertebrates. There is a proposal to re-open this reserve. This will have a positive effect on the ability of consumptive divers to relocate to adequate substitute sites. In the short term, impacts should be less than estimated in the Step 1 Analysis.

For the same reasons that mitigation of losses would be more likely in the short term, benefits from replenishment effects will be smaller in the long term. Because Alternative 3 is of a smaller size, the assumption is made that the increases in abundance and size of fish will be lower in magnitude. However, for Alternative 3, the relative small size and the high likelihood of substitution would result in a higher probability of a positive - albeit smaller - net benefit to consumptive users.

Alternative 4. In the short term, complete mitigation by substituting to alternative sites is less likely for alternative 4 in comparison to the Preferred Alternative because it is larger and encompasses areas of more intense use. Both those participating in consumptive fishing and consumptive diving would be less likely to find a substitute sight based upon the current distribution of use. Crowding/congestion effects are expected to be higher for this alternative. The portions of Alternative 4 to the north of Anacapa Island and on the northeast side of Santa Cruz Island encompass a particularly high usage area. Additionally, Alternative 4 encompasses the high use areas surrounding Santa Barbara Island. The potential for crowding/congestion effects would also be higher, again because of the relatively larger size and the location of the alternative. The re-opening of the region of the Cowcod Conservation Area to the northeast of Santa Barbara Island may have a positive effect on the ability of users to find adequate substitute sites. Overall, some substitution will likely take place, so even in the short-term, estimated impacts are expected to be less than estimated in the Step 1 Analysis

As was mentioned above, the size of a reserve is fundamental to its effectiveness (Roberts et. al., 2001). Because Alternative 4 is of a larger size, the assumption is made that the increases in abundance and size of fish will be higher in magnitude, resulting in a positive influence on the long-term net benefit. Reserves established in areas of high recreational use are most likely to provide benefits to target species and long-term benefits to recreational fisherman. When intense fishing pressure is reduced in areas of high productivity, target species in reserves are likely to increase rapidly in abundance and individual size, leading to significantly higher reproductive potential. Increases in density and reproductive potential are likely to contribute to export of larvae and spillover of adult fish that will help to offset the loss of recreational fishing grounds. In the long-term, it is highly likely that this alternative will result in net benefits to consumptive recreation users.

Alternative 5. Because it is larger and because it covers more of the area that is important to consumptive users generally, mitigation by substituting to alternative sites is less likely for alternative 5 than for the Preferred Alternative. Both those participating in consumptive fishing and consumptive diving would be less likely to find a substitute sight based upon the current distribution of use. Specifically, Alternative 5 covers more of the area around Anacapa Island, the east side of Santa Cruz Island and a much larger area around Santa Barbara Island. The potential for crowding/congestion effects would also be higher, again because of the relatively larger size and the location of the alternative. The re-opening of the region of the Cowcod Conservation Area to the northeast of Santa Barbara Island may have a positive short-term effect on the ability of users to find adequate substitute sites. Because data is not available by species, the effect of this proposed action can not be quantified; however, it is expected to be a mitigating factor. Although substitution is not likely to lead to full mitigation of costs, some substitution is expected to occur, resulting in lower impacts than estimated in the Step 1 Analysis.

Because Alternative 5 is of a larger size, the assumption is made that the increases in abundance and size of fish will be higher in magnitude in the long-term. The number of interacting variables in marine ecosystems precludes accurate predictions of the magnitude of potential changes in abundance of target species. However, preliminary attempts to model ecosystems with reserve management have suggested that large reserves provide significantly greater benefits to target species than small reserves and limited-take zones (Salomon et al. 2002).

Reserves established in areas of high recreational use are most likely to provide benefits to target species and long-term benefits to recreational fisherman. When intense fishing pressure is reduced in areas of high productivity, target species in reserves are likely to increase rapidly in abundance and individual size, leading to significantly higher reproductive potential. Increases in density and reproductive potential are likely to contribute to export of larvae and spillover of adult fish that will help to offset the loss of recreational fishing grounds.

Recreation Non-consumptive Users – Step 2 Analysis

In addition to benefits derived from replenishment effects, the establishment of marine reserve systems is expected to result in benefits to non-consumptive recreational users. These increased benefits take the form of increases in diversity of wildlife, viewing opportunities from increased abundance of fish and invertebrates, water quality, etc. Benefits may also be derived from the decrease in the density of users or in the reduction in conflicts with consumptive users. There is no data currently available to directly estimate the magnitude of these benefits. In light of this fact a simulation is conducted for each alternative using a range of increases in quality and of elasticities. Quality elasticities show the percentage change in consumer's surplus for a percentage change in quality. In a paper by Freeman (1995), 13 studies were summarized on marine recreation, which contained enough information to calculate quality elasticities. Catch rate was the quality variable in all the studies in Freeman (1995). In a paper by Bockstael, et al (1989) there was enough information to calculate quality elasticities for swimming, boating and fishing in Chesapeake Bay. See Appendix I for the derivation of these elasticities. Using the range of quality elasticities and the assumption of a 10%, 50% and 100% increase in quality, benefit estimates were calculated for each alternative. To avoid skewed results from outliers, the highest and lowest elasticities were dropped from this range.

For each alternative, four tables are provided. The first three tables report baseline 1999 activity within each alternative and their corresponding economic impact. The fourth table presents a range of potential impacts using our range of quality increases and quality elasticities. Quality increases are expected to grow over time. Elasticities also have a time dimension and in the short-term are smaller (less behavioral response to quality) and larger over the long-term (greater behavioral response). The number in the upper left corner of the tables reflects the smallest changes and the lower right corner of the tables yield the largest potential changes.

One other important point to bear in mind is that data was only available for charter/party boat non-consumptive recreation. This section does not take into account private boat non-consumptive usage, for which there was no data available. Therefore estimates of aggregate benefits presented here will tend to underestimate true benefits due to the exclusion of private boat non-consumptive usage in the calculations.

In the years 1999-2000, it is estimated that 6.3 million people age 16 or older from U.S. households participated in either bird watching, viewing other wildlife, viewing scenery or doing photography in the marine environment of California. They spent over 120.2 million days in these activities (Leeworthy 2001b and Leeworthy and Wiley 2001c)[6]. As a comparison, the same study estimated 2.7 million particiapnts that participated in 20.3 million days of saltwater recreational fishing. Given the above estiamtes, the private boat non-consumptive usage of the CINMS may be quite large.

Preferred Alternative. The aggregate economic impact on income associated with all non-consumptive activities is about $1.04 million dollars or 17.3% of the income generated in the study area. In terms of income, the activity with the highest baseline is whale watching with a baseline of $579 thousand, followed by non-consumptive diving with $327 thousand, sailing with $71 thousand and kayaking/sightseeing with $66 thousand. Please see Tables 3.4 through 3.6 the remainder of the economic measures and breakout by jurisdiction.

Table 3.4. Economic Impact Associated with Non-consumptive Activities Preferred Alternative - Total (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	4,105	15.80%	2,197	20.39%	499	12.42%	357	28.96%
Market Impact								
Direct Sales	$ 682,449	15.9%	$ 382,600	20.6%	$ 86,775	12.5%	$ 74,647	29.0%
Direct Wages and Salaries	$ 330,700	15.9%	$ 186,889	20.8%	$ 40,468	12.4%	$ 37,477	29.0%
Direct Employment	11	15.2%	6	20.4%	1	12.4%	2	29.0%
Total Income								
Upper Bound	$ 578,724	15.9%	$ 327,056	20.8%	$ 70,820	12.4%	$ 65,585	29.0%
Lower Bound	$ 496,050	15.9%	$ 280,333	20.8%	$ 60,702	12.4%	$ 56,216	29.0%
Total Employment								
Upper Bound	16	15.3%	10	20.2%	2	12.2%	2	28.5%
Lower Bound	14	15.3%	8	20.3%	2	12.5%	2	27.1%
Non-Market Impact								
Consumer's Surplus	$ 148,165	49.2%	$ 79,313	63.6%	$ 17,999	38.7%	$ 12,890	90.3%
Profit[1]	$ 19,907	12.7%	$ 9,290	20.1%	$ 2,549	14.1%	$ 799	28.9%

1. Profit is used as a proxy for producer's surplus.

Table 3.5. Economic Impact Associated with Non-consumptive Activities - Preferred Alternative - State Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	3,787	14.57%	1,972	18.30%	440	10.96%	357	28.96%
Market Impact								
Direct Sales	$ 629,435	14.7%	$ 342,533	18.4%	$ 76,877	11.1%	$ 74,647	29.0%
Direct Wages and Salaries	$ 305,042	14.6%	$ 167,288	18.6%	$ 35,679	10.9%	$ 37,477	29.0%
Direct Employment	10	14.0%	6	18.3%	1	10.9%	2	29.0%
Total Income								
Upper Bound	$ 533,824	14.6%	$ 292,754	18.6%	$ 62,438	10.9%	$ 65,585	29.0%
Lower Bound	$ 457,563	14.6%	$ 250,932	18.6%	$ 53,518	10.9%	$ 56,216	29.0%
Total Employment								
Upper Bound	15	14.1%	9	18.2%	2	10.8%	2	28.5%
Lower Bound	13	14.1%	7	18.2%	1	11.0%	2	27.1%
Non-Market Impact								
Consumer's Surplus	$ 136,686	14.6%	$ 71,190	18.3%	$ 15,885	11.0%	$ 12,890	29.0%
Profit[1]	$ 18,509	11.8%	$ 8,278	17.9%	$ 2,418	13.4%	$ 799	28.9%

1. Profit is used as a proxy for producer's surplus.

Table 3.6. Economic Impact Associated with Non-consumptive Activities - Preferred Alternative - Federal Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	318	1.22%	225	2.09%	59	1.46%	-	0.00%
Market Impact								
Direct Sales	$ 53,014	1.2%	$ 40,067	2.2%	$ 9,897	1.4%	$ -	0.0%
Direct Wages and Salaries	$ 25,658	1.2%	$ 19,601	2.2%	$ 4,789	1.5%	$ -	0.0%
Direct Employment	1	1.2%	1	2.1%	0	1.5%	-	0.0%
Total Income								
Upper Bound	$ 44,901	1.2%	$ 34,301	2.2%	$ 8,381	1.5%	$ -	0.0%
Lower Bound	$ 38,486	1.2%	$ 29,401	2.2%	$ 7,184	1.5%	$ -	0.0%
Total Employment								
Upper Bound	1	1.2%	1	2.1%	0	1.4%	-	0.0%
Lower Bound	1	1.2%	1	2.1%	0	1.5%	-	0.0%
Non-Market Impact								
Consumer's Surplus	$ 11,478	1.2%	$ 8,123	2.1%	$ 2,114	1.5%	$ -	0.0%
Profit[1]	$ 1,399	0.9%	$ 1,012	2.2%	$ 131	0.7%	$ -	0.0%

1. Profit is used as a proxy for producer's surplus.

The above tables show the baseline economic impact of potential beneficiaries to the Preferred Alternative. Here, that logic is extended into a range of benefit scenarios described in the introduction to this section. Table 3.7 shows the range of benefits based on certain assumptions about the increase in quality and the value elasticity of quality. By quality, we are referring to a composite attribute that takes into consideration the range of benefits that would have an impact on the non-consumptive recreation experience. This includes such attributes as diversity of wildlife, abundance of fish and invertebrates, the decrease in the density of users, the increase in water quality, etc. We use a range of a 10% increase to a 100% increase in quality. Value elasticity of quality is defined as the percentage increase in value associated with a one-percent increase in quality. For this illustration, we use a range of elasticities of 0.04 to 4.5. The valuation measure we use for this illustration is consumers' surplus associated with the boundary alternative, summed across all non-consumptive uses.

Table 3.7 presents a range of benefits with low end in terms of consumer's surplus of $6,459 with the assumption of a 10% increase in quality and a 0.25 value elasticity of quality and a high end of $1,162,649 with a 100% increase in value and a value elasticity of quality of 4.5. Income impacts range between $26,055 and $4,689,833, while employment impacts range between less than one job to 135 new jobs.

Table 3.7 Potential Benefits to Non-consumptive Users from The Preferred Alternative - Step 2 Analysis

Increase in Quality	Economic Measure	Elasticity of 0.25	Elasticity of 1.0	Elasticity of 4.5
10%				
	Consumer's Surplus	$ 6,459	$ 25,837	$ 116,265
	Income	$ 26,055	$ 104,219	$ 468,983
	Employment	0.75	3.00	13.50
	Person-days	179	716	3,221
50%				
	Consumer's Surplus	$ 32,296	$ 129,183	$ 581,324
	Income	$ 130,273	$ 521,093	$ 2,344,916
	Employment	3.75	15.00	67.50
	Person-days	895	3,579	16,106
100%				
	Consumer's Surplus	$ 64,592	$ 258,366	$ 1,162,649
	Income	$ 260,546	$ 1,042,185	$ 4,689,833
	Employment	7.50	30.00	135.00
	Person-days	1,790	7,158	32,211

1. Benefits are the aggregate amounts across all non-consumptive activities for The Preferred Alternative

Alternative 1. In terms of impact of non-consumptive activities this is the smallest marine reserve alternative. The aggregate economic impact on income associated with all non-consumptive activities in Alternative 1 is about $383 thousand dollars or 6.4% of the income generated in the study area. In terms of income, the activity with the highest baseline is whale watching with a baseline of $182 thousand, followed by non-consumptive diving with $145 thousand, sailing with $33 thousand and kayaking/sightseeing with $23 thousand. Please see Tables 3.8 through 3.10 the remainder of the economic measures and breakout by jurisdiction.

Table 3.8. Economic Impact Associated with Non-consumptive Activities - Alternative 1 - Total (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	1,290	4.96%	1,042	9.67%	229	5.70%	126	10.19%
Market Impact								
Direct Sales	$ 214,264	5.0%	$ 169,595	9.1%	$ 38,651	5.6%	$ 26,492	10.3%
Direct Wages and Salaries	$ 103,868	5.0%	$ 82,767	9.2%	$ 18,703	5.7%	$ 13,315	10.3%
Direct Employment	3	4.8%	3	9.7%	1	5.7%	1	10.4%
Total Income								
Upper Bound	$ 181,769	5.0%	$ 144,842	9.2%	$ 32,731	5.7%	$ 23,301	10.3%
Lower Bound	$ 155,802	5.0%	$ 124,150	9.2%	$ 28,055	5.7%	$ 19,973	10.3%
Total Employment								
Upper Bound	5	4.8%	5	9.6%	1	5.6%	1	10.2%
Lower Bound	4	4.8%	4	9.6%	1	5.8%	1	9.7%
Non-Market Impact								
Consumer's Surplus	$ 46,558	15.5%	$ 37,617	30.2%	$ 8,255	17.8%	$ 4,537	31.8%
Profit[1]	$ 6,437	4.1%	$ 3,511	7.6%	$ 510	2.8%	$ 275	10.0%

1. Profit is used as a proxy for producer's surplus.

Table 3.9. Economic Impact Associated with Non-consumptive Activities - Alternative 1 - State Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	1,288	4.96%	937	8.69%	197	4.91%	126	10.19%
Market Impact								
Direct Sales	$ 213,891	5.0%	$ 151,064	8.1%	$ 33,296	4.8%	$ 26,492	10.3%
Direct Wages and Salaries	$ 103,687	5.0%	$ 73,702	8.2%	$ 16,112	4.9%	$ 13,315	10.3%
Direct Employment	3	4.8%	3	8.7%	1	4.9%	1	10.4%
Total Income								
Upper Bound	$ 181,453	5.0%	$ 128,978	8.2%	$ 28,196	4.9%	$ 23,301	10.3%
Lower Bound	$ 155,531	5.0%	$ 110,553	8.2%	$ 24,168	4.9%	$ 19,973	10.3%
Total Employment								
Upper Bound	5	4.8%	4	8.6%	1	4.8%	1	10.2%
Lower Bound	4	4.8%	3	8.7%	1	5.0%	1	9.7%
Non-Market Impact								
Consumer's Surplus	$ 46,477	5.0%	$ 33,816	8.7%	$ 7,111	4.9%	$ 4,537	10.2%
Profit[1]	$ 6,428	4.1%	$ 3,054	6.6%	$ 439	2.4%	$ 275	10.0%

1. Profit is used as a proxy for producer's surplus.

Table 3.10. Economic Impact Associated with Non-consumptive Activities - Alternative 1 - Federal Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	2	0.01%	105	0.98%	32	0.79%	-	0.00%
Market Impact								
Direct Sales	$ 373	0.0%	$ 18,531	1.0%	$ 5,355	0.8%	$ -	0.0%
Direct Wages and Salaries	$ 181	0.0%	$ 9,065	1.0%	$ 2,591	0.8%	$ -	0.0%
Direct Employment	0	0.0%	0	1.0%	0	0.8%	-	0.0%
Total Income								
Upper Bound	$ 316	0.0%	$ 15,864	1.0%	$ 4,535	0.8%	$ -	0.0%
Lower Bound	$ 271	0.0%	$ 13,598	1.0%	$ 3,887	0.8%	$ -	0.0%
Total Employment								
Upper Bound	0	0.0%	0	1.0%	0	0.8%	-	0.0%
Lower Bound	0	0.0%	0	1.0%	0	0.8%	-	0.0%
Non-Market Impact								
Consumer's Surplus	$ 81	0.0%	$ 3,801	1.0%	$ 1,144	0.8%	$ -	0.0%
Profit[1]	$ 9	0.0%	$ 457	1.0%	$ 71	0.4%	$ -	0.0%

1. Profit is used as a proxy for producer's surplus.

The above tables show the baseline economic impact of potential beneficiaries to Alternative 1. Here, that logic is extended into a range of benefit scenarios described in the introduction to this section. Table 3.11 shows the range of benefits based on certain assumptions about the increase in quality and the value elasticity of quality. By quality, we are referring to a composite attribute that takes into consideration the range of benefits that would have an impact on the non-consumptive recreation experience. This includes such attributes as diversity of wildlife, abundance of fish and invertebrates, the decrease in the density of users, the increase in water quality, etc. We use a range of a 10% increase to a 100% increase in quality. Value elasticity of quality is defined as the percentage increase in value associated with a one-percent increase in quality. For this illustration, we use a range of elasticities of 0.04 to 4.5. The valuation measure we use for this illustration is consumers' surplus associated with the boundary alternative, summed across all non-consumptive uses.

Table 3.11 presents a range of benefits with low end in terms of consumer's surplus of $2,299 with the assumption of a 10% increase in quality and a 0.25 value elasticity of quality and a high end of $413,737 with a 100% increase in value and a value elasticity of quality of 4.5. Income impacts range between $9,566 and $1,721,895, while employment impacts range between less than one job to 51 new jobs.

Table 3.11 Potential Benefits to Non-consumptive Users from Alternative 1 - Step 2 Analysis

Increase in Quality	Economic Measure	Elasticity of 0.25	Elasticity of 1.0	Elasticity of 4.5
10%				
	Consumer's Surplus	$ 2,299	$ 9,194	$ 41,374
	Income	$ 9,566	$ 38,264	$ 172,189
	Employment	0.29	1.14	5.14
	Person-days	67	269	1,209
50%				
	Consumer's Surplus	$ 11,493	$ 45,971	$ 206,868
	Income	$ 47,830	$ 191,322	$ 860,947
	Employment	1.43	5.72	25.72
	Person-days	336	1,344	6,046
100%				
	Consumer's Surplus	$ 22,985	$ 91,941	$ 413,737
	Income	$ 95,661	$ 382,643	$ 1,721,895
	Employment	2.86	11.43	51.44
	Person-days	672	2,687	12,092

1. Benefits are the aggregate amounts across all non-consumptive activities for Alterantive 1

Alternative 2. In terms of impact associated with non-consumptive activities Alternative 2 is slightly larger than the Preferred Alternative. The aggregate economic impact on income associated with all non-consumptive activities is about $1.03 million dollars or 17.1% of the income generated in the study area. In terms of income, the activity with the highest baseline is whale watching with $635 thousand, followed by non-consumptive diving with $295 thousand, sailing with $77 thousand and kayaking/sightseeing with $23 thousand. Please see Tables 3.12 through 3.14 the remainder of the economic measures and breakout by jurisdiction.

Table 3.12. Economic Impact Associated with Non-consumptive Activities - Alternative 2 - Total (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	4,503	17.33%	1,984	18.41%	540	13.44%	130	10.54%
Market Impact								
Direct Sales	$ 748,574	17.5%	$ 346,919	18.7%	$ 91,179	13.1%	$ 26,627	10.3%
Direct Wages and Salaries	$ 362,749	17.4%	$ 168,585	18.7%	$ 44,122	13.5%	$ 13,333	10.3%
Direct Employment	12	16.7%	6	18.4%	1	13.5%	1	10.2%
Total Income								
Upper Bound	$ 634,811	17.4%	$ 295,024	18.7%	$ 77,213	13.5%	$ 23,332	10.3%
Lower Bound	$ 544,123	17.4%	$ 252,878	18.7%	$ 66,183	13.5%	$ 19,999	10.3%
Total Employment								
Upper Bound	18	16.7%	9	18.3%	2	13.3%	1	10.0%
Lower Bound	15	16.7%	7	18.4%	2	13.6%	1	9.5%
Non-Market Impact								
Consumer's Surplus	$ 162,527	54.0%	$ 71,608	57.4%	$ 19,474	41.9%	$ 4,689	32.8%
Profit[1]	$ 21,867	13.9%	$ 8,725	18.8%	$ 1,203	6.7%	$ 305	11.0%

1. Profit is used as a proxy for producer's surplus.

Table 3.13. Economic Impact Associated with Non-consumptive Activities - Alternative 2 - State Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	4,079	15.70%	1,821	16.90%	482	12.00%	130	10.54%
Market Impact								
Direct Sales	$ 677,801	15.8%	$ 317,349	17.1%	$ 81,425	11.7%	$ 26,627	10.3%
Direct Wages and Salaries	$ 328,537	15.8%	$ 154,119	17.1%	$ 39,402	12.1%	$ 13,333	10.3%
Direct Employment	11	15.2%	5	16.9%	1	12.0%	1	10.2%
Total Income								
Upper Bound	$ 574,941	15.8%	$ 269,708	17.1%	$ 68,953	12.1%	$ 23,332	10.3%
Lower Bound	$ 492,806	15.8%	$ 231,178	17.1%	$ 59,103	12.1%	$ 19,999	10.3%
Total Employment								
Upper Bound	16	15.2%	8	16.8%	2	11.8%	1	10.0%
Lower Bound	14	15.2%	7	16.9%	2	12.1%	1	9.5%
Non-Market Impact								
Consumer's Surplus	$ 147,244	15.7%	$ 65,744	16.9%	$ 17,391	12.0%	$ 4,689	10.5%
Profit[1]	$ 20,188	12.8%	$ 7,946	17.2%	$ 1,074	6.0%	$ 305	11.0%

1. Profit is used as a proxy for producer's surplus.

Table 3.14. Economic Impact Associated with Non-consumptive Activities - Alternative 2 - Federal Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	423	1.63%	162	1.51%	58	1.44%	-	0.00%
Market Impact								
Direct Sales	$ 70,772	1.7%	$ 29,569	1.6%	$ 9,754	1.4%	$ -	0.0%
Direct Wages and Salaries	$ 34,211	1.6%	$ 14,467	1.6%	$ 4,720	1.4%	$ -	0.0%
Direct Employment	1	1.5%	0	1.5%	0	1.4%	-	0.0%
Total Income								
Upper Bound	$ 59,870	1.6%	$ 25,316	1.6%	$ 8,260	1.4%	$ -	0.0%
Lower Bound	$ 51,317	1.6%	$ 21,700	1.6%	$ 7,080	1.4%	$ -	0.0%
Total Employment								
Upper Bound	2	1.5%	1	1.5%	0	1.4%	-	0.0%
Lower Bound	1	1.5%	1	1.5%	0	1.5%	-	0.0%
Non-Market Impact								
Consumer's Surplus	$ 15,283	1.6%	$ 5,864	1.5%	$ 2,083	1.4%	$ -	0.0%
Profit[1]	$ 1,679	1.1%	$ 780	1.7%	$ 129	0.7%	$ -	0.0%

1. Profit is used as a proxy for producer's surplus.

The above tables show the baseline economic impact of potential beneficiaries to Alternative 2. Here, that logic is extended into a range of benefit scenarios described in the introduction to this section. Table 3.15 shows the range of benefits based on certain assumptions about the increase in quality and the value elasticity of quality. By quality, we are referring to a composite attribute that takes into consideration the range of benefits that would have an impact on the non-consumptive recreation experience. This includes such attributes as diversity of wildlife, abundance of fish and invertebrates, the decrease in the density of users, the increase in water quality, etc. We use a range of a 10% increase to a 100% increase in quality. Value elasticity of quality is defined as the percentage increase in value associated with a one-percent increase in quality. For this illustration, we use a range of elasticities of 0.04 to 4.5. The valuation measure we use for this illustration is consumers' surplus associated with the boundary alternative, summed across all non-consumptive uses.

Table 3.15 presents a range of benefits with low end in terms of consumer's surplus of $6,457 with the assumption of a 10% increase in quality and a 0.25 value elasticity of quality and a high end of $1,162,343 with a 100% increase in value and a value elasticity of quality of 4.5. Income impacts range between $25,760 and $4,636,710, while employment impacts range between less than one job to 133 new jobs.

Table 3.15 Potential Benefits to Non-consumptive Users from Alternative 2 - Step 2 Analysis

Increase in Quality	Economic Measure	Elasticity of 0.25	Elasticity of 1.0	Elasticity of 4.5
10%				
	Consumer's Surplus	$ 6,457	$ 25,830	$ 116,234
	Income	$ 25,760	$ 103,038	$ 463,671
	Employment	0.74	2.96	13.32
	Person-days	179	716	3,220
50%				
	Consumer's Surplus	$ 32,287	$ 129,149	$ 581,172
	Income	$ 128,798	$ 515,190	$ 2,318,355
	Employment	3.70	14.80	66.60
	Person-days	895	3,578	16,101
100%				
	Consumer's Surplus	$ 64,575	$ 258,298	$ 1,162,343
	Income	$ 257,595	$ 1,030,380	$ 4,636,710
	Employment	7.40	29.60	133.21
	Person-days	1,789	7,156	32,202

1. Benefits are the aggregate amounts across all non-consumptive activities for Alterantive 2

Alternative 3. In terms of impact associated with non-consumptive activities Alternative 3 is significantly smaller than the preferred alternative. The aggregate economic impact on income associated with all non-consumptive activities is about $384 thousands dollars or 6.4% of the income generated in the study area. In terms of income, the activity with the highest baseline is non-consumptive diving with $164 thousand, followed by whale watching with $156 thousand, sailing with $37 thousand and kayaking/sightseeing with $25 thousand. Please see Tables 3.16 through 3.18 the remainder of the economic measures and breakout by jurisdiction.

Table 3.16. Economic Impact Associated with Non-consumptive Activities - Alternative 3 - Total (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	1,112	4.28%	1,175	10.90%	264	6.57%	136	11.00%
Market Impact								
Direct Sales	$ 183,670	4.3%	$ 192,526	10.4%	$ 44,589	6.4%	$ 28,472	11.1%
Direct Wages and Salaries	$ 89,284	4.3%	$ 93,983	10.4%	$ 21,577	6.6%	$ 14,304	11.1%
Direct Employment	3	4.3%	3	10.9%	1	6.6%	1	11.1%
Total Income								
Upper Bound	$ 156,246	4.3%	$ 164,471	10.4%	$ 37,759	6.6%	$ 25,032	11.1%
Lower Bound	$ 133,926	4.3%	$ 140,975	10.4%	$ 32,365	6.6%	$ 21,456	11.1%
Total Employment								
Upper Bound	5	4.3%	5	10.8%	1	6.5%	1	10.9%
Lower Bound	4	4.3%	4	10.9%	1	6.6%	1	10.4%
Non-Market Impact								
Consumer's Surplus	$ 40,153	13.3%	$ 42,409	34.0%	$ 9,523	20.5%	$ 4,894	34.3%
Profit[1]	$ 6,660	4.2%	$ 4,054	8.8%	$ 588	3.3%	$ 300	10.8%

1. Profit is used as a proxy for producer's surplus.

Table 3.17. Economic Impact Associated with Non-consumptive Activities - Alternative 3 - State Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	1,108	4.26%	975	9.05%	232	5.78%	136	11.00%
Market Impact								
Direct Sales	$ 182,925	4.3%	$ 157,141	8.5%	$ 39,234	5.7%	$ 28,472	11.1%
Direct Wages and Salaries	$ 88,920	4.3%	$ 76,673	8.5%	$ 18,985	5.8%	$ 14,304	11.1%
Direct Employment	3	4.3%	3	9.0%	1	5.8%	1	11.1%
Total Income								
Upper Bound	$ 155,610	4.3%	$ 134,178	8.5%	$ 33,224	5.8%	$ 25,032	11.1%
Lower Bound	$ 133,380	4.3%	$ 115,010	8.5%	$ 28,478	5.8%	$ 21,456	11.1%
Total Employment								
Upper Bound	5	4.3%	4	9.0%	1	5.7%	1	10.9%
Lower Bound	4	4.3%	4	9.0%	1	5.8%	1	10.4%
Non-Market Impact								
Consumer's Surplus	$ 39,989	4.3%	$ 35,183	9.0%	$ 8,380	5.8%	$ 4,894	11.0%
Profit[1]	$ 6,627	4.2%	$ 3,173	6.9%	$ 518	2.9%	$ 300	10.8%

1. Profit is used as a proxy for producer's surplus.

Table 3.18. Economic Impact Associated with Non-consumptive Activities - Alternative 3 - Federal Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	5	0.02%	200	1.86%	32	0.79%	-	0.00%
Market Impact								
Direct Sales	$ 746	0.0%	$ 35,385	1.9%	$ 5,355	0.8%	$ -	0.0%
Direct Wages and Salaries	$ 364	0.0%	$ 17,310	1.9%	$ 2,591	0.8%	$ -	0.0%
Direct Employment	0	0.0%	1	1.9%	0	0.8%	-	0.0%
Total Income								
Upper Bound	$ 637	0.0%	$ 30,292	1.9%	$ 4,535	0.8%	$ -	0.0%
Lower Bound	$ 546	0.0%	$ 25,965	1.9%	$ 3,887	0.8%	$ -	0.0%
Total Employment								
Upper Bound	0	0.0%	1	1.8%	0	0.8%	-	0.0%
Lower Bound	0	0.0%	1	1.9%	0	0.8%	-	0.0%
Non-Market Impact								
Consumer's Surplus	$ 164	0.0%	$ 7,226	1.9%	$ 1,144	0.8%	$ -	0.0%
Profit[1]	$ 33	0.0%	$ 881	1.9%	$ 71	0.4%	$ -	0.0%

1. Profit is used as a proxy for producer's surplus.

The above tables show the baseline economic impact of potential beneficiaries to Alternative 3. Here, that logic is extended into a range of benefit scenarios described in the introduction to this section. Table 3.19 shows the range of benefits based on certain assumptions about the increase in quality and the value elasticity of quality. By quality, we are referring to a composite attribute that takes into consideration the range of benefits that would have an impact on the non-consumptive recreation experience. This includes such attributes as diversity of wildlife, abundance of fish and invertebrates, the decrease in the density of users, the increase in water quality, etc. We use a range of a 10% increase to a 100% increase in quality. Value elasticity of quality is defined as the percentage increase in value associated with a one-percent increase in quality. For this illustration, we use a range of elasticities of 0.04 to 4.5. The valuation measure we use for this illustration is consumers' surplus associated with the boundary alternative, summed across all non-consumptive uses.

Table 3.19 presents a range of benefits with low end in terms of consumer's surplus of $2,424 with the assumption of a 10% increase in quality and a 0.25 value elasticity of quality and a high end of $436,406 with a 100% increase in value and a value elasticity of quality of 4.5. Income impacts increase to a range between $9,588 and $1,725,785, while employment impacts range between less than one job to 52 new jobs.

Table 3.19 Potential Benefits to Non-consumptive Users from Alternative 3 - Step 2 Analysis

Increase in Quality	Economic Measure	Elasticity of 0.25	Elasticity of 1.0	Elasticity of 4.5
10%				
	Consumer's Surplus	$ 2,424	$ 9,698	$ 43,641
	Income	$ 9,588	$ 38,351	$ 172,578
	Employment	0.29	1.16	5.23
	Person-days	67	269	1,209
50%				
	Consumer's Surplus	$ 12,122	$ 48,490	$ 218,203
	Income	$ 47,938	$ 191,754	$ 862,892
	Employment	1.45	5.82	26.17
	Person-days	336	1,344	6,046
100%				
	Consumer's Surplus	$ 24,245	$ 96,979	$ 436,406
	Income	$ 95,877	$ 383,508	$ 1,725,785
	Employment	2.91	11.63	52.34
	Person-days	672	2,687	12,092

1. Benefits are the aggregate amounts across all non-consumptive activities for Alterantive 3

Alternative 4. In terms of impact associated with non-consumptive activities Alternative 4 is larger than the Preferred Alternative. The aggregate economic impact on income associated with all non-consumptive activities is about $1.3 million dollars or 20.8% of the income generated in the study area. In terms of income, the activity with the highest baseline is whale watching with $767 thousand, followed by non-consumptive diving with $370 thousand, sailing with $81 thousand and kayaking/sightseeing with $32 thousand. Please see Tables 3.20 through 3.22 the remainder of the economic measures and breakout by jurisdiction.

Table 3.20. Economic Impact Associated with Non-consumptive Activities - Alternative 4 - Total (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	5,450	20.97%	2,505	23.25%	569	14.17%	174	14.13%
Market Impact								
Direct Sales	$ 903,539	21.1%	$ 434,389	23.4%	$ 97,837	14.1%	$ 36,097	14.0%
Direct Wages and Salaries	$ 438,372	21.0%	$ 211,439	23.5%	$ 46,329	14.2%	$ 18,101	14.0%
Direct Employment	15	20.5%	7	23.2%	1	14.2%	1	13.9%
Total Income								
Upper Bound	$ 767,151	21.0%	$ 370,018	23.5%	$ 81,076	14.2%	$ 31,676	14.0%
Lower Bound	$ 657,558	21.0%	$ 317,159	23.5%	$ 69,493	14.2%	$ 27,151	14.0%
Total Employment								
Upper Bound	22	20.6%	11	23.1%	2	13.9%	1	13.7%
Lower Bound	19	20.6%	9	23.2%	2	14.3%	1	13.0%
Non-Market Impact								
Consumer's Surplus	$ 196,695	65.4%	$ 90,416	72.5%	$ 20,540	44.2%	$ 6,290	44.1%
Profit[1]	$ 28,847	18.3%	$ 10,645	23.0%	$ 2,227	12.4%	$ 399	14.4%

1. Profit is used as a proxy for producer's surplus.

Table 3.21. Economic Impact Associated with Non-consumptive Activities - Alternative 4 - State Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	4,272	16.44%	2,194	20.36%	518	12.89%	174	14.13%
Market Impact								
Direct Sales	$ 709,897	16.6%	$ 378,420	20.4%	$ 89,135	12.8%	$ 36,097	14.0%
Direct Wages and Salaries	$ 344,085	16.5%	$ 184,058	20.5%	$ 42,118	12.9%	$ 18,101	14.0%
Direct Employment	11	15.9%	6	20.4%	1	12.9%	1	13.9%
Total Income								
Upper Bound	$ 602,149	16.5%	$ 322,101	20.5%	$ 73,706	12.9%	$ 31,676	14.0%
Lower Bound	$ 516,127	16.5%	$ 276,087	20.5%	$ 63,177	12.9%	$ 27,151	14.0%
Total Employment								
Upper Bound	17	15.9%	10	20.2%	2	12.7%	1	13.7%
Lower Bound	14	15.9%	8	20.3%	2	13.0%	1	13.0%
Non-Market Impact								
Consumer's Surplus	$ 154,207	16.4%	$ 79,202	20.4%	$ 18,681	12.9%	$ 6,290	14.1%
Profit[1]	$ 21,098	13.4%	$ 9,198	19.9%	$ 2,112	11.7%	$ 399	14.4%

1. Profit is used as a proxy for producer's surplus.

Table 3.22. Economic Impact Associated with Non-consumptive Activities - Alternative 4 - Federal Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	1,177	4.53%	311	2.88%	51	1.28%	-	0.00%
Market Impact								
Direct Sales	$ 193,641	4.5%	$ 55,968	3.0%	$ 8,702	1.3%	$ -	0.0%
Direct Wages and Salaries	$ 94,287	4.5%	$ 27,381	3.0%	$ 4,211	1.3%	$ -	0.0%
Direct Employment	3	4.6%	1	2.9%	0	1.3%	-	0.0%
Total Income								
Upper Bound	$ 165,003	4.5%	$ 47,917	3.0%	$ 7,369	1.3%	$ -	0.0%
Lower Bound	$ 141,431	4.5%	$ 41,072	3.0%	$ 6,316	1.3%	$ -	0.0%
Total Employment								
Upper Bound	5	4.6%	1	2.9%	0	1.3%	-	0.0%
Lower Bound	4	4.6%	1	2.9%	0	1.3%	-	0.0%
Non-Market Impact								
Consumer's Surplus	$ 42,488	4.5%	$ 11,214	2.9%	$ 1,859	1.3%	$ -	0.0%
Profit[1]	$ 7,748	4.9%	$ 1,447	3.1%	$ 115	0.6%	$ -	0.0%

1. Profit is used as a proxy for producer's surplus.

The above tables show the baseline economic impact of potential beneficiaries to Alternative 4. Here, that logic is extended into a range of benefit scenarios described in the introduction to this section. Table 3.23 shows the range of benefits based on certain assumptions about the increase in quality and the value elasticity of quality. By quality, we are referring to a composite attribute that takes into consideration the range of benefits that would have an impact on the non-consumptive recreation experience. This includes such attributes as diversity of wildlife, abundance of fish and invertebrates, the decrease in the density of users, the increase in water quality, etc. We use a range of a 10% increase to a 100% increase in quality. Value elasticity of quality is defined as the percentage increase in value associated with a one-percent increase in quality. For this illustration, we use a range of elasticities of 0.04 to 4.5. The valuation measure we use for this illustration is consumers' surplus associated with the boundary alternative, summed across all non-consumptive uses.

Table 3.23 presents a range of benefits with low end in terms of consumer's surplus of $7,849 with the assumption of a 10% increase in quality and a 0.25 value elasticity of quality and a high end of $1,412,732 with a 100% increase in value and a value elasticity of quality of 4.5. Income impacts increase to a range between $31,248 and $5,624,646, while employment impacts range between less than one job to about 164 new jobs.

Table 3.23 Potential Benefits to Non-consumptive Users from Alternative 4 - Step 2 Analysis

Increase in Quality	Economic Measure	Elasticity of 0.25	Elasticity of 1.0	Elasticity of 4.5
10%				
	Consumer's Surplus	$ 7,849	$ 31,394	$ 141,273
	Income	$ 31,248	$ 124,992	$ 562,465
	Employment	0.91	3.64	16.37
	Person-days	217	870	3,914
50%				
	Consumer's Surplus	$ 39,243	$ 156,970	$ 706,366
	Income	$ 156,240	$ 624,961	$ 2,812,323
	Employment	4.55	18.19	81.85
	Person-days	1,087	4,349	19,571
100%				
	Consumer's Surplus	$ 78,485	$ 313,940	$ 1,412,732
	Income	$ 312,480	$ 1,249,921	$ 5,624,646
	Employment	9.09	36.38	163.70
	Person-days	2,175	8,698	39,141

1. Benefits are the aggregate amounts across all non-consumptive activities for Alterantive 4

Alternative 5. In terms of impact associated with non-consumptive activities Alternative 5 is significantly larger than the preferred altemative. The aggregate economic impact on income associated with all non-consumptive activities is about $1.5 million dollars or 25.5% of the income generated in the study area. In terms of income, the activity with the highest baseline is whale watching with $939 thousand, followed by non-consumptive diving with $431 thousand, sailing with $96 thousand and kayaking/sightseeing with $71 thousand. Please see Tables 3.24 through 3.26 the remainder of the economic measures and breakout by jurisdiction.

Table 3.24. Economic Impact Associated with Non-consumptive Activities - Alternative 5 - Total (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	6,670	25.67%	2,901	26.93%	672	16.75%	386	31.31%
Market Impact								
Direct Sales	$ 1,104,869	25.8%	$ 504,751	27.2%	$ 116,137	16.7%	$ 80,471	31.3%
Direct Wages and Salaries	$ 536,287	25.7%	$ 246,032	27.3%	$ 54,677	16.8%	$ 40,387	31.2%
Direct Employment	18	25.2%	8	26.9%	2	16.8%	2	31.2%
Total Income								
Upper Bound	$ 938,502	25.7%	$ 430,556	27.3%	$ 95,685	16.8%	$ 70,676	31.2%
Lower Bound	$ 804,430	25.7%	$ 369,048	27.3%	$ 82,016	16.8%	$ 60,580	31.2%
Total Employment								
Upper Bound	27	25.3%	13	26.7%	3	16.5%	2	30.7%
Lower Bound	23	25.3%	10	26.8%	2	16.9%	2	29.2%
Non-Market Impact								
Consumer's Surplus	$ 240,754	80.0%	$ 104,723	83.9%	$ 24,270	52.2%	$ 13,934	97.6%
Profit[1]	$ 36,362	23.1%	$ 12,367	26.7%	$ 2,936	16.3%	$ 870	31.5%

1. Profit is used as a proxy for producer's surplus.

Table 3.25. Economic Impact Associated with Non-consumptive Activities - Alternative 5 - State Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	4,901	18.86%	2,542	23.59%	609	15.17%	386	31.31%
Market Impact								
Direct Sales	$ 814,227	19.0%	$ 439,779	23.7%	$ 105,427	15.2%	$ 80,471	31.3%
Direct Wages and Salaries	$ 394,686	18.9%	$ 214,245	23.8%	$ 49,494	15.2%	$ 40,387	31.2%
Direct Employment	13	18.2%	7	23.6%	2	15.2%	2	31.2%
Total Income								
Upper Bound	$ 690,701	18.9%	$ 374,930	23.8%	$ 86,615	15.2%	$ 70,676	31.2%
Lower Bound	$ 592,030	18.9%	$ 321,368	23.8%	$ 74,242	15.2%	$ 60,580	31.2%
Total Employment								
Upper Bound	20	18.3%	11	23.4%	2	14.9%	2	30.7%
Lower Bound	16	18.3%	9	23.5%	2	15.3%	2	29.2%
Non-Market Impact								
Consumer's Surplus	$ 176,903	18.9%	$ 91,736	23.6%	$ 21,983	15.2%	$ 13,934	31.3%
Profit[1]	$ 24,353	15.5%	$ 10,680	23.1%	$ 2,795	15.5%	$ 870	31.5%

1. Profit is used as a proxy for producer's surplus.

Table 3.26. Economic Impact Associated with Non-consumptive Activities - Alternative 5 - Federal Waters (Baseline 1999)

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	1,769	6.81%	360	3.34%	63	1.58%	-	0.00%
Market Impact								
Direct Sales	$ 290,642	6.8%	$ 64,973	3.5%	$ 10,710	1.5%	$ -	0.0%
Direct Wages and Salaries	$ 141,600	6.8%	$ 31,786	3.5%	$ 5,183	1.6%	$ -	0.0%
Direct Employment	5	7.0%	1	3.3%	0	1.6%	-	0.0%
Total Income								
Upper Bound	$ 247,801	6.8%	$ 55,626	3.5%	$ 9,070	1.6%	$ -	0.0%
Lower Bound	$ 212,401	6.8%	$ 47,680	3.5%	$ 7,774	1.6%	$ -	0.0%
Total Employment								
Upper Bound	8	7.0%	2	3.3%	0	1.6%	-	0.0%
Lower Bound	6	7.0%	1	3.3%	0	1.6%	-	0.0%
Non-Market Impact								
Consumer's Surplus	$ 63,852	6.8%	$ 12,987	3.3%	$ 2,287	1.6%	$ -	0.0%
Profit[1]	$ 12,009	7.6%	$ 1,688	3.6%	$ 141	0.8%	$ -	0.0%

1. Profit is used as a proxy for producer's surplus.

The above tables show the baseline economic impact of potential beneficiaries to Alternative 5. Here, that logic is extended into a range of benefit scenarios described in the introduction to this section. Table 3.27 shows the range of benefits based on certain assumptions about the increase in quality and the value elasticity of quality. By quality, we are referring to a composite attribute that takes into consideration the range of benefits that would have an impact on the non-consumptive recreation experience. This includes such attributes as diversity of wildlife, abundance of fish and invertebrates, the decrease in the density of users, the increase in water quality, etc. We use a range of a 10% increase to a 100% increase in quality. Value elasticity of quality is defined as the percentage increase in value associated with a one-percent increase in quality. For this illustration, we use a range of elasticities of 0.04 to 4.5. The valuation measure we use for this illustration is consumers' surplus associated with the boundary alternative, summed across all non-consumptive uses.

Table 3.27 presents a range of benefits with low end in terms of consumer's surplus of $9,592 with the assumption of a 10% increase in quality and a 0.25 value elasticity of quality and a high end of $1,726,565 with a 100% increase in value and a value elasticity of quality of 4.5. Income impacts increase to a range between $38,385 and $6,909,387, while employment impacts range between about one job to 202 new jobs.

Table 3.27 Potential Benefits to Non-consumptive Users from Alternative 5 - Step 2 Analysis

Increase in Quality	Economic Measure	Elasticity of 0.25	Elasticity of 1.0	Elasticity of 4.5
10%				
	Consumer's Surplus	$ 9,592	$ 38,368	$ 172,656
	Income	$ 38,385	$ 153,542	$ 690,939
	Employment	1.12	4.50	20.23
	Person-days	266	1,063	4,784
50%				
	Consumer's Surplus	$ 47,960	$ 191,841	$ 863,282
	Income	$ 191,927	$ 767,710	$ 3,454,693
	Employment	5.62	22.48	101.17
	Person-days	1,329	5,315	23,918
100%				
	Consumer's Surplus	$ 95,920	$ 383,681	$ 1,726,565
	Income	$ 383,855	$ 1,535,419	$ 6,909,387
	Employment	11.24	44.96	202.34
	Person-days	2,658	10,630	47,835

1. Benefits are the aggregate amounts across all non-consumptive activities for Alterantive 5

Table 3.28. Summary: Economic Impacts on Recreation Non-consumptive Activities - Step 2 Analysis

	Range of Impacts			
	Person-days		Consumer's Surplus	
Alternative	Amount	%	Amount	%
Preferred Alternative	179 - 32,211	0.43% - 77%	$6,459 - $1,162,649	0.43% - 77%
Alternative 1	67 - 12,092	0.16% - 29%	$2,299 - $ 413,737	0.15% - 27%
Alternative 2	179 - 32,202	0.43% - 77%	$6,457 - $1,162,343	0.43% - 77%
Alternative 3	67 - 12,092	0.16% - 29%	$2,424 - $ 436,406	0.16% - 29%
Alternative 4	217 - 39,141	0.52% - 93%	$7,849 - $1,412,732	0.52% - 93%
Alternative 5	266 - 47,835	0.63% - 114%	$9,592 - $1,726,565	0.63% - 114%

	Income		Employment	
Alternative	Amount	%	Amount	%
Preferred Alternative	$26,055 - $4,689,833	0.43% - 78%	0.75 - 135	0.42% - 75%
Alternative 1	$ 9,566 - $1,721,895	0.16% - 29%	0.29 - 51	0.16% - 28%
Alternative 2	$25,760 - $4,636,710	0.43% - 77%	0.74 - 133	0.41% - 74%
Alternative 3	$ 9,588 - $1,725,785	0.16% - 29%	0.29 - 52	0.16% - 29%
Alternative 4	$31,248 - $5,624,646	0.52% - 93%	0.91 - 164	0.51% - 92%
Alternative 5	$38,385 - $6,909,387	0.64% - 115%	1.12 - 202	0.63% - 113%

1. Percents are percent of baseline 1999 for the entire study area.

Other Potential Benefits and Net Assessment

In previous sections we addressed the potential costs to all consumptive users (both the recreational industry and for the commercial fishery and kelp), we discussed the potential benefits to recreational consumptive users and commercial fisheries from the replenishment effect of the marine reserves. We also discussed the potential benefits to nonconsumptive recreational users and simulated the potential benefits using a range of assumptions about future quality increases in the marine reserves and the behavioral responses (quality elasticities). In the introduction of the report, we introduced the concepts of nonuse or passive economic use values. Here we derive some rough estimates for nonuse or passive use economic values using a conservative range of values from the economics literature and some assumptions about how many American households might be willing to pay for marine reserves in the CINMS. We summarize some key National and California Statewide surveys to provide underlying support for the notion that people are willing to pay for marine reserves. Lastly, we provide a rough assessment of the Net National Benefits of marine reserves in the CINMS. We do this by overstating the amounts of consumer's surplus losses for the commercial fisheries and kelp and consumptive recreation activities and use conservative lower bound estimates for nonuse or passive use economic values. Although we show a range of values for nonconsumptive recreation, we did not add these in the Net Benefit Assessment. The net national benefits of marine reserves are greater than the costs by considering only the nonuse or passive use economic values for any of the alternatives, except under the most conservative assumptions for the largest reserve alternatives proposed for the CINMS. If we added the highest range of nonconsumptive recreation value to nonuse or passive economic use value, the consumptive use values lost would exceed the benefits only for Alternative 5 under the most conservative assumptions for nonuse or passive economic use value.

Nonuse or Passive Use Economic Value. To date there are no known studies that have estimated nonuse or passive use economic values specifically for the marine reserves in the CINMS or for marine reserves anywhere else. However, Spurgeon (1992) has offered two sets of identifiable factors, which will dictate the magnitude of nonuse or passive use economic values. First, nonuse economic values will be positively related to the quality, condition, and uniqueness of the ecosystem on a national or global scale. Second, the size of population, standard of education, and environmental perception of people in the country owning or having jurisdiction over the ecosystem will be positively related to nonuse or passive use economic values. Thus, nonuse or passive use economic values are determined by both supply and demand conditions. The existence of many similar sites would reduce the value. Although Spurgeon limits his scope to the people in the country owning or having jurisdiction over the ecosystem, people from all over the world may have nonuse or passive use economic values for ecosystem protection in other countries. Debt for nature protection swaps being conducted by The Nature Conservancy in South America is just one example. Legitimacy of including the values of people from other countries is more a judicial concern than an economic one. In some judicial proceedings people from other countries might not have legal standing over issues of resource protection and their economic values may be eliminated from inclusion in the proceedings.

What we know about nonuse economic values. We searched the literature and found 19 studies in which nonuse economic values were estimated. Desvouges et al (1992) contained summaries of 18 of the 19 studies. The remaining study was by Carson et al (1992) on the Exxon Valdez Oil Spill. Sixteen (16) of the 18 studies found in Desvouges et al (1992) reported values (not adjusted for inflation) of $10 or more per household per year for a broad variety of natural resource protection efforts. Of the two studies that reported values less than $10/household/year, one reported $3.80/household/year for adding one park in Australia and $5.20/household per year for a second park (these estimates were from a National sample of Australians). The other study that estimated nonuse economic values less than $10/household/year was a study of Wisconsin resident's willingness to pay for protecting bald eagles and striped shiners in the State of Wisconsin. For the bald eagle, nonuse economic values had an estimated range of $4.92 to $28.38/household/year, while for striped shiners the values ranged from $1.00 to $5.66/household/year. Total value ranged from $6.50 to $75.31/household/year.

Only two of the 18 studies summarized in Desvouges et al (1992) used National samples of U.S. households, the others were limited to state or region populations. The Exxon Valdez Oil Spill Study (Carson et al, 1992) used a National sample of U.S. households. An important caveat is that the sample included only English speaking households and eliminated Alaskan residents. Alaskan residents were eliminated to limit the sample to primarily nonusers of Prince William Sound (site of the oil spill) and non-English speaking households were eliminated because the researchers were not able to convert their questionnaires to other languages. The impact was that the sample represented only 90 percent of U.S. households.

Carson et al (1992) reported a median willingness to pay of $31 per household. The payment was a lump sum payment through income taxes and covered a ten-year period. The funds would go into a trust fund to pay for equipment and other costs necessary to prevent a future accident like the Exxon Valdez in Prince William Sound. After 10 years, double hull tankers would be fully implemented and the need for the protection program would expire. Mean willingness to pay was higher and more variable to model specification than the median willingness to pay, so the authors argued that the median value was a conservative estimate. Applying the $31/household to only 90 percent of the U.S. population of households was also considered conservative since non English speaking people probably have positive nonuse economic values as do Alaskans.

Estimation of Nonuse Economic Values. Given what we know about nonuse economic values, we can develop a range of "conservative" (i.e., lower bound) estimates of nonuse or passive use economic values for the marine reserves in the CINMS. To do this requires the following assumptions and facts:

Assumptions:

1. One (1) percent of U.S. households would have some positive nonuse or passive economic use values for a network of marine reserves in the CINMS.
2. The one (1) percent of U.S. households would be, on average, willing to pay either $3/household/year, $5/household/year, or $10/houshold/year for marine reserves in the CINMS.

Fact:

1. As of July 1, 1999, there were 103.9 million households in the U.S.

Using the above assumptions and the number of U.S. households in 1999, we can estimate a probable lower bound set of estimates for the nonuse or passive use economic values for the network of marine reserves in the CINMS.

	$3/household/year	$5/household/year	$10/household/year
1999 Annual Amount	$3.12 million	$5.19 million	$10.39 million

The 1999 annual willingness to pay for marine reserves in the CINMS would range between $3.12 million and $10.39 million, depending on the assumed willingness to pay per household. We would expect that nonuse economic values would be greater the larger the area protected. But as described earlier, we would also expect willingness to pay to be positively related to both the characteristics of those valuing the reserve and the characteristics of what they are asked to value. Since our estimates of nonuse economic values are based on an assumed range of values (at the lowest end of the distribution of values estimated in other studies), we are not able to compare the values of the different alternatives in dollar terms. However, following the suggestions of Spurgeon, we demonstrate the characteristics of the U.S. population that would support our statement that the above estimates would likely be lower bound estimates.

Factors Supporting Positive Nonuse Economic Value. We reviewed four studies based on National surveys of U.S. households that evaluated adult's perceptions and concerns about the environment. In addition, one of the studies focused specifically on ocean related issues (SeaWeb, 1996) and found strong support for marine protected areas. One more recent study (SeaWeb, 2001) directly addressed the issue of marine protected areas and fully protected marine reserves. Each of the surveys demonstrated that U.S. citizens have a high level of concern about the environment and believe the environment is threatened and requires action and overwhelming support the creation of marine reserves. One recent study based on a survey of Californians (SeaWeb, 2002) found support for the California MLPA and for marine reserves in the CINMS. Also, our assumption that only one (1) percent of U.S. households would be willing to pay for marine reserves in the CINMS would appear to be a conservative lower bound estimate since the Roper survey (Roper, 1990) indicated that in 1990 eight (8) percent of U.S. households made financial contributions to environmental organizations. Selected results from the five studies are summarized below.

Environmental Opinion Study, Inc. National sample of 804 households conducted May 18-26, 1991.

Identification with Environmental Label

	%
Strong Environmentalist	31
Weak Environmentalist	29
Lean Towards Environmentalism	30
Neutral	6
Anti-Environmentalist	4

Roper 1989 and 1990 National Surveys

1. Things the Nation Should Make a Major Effort on Now

	1989 (%)	1990 (%)
a. Trying to solve the problem of crime and drugs	78	88
b. Taking steps to contain the cost of health care	70	80
c. **Trying to improve the quality of the environment**	**56**	**78**
d. Trying to improve the quality of public school education	N//A	77
2. Contribute money to environmental groups	7	8

SeaWeb 1996. National Sample of 900 U.S. Households (May 1-15, 1996)

1. Condition of the ocean	49% very important	38% somewhat important	
2. Destruction of the ocean on Quality of Life			
a. Today	52% very serious	35% somewhat serious	
b. 10 years from now	63% very serious	23% somewhat serious	
3. Oceans threatened by human activity			82% agree
4. The federal government needs to do more to help protect the oceans			85% agree to strongly agree
5. Destruction of ocean plants/ animals			56% very serious problem
6. Overfishing by commercial fishermen			45% very serious problem
7. Deterioration of coral reefs			43% very serious problem
8. Protect sanctuaries where fishing, boating, etc, prohibited			62% strongly agree
9. Support efforts to set up Marine Sanctuaries			24% say they are almost certain to take this action
10. Marine sanctuaries where no human activity is permitted			19% say they are almost certain to take this action

SeaWeb 2001, A combination of two studies.

1. **Attitudes Toward Marine Reserves, National Sample of 1,000 Adult Americans Nationwide, February 9-11, 2001**

2. **Public Attitudes Toward Protected Areas in the Ocean, National Sample of 802 Adult Americans Nationwide, September 25, 1999 to October 3, 1999**

Summary of Key findings:

- **Most Americans have a fairly Negative View of the Overall Health of the Oceans** (44% - Only Fair, and 15% - Poor for a total of 59% with Negative ratings)
- **Nearly Two-thirds believe that regulations protecting the ocean are too lax** (63% - regulations are not strict enough)
- **Pollution, Contaminated Seafood, and Dirty Beaches Top the list of ocean concerns. Recreation-related concerns are seen as less serious.**
- **Large majorities find the condition of both "Coastal" and "Deep Sea" Waters Important**
  "How important is the condition of _________ to you personally?"
  Coastal Waters (69% very important and 23% somewhat important)
  Deep Sea (53% very important, 30% somewhat important)
- **Americans believe a far greater percentage of our ocean waters are fully protected than actually are.**
  "As you may know, there are different kinds of protected areas in American oceans – some are fully protected and allow no human activities that could harm the ocean environment at all. Other kinds of protected areas have lower levels of protected areas and ban only certain activities. What percentage of U.S. waters do you think are fully protected – that is, allow no human activities that could harm the ocean environment at all?"
  On average, Americans believe 22% of the oceans is fully protected.
- **Only one-third of Americans are even dimly aware of the existence of Marine Sanctuaries.**
  "Do you happen to know whether or not the federal government has established certain areas of the ocean as marine sanctuaries – or don't you happen to know?"
  (Yes-do know, 33%, No-don't know, 17% and Don't Know, 50%)

- **Most Americans think there are too few Marine Sanctuaries.**
  "Currently there are 12 areas of the ocean in US territorial waters that are designated as marine sanctuaries. Do you think that is too many, about the right number, or too few?"
  (Too Few-60%, About Right-19%, Too Many-3%, Don't Know-18%)
- **Support for Strengthening Protections in the 12 Marine Sanctuaries is Overwhelming.**
  "There are currently 12 marine sanctuaries in United States territorial waters which total about 1% of US waters and there are few restrictions on recreational or commercial activities within the sanctuaries. Do you think that we should increase protections that restrict human activities within the sanctuaries or do you think we should not increase protections that restrict human activities within marine sanctuaries in U.S. waters or don't you have an opinion on this?"
  (Increase Protections-75%, Do not Increase Protections-10%, Don't Know-15%)
- **A plurality think of the ocean as a habitat for marine creatures. Only a minority thinks of the ocean in purely instrumental terms.**
  "Which of the best describes how you mainly think of the ocean?"
  - *As a habitat for the fish, marine creatures and plants that live in the ocean (41%)*
  - *As a spiritual place important to human life on earth (13%)*
  - *As a place for recreation such as swimming, boating, fishing, and vacationing (17%)*
  - *As an important source of food (15%)*
  - *As an important resource for oil and transportation (6%)*
  - *Other or don't know (8%)*
- **At the same time, People are not sure exactly how ocean systems work. Most, but far from all, think fish breeding grounds and coral reefs are found only in particular places.**
  "As far as you know, do most species of fish breed all throughout the ocean or do various species of fish breed in particular places within the ocean or don't you have an opinion on this?"
  (All Over-14%, Particular Places-63%, Don't Know-24%)
  "As far as you know, are coral reefs only found in certain areas of the ocean or are they found all throughout the ocean or don't you have an opinion on this?"
  (Throughout-26%, Certain areas-56%, Don't Know-18%)
- **On the other hand, most feel that pollution in one area affects the whole ocean…..**
  "As far as you know, does pollution entering on area of the ocean affect the entire ocean, or does it mostly affect the area of the ocean near the source, or don't you have an opinion on this?"
  (Entire Ocean-58%, Area Near Source-34%, Don't Know-8%)

- **…Which results in division on whether the ocean has unique areas that can be protected.**
  "Which of the following statements comes closest to your own view: the ocean, like the land, has certain areas that are unique and can be protected from pollution or overfishing OR The ocean is one giant body of water and protecting one particular area of it from pollution or overfishing is useless since anything that is done in one part of the ocean will affect every other part or don't you have an opinion on this?"
  (Unique Areas-47%, One Giant Body-43%, Don't Know-10%)
- **Yet, when these areas are described, support for protected areas is broad and strong.**
  "Do you favor or oppose the United States having certain areas of the ocean within U.S. territorial waters as ocean protected areas in which activities that can result in pollution, seriously deplete fish or marine life, or damage important underwater habitat such as coral reefs and other special places are limited, or don't you have an opinion on this?"
  (Favor-75%, Oppose-10%, Don't Know-15%)
- **Overwhelming public support for the Clinton Executive Order on marine reserves (from Feb., 2001 Survey)**
  "Last May, former President Clinton signed an executive order calling on states, local governments and non-governmental organizations to create a system of protected areas in the oceans off the U.S. coasts. Do you favor or oppose this executive order to establish a system of marine protected areas in U.S. waters?"
  (Favor-83%, Oppose-16%, Don't Know-2%)
- **Top goals for ocean protected areas focus on dumping and pollution, followed by protection of sea life and habitats. Middle tear goals focus on management of commercial enterprise.**

- **Americans see a value in fully protected marine reserves with no exceptions for even recreational activities.**
  "We need some areas that are fully protected, even from recreational activities" (63%)
  "It is not right to prohibit individual recreational use of the ocean" (16%)
  "Don't Know" (21%)
- **The public finds scientific consensus to be a compelling reason to support fully protected marine areas.**
  "Leading marine scientists issued a statement recently saying that we need fully protected ocean areas that prohibit all invasive and extractive human activities, both recreational and commercial. These scientists say that the research shows that full protection in these areas leads to more robust and diverse marine life within the area, and also provides greater benefits to ocean habitat and marine life outside the protected area. How convincing is this as a reason to support fully protected ocean areas?"
  (Convincing-77%, Not Convincing-21%, Not Sure -2%)
- **A simple statement that we protect less than 1% of our ocean waters is very compelling to the public.**
  "Currently, we only protect less than 1% of US waters. To preserve this beautiful resource, we need to protect more. How convincing is this as a reason to support fully protected ocean areas?"
  (Convincing-88%, Not Convincing-9%, Not sure -3%)

SeaWeb 2002. Survey of 1,000 likely voters in California (January 8-16, 2002)

Summary of key findings:

- **64% say overall health of California's ocean is fair-to-poor**
- **62% say health of marine life, fish and mammals that live in California's ocean waters is only fair-to-poor**
- **56% say the abundance of marine life in state ocean waters is fair-to-poor**
- **22% believe their state's ocean waters are fully protected from all human activities that can harm the ocean environment.**
- **There is strong support for establishing fully-protected areas in the ocean in which all extractive activities are prohibited, including oil drilling, mining and all commercial and recreational fishing. 71% support establishing such areas in California's ocean waters, and 55% strongly support their establishment, while 15% are opposed.**
- **Even when respondents are told they might loose personal access to parts of the ocean, 69% continue to support full protected areas, while 16% are opposed.**
- **When told that the Marine Life Protection Act "provides for the establishment of a range of protected areas from fully protected with no commercial or recreational activities to those that allow all recreational and most commercial activities," 85% say it is important that the MLPA result in at least some percentage of California's ocean being fully protected from all commercial and recreational activities.**
- **65% say that the long-term benefits of a healthier and more abundant resources, including fish populations and increased tourism to restored ocean places is more important than the short-term costs in jobs, higher prices for goods and services and impacts on people whose incomes depend on ocean resources. Only 14% feel that short-term costs should take precedence.**
- **83% agree with the statement, "I am willing to give up personal access to certain places in the ocean just so there can be some places that are fully protected from all human use (59% strongly agree)**
- **89% agree that, "Individuals and businesses that use ocean resources have a responsibility to leave critically important habitat and nursery grounds for fish and marine mammals untouched" (66% strongly agree)**
- **80% agree that, "Protecting less than 1% of California's ocean from all commercial and extractive activities is not enough *55% strongly agree)**

An important criterion for evaluating the legitimacy of estimated nonuse or passive economic use values is referred to the scale or scope test. The scale or scope test is based on the premise that more of a good or service should have higher value than less of a good or service. When consumers are presented with a valuation scenario, a larger marine reserve that provides more habitat protection should have more value than a smaller marine reserve that provides less habitat protection.

The U.S. population is certainly a high income and highly educated population and, as the results above predictably show, the U.S. and California population has high environmental concern and overwhelmingly supports the creation of marine reserves. Cleary on the demand side, our assumption that only one (1) or two (2) percent of the U.S. households would be willing to pay some amount for marine reserves in the Channel Islands National Marine Sanctuary (CINMS) seem extremely conservative.

On the supply side, the CINMS is one of only 13 National Marine Sanctuaries, two of which only protect cultural resources (Monitor and Thunder Bay). The other 11 represent special marine resources. National Marine Sanctuaries have special recognition. Each goes through a public process to be established. Congress must approve the designation and the President must sign the legislation before a proposed area becomes a National Marine Sanctuary. To date only 11 marine areas protecting natural resources in the U.S. have been established as National Marine Sanctuaries.

Contrast Prince William Sound (site of the Exxon Valdez Oil Spill) with the CINMS. Prince William Sound doesn't have the special recognition as a National Marine Sanctuary and is not recognized, as a Marine Protected Area (MPA) i.e., there is no law specifically recognizing Prince William Sound as a special marine area. However, Carson et al (1992) were able to show that 90 percent of U.S. households were willing to pay $31 per household for a ten-year protection program for Prince William Sound.

Given the demand and supply information above, it would seem that our assumption of only one (1) or two (2) percent of U.S. households being willing to pay some amount is extremely conservative.

Characteristics of the people valuing the reserve would be constant (U.S. Households) across different proposed marine reserve boundary alternatives. To differentiate among alternatives would require that we compare some measurements that would serve as indicators of the relative quality, condition and uniqueness of the proposed reserves across alternatives. We have some information compiled on 15 habitat types protected by each alternative.

Alternative 1. This alternative is the smallest in size at approximately 186.5 nautical square miles and overall protects 12 percent of CINMS waters. Only three of the 15 habitats receive 20 percent or more of protection and only two habitats receive more than 30 percent protection. This alternative should have the lowest nonuse or passive economic use value.

Alternative 2. This alternative is the second smallest in size at approximately 213.1 nautical square miles and overall protects 14 percent of CINMS waters. Only four of the 15 habitats receive 20 percent or more of protection and only one habitat receives more than 30 percent protection. People may not be able to distinguish this alternative from alternative 1 without more information.

Alternative 3. This alternative is the third smallest in size at approximately 306.5 nautical square miles and overall protects 21 percent of CINMS waters. Only six of the 15 habitats receive 20 percent or more of protection and only two habitats receive more than 30 percent protection. This alternative would be expected to have higher nonuse or passive use economic value than alternatives 1 and 2.

Alternative 4. This alternative is the second largest in size at approximately 450.1 nautical square miles and overall protects 29 percent of CINMS waters. 14 of the 15 habitats receive 20 percent or more of protection and six habitats receive more than 30 percent protection. This alternative would be expected to have higher nonuse or passive economic use value than alternatives 1,2, 3 and the preferred alternative.

Alternative 5. This alternative is the largest in size at approximately 516.4 nautical square miles and overall protects 34 percent of CINMS waters. All 15 habitats receive 24 percent or more of protection and nine habitats receive more than 30 percent protection. This alternative would be expected to have the highest nonuse or passive use economic value among all alternatives.

Preferred Alternative. This alternative is mid-range in size at approximately 369.6 nautical square miles and overall protects 25 percent of CINMS waters. All 15 habitats receive 21 percent or more of protection and eight habitats receive more than 30 percent protection. This alternative would be expected to have nonuse or passive use economic value somewhere between that between alternatives 3 and 4.

Scientific and Education Values. Marine reserves provide a multitude of benefits. Sobel (1996) provides a long list of these benefits. Most of those benefits have been covered in Chapter 1 and 2 and in our discussion of nonuse economic benefits above. Scientific and education values were categorized by Sobel into those things a reserves provides that increase knowledge and understanding of marine systems. Sobel provides the following lists of benefits:

Scientific

- Provides long-term monitoring sites
- Provides focus for study
- Provides continuity of knowledge in undisturbed site
- Provides opportunity to restore or maintain natural behaviors
- Reduces risks to long-term experiments
- Provides controlled natural areas for assessing anthropogenic impacts, including fishing and other impacts

Education

- Provides sites for enhanced primary and adult education
- Provides sites for high-level graduate education

We cannot quantify these benefits, but they are extremely important.

Net Assessment

Here we provide a net assessment using the National Net Benefits Approach. Under this approach, only consumer's surplus and economic rent values are appropriate for consideration, as in a formal benefit-cost analysis. We are not able to quantify all the costs and benefits, especially not across all alternatives, as with the nonuse or passive economic use values. But with certain assumptions designed to bias the result in favor of the consumptive activities, we show that, except under the most conservative assumptions for the larger reserve alternatives, the nonuse or passive economic use values would likely exceed all consumptive use values. ***Thus, there would be net national benefits to adopting any of the alternatives for the proposed marine reserves in the CINMS.***

Commercial Fishing and Kelp. We concluded in Chapter 1 that the supplies of CINMS caught commercial fish were not a high enough proportion of total supply to affect prices. Squid and urchins are primarily sold in international markets and CINMS total catch is only 2.15% of world supply for squid and 2.24% of world supply for urchins. The proportions of supply impacted by each marine reserve alternative would be far too small to impact prices and consumer's surplus impacts from each alternative would be zero. For squid and urchins the percent of world supply impacted varies between about one-tenth of one percent to one half of one percent. Also, we have found no evidence that economic rents exist in the CINMS fisheries. For the largest commercial fishery, squid, there appears to be economic overfishing and possibly negative economic rents.

Although there are no “price effects” expected and therefore losses in consumer’s surplus and the fact the commercial fisheries are most likely all characterized by economic overfishing i.e., no economic rents or negative economic rents, there still may be some losses on the producer side of commercial fishing.

The usual assumptions of benefit-cost analysis are that the economy is at full employment and that displaced labor and capital are mobile and can find alternative employment. Adhering to our “maximum potential loss assumption, we relax the two assumptions in benefit-cost analysis and assume that displaced labor and capital will not be able to find alternative employment.

Good costs and earnings studies were not available for California or Channel Islands commercial fisheries. So, we used cost and return studies conducted for the Gulf of Mexico fisheries as applied to the commercial fisheries in analyzing the impacts of creating the Tortugas Ecological Reserve in the Florida Keys National Marine Sanctuary (See Leeworthy and Wiley, 1999). The returns to labor and capital include all labor, including captain’s wages and return to owner’s capital investment in the fishery. Across all fisheries the average return to labor and capital was normalized to returns to labor and capital as a percent of harvest revenue (27.98%). We applied this percentage of estimated harvest revenue under Step 1 Analysis (maximum potential loss) for each marine reserve alternative (Table 3.29).

Table 3.29. Net Assessment: National Net Benefits of Marine Reserves in the CINMS

	Alternatives					
Use	1	2	3	4	5	Preferred
Costs						
Recreation Consumptive	$ 1,437,436	$ 2,533,299	$ 1,637,119	$ 3,121,889	$ 3,687,129	$ 2,746,600
Commercial Fisheries and Kelp	$ 604,915	$ 621,574	$ 662,574	$ 1,159,577	$ 1,438,042	$ 985,488
Total Consumptive	$ 2,042,351	$ 3,154,873	$ 2,299,693	$ 4,281,466	$ 5,125,171	$ 3,732,088
Benefits						
Recreation Non-consumptive						
Mid-range (50% quality increase, elasticity 1.0)	$ 45,971	$ 129,149	$ 48,490	$ 156,970	$ 191,841	$ 129,183
Highest (100% quality increase, elasticity 4.5)	$ 413,737	$ 1,162,343	$ 436,406	$ 1,412,732	$ 1,726,565	$ 1,162,649
Nonuse/Passive Economic Use (1% U.S. Households)						
Lowest ($3.12 million)	+	-	+	-	-	-
Mid-range ($5.19 million)	+	+	+	+	+	+
Highest ($10.39 million)	+	+	+	+	+	+
Nonuse/Passive Economic Use (2% U.S. Households)						
Lowest ($6.24 million)	+	+	+	+	+	+
Mid-range ($10.38 million)	+	+	+	+	+	+
Highest ($20.78 million)	+	+	+	+	+	+

1. "+" means nonuse values higher than consumptive use values, "-" means nonuse values are lower than consumptive use values.

Recreation Consumptive Activities. We use our Step 1 analysis estimates and ignore the offsetting factors discussed at the beginning of this chapter that indicate much of the losses in Step 1 would not likely occur. Again, the effect here will be to bias the analysis towards the consumptive users.

Nonconsumptive Recreation Activities. We simulated a range of potential benefits for a portion of the group that we were able to include in our analyses, i.e., those doing nonconsumptive activities using the for hire or charter/party/guide boat businesses. We were not able to find any information to estimate the amount of nonconsumptive use from private household/rental boats in the CINMS. We include a mid-range and upper range of values estimated for the charter/party/guide boat nonconsumptive users. Because the nonconsumptive private household boat use is not included, again our estimates are biased towards the consumptive users.

Table 3.29 summarizes the results of our National Net Benefits Assessment. The “+” at the bottom of the table means that, when comparing only the nonuse or passive economic use values with the sum of the consumptive use values, the nonuse or passive economic use values are higher. A “-” means that nonuse/passive economic use values are lower. We conduct the assessment using the two policy simulation assumptions, 1) one percent of U.S. households are willing to pay the three different dollar amounts, and 2) two percent of U.S. households are willing to pay the three different dollar amounts. Under the one percent assumption, losses in consumptive activities exceed the nonuse/passive economic use values for alternatives 2, 4, 5 and the preferred alternative. Under the 2 percent assumption, nonuse/passive economic use value exceeds the losses. ***Thus, we would expect that there would be net national benefits from adopting any of the marine reserve alternatives except under the most conservative assumptions for the largest reserve alternatives.***

Net National Benefits Approach versus Local Income and Employment

Economists for years have been trying to explain cost-benefit analysis or the net national benefits approach. Even though cost-benefit analysis has been widely excepted in public policy and management many still don't understand the concepts of consumer's surplus, producer's surplus or economic rent used by economists in cost-benefit analysis. Many understand sales, income and employment numbers and how this relates to their local economies. But, generally these measures are not appropriate inputs into the cost-benefit calculation. They enter the analysis indirectly when one of the major assumptions of cost-benefit analysis is violated i.e., that the economy is at full employment and any displaced capital or labor can easily find employment. When the economy is not at full emp loyment or capital and labor cannot simply find alternative employment, this leads to real economic costs that must included. There are also issues of equity or fairness that are not addressed in cost-benefit analysis. To address this issue some public agencies have asked that the distribution of costs and benefits be included in analyses.

The net national benefits approach versus the local income and employment approach partially addresses this question of the distribution of benefits and costs. As we showed above in the net national benefits exercise, the main benefits of marine reserves came from national sources that are highly dispersed across the country. Nonuse or passive economic use values will be dispersed widely across people throughout the country. There is no income and employment impacts associated with nonuse or passive use values, except the media sources, which are the basis for people finding out about the resources they value. Consumer's surplus values from changes in supply of comme rcial fishing products are also widely dispersed and, for many CINMS species, consumers would include foreign consumers. The potential income and employment impacts are largely concentrated in the local communities adjacent to the CINMS. If there are trade-offs, they might entail distributions of national benefits with most of the costs born locally. This is true for many goods and services where there might be high net national benefits, but the costs are concentrated (e.g. pollution and undesirable industrial development) in local areas. Oil and gas development is certainly one of these types of issues. Benefits are often small per individual dispersed across the whole country, while costs are high per a small number of individuals concentrated in local areas.

Why don't economists want to include income and employment impacts in cost-benefit analysis? The general answer is that is people don't spend their money on one thing they will spend it on something else. So, one person's loss is another person's gain. This is the issue of substitution we discussed in our Step 2 analysis, but on a broader scale. If someone is displaced from their favorite recreational fishing spot and decide to not go fishing, but instead go to out to a restaurant and see a movie. This too has sales, income and employment impacts that would partially or even fully off set the sales, income and employment impacts in the local economy of the lost fishing day. If people don't go fishing or diving, they will do something else and that something else will generally involve some activity which requires some spending. That spending will partially or fully off set the impacts on sales, income and employment. There may be different patterns of spending. And, it may be an issue of one person's loss is another person's gain. The net effect could be zero, in terms of total local sales, income and employment, or it could be lower sales, income and employment locally, but no difference from a State, Region or National perspective. The same is not true for the net national benefits approach. The concepts of consumer's surplus, producer's surplus and economic rents are net benefits and costs. They may have different distributions, but they are by definition net benefits and costs and do not cancel each other out. This is why economists don't include income and employment in cost-benefit analyses.

End Notes

1. Some confusion exists about open access fisheries. For economic analysis, it is critical to understand the structure of who can enter the fishery, if there are constraints on the amount and timing of total take allowed, and what is the current capacity to catch the fish stock.

   Case 1. A permit system where all you have to do is buy a permit and you are allowed to fish. And, the fishery has some total allowable take, but not specified by fishermen (first come first serve). The economic analysis of open access fisheries applies.

   Case 2. A permit system where all you have to do is buy a permit and you are allowed to fish, except the number of permits is limited. However, the capacity of the fleet is such that they could catch the entire stock of fish. One might describe this as limited entry, but it has no real effect economically or biologically because of the capacity of the fleet. This would still be analyzed as an open access fishery.

   Case 3. A permit system where all you have to do is buy a permit and you are allowed to fish, except the number of permits is limited. In this case, the number of permits and the capacity of the fleet is controlled to where it cannot exceed total allowable catch. Still do not have Individual Transferable Quotas, but there is the possibility of the participants in the fishery earning economic rents. This would not be analyzed as an open access fishery. This is likely to be a derby fishery, still not the economically efficient solution, but not the open access fishery.

   Case 4. Individual transferable Quotas (ITQs). A limited number of fishermen are given ITQs, which specify a certain share of the total allowable catch. This avoids the derby fishery problem and since one can buy and sell the ITQs, it solves the capacity problem and fosters economic efficiency. Not open access.

   It would appear that all the CINMS fisheries fir either Case 1 or 2 and can be analyzed as open access fisheries.

2. Because the Pomeroy Sample surveys were undertaken during the off season for squid, the squid/wetfish sample under-represents squid fishery participants from Washington and, to a lesser extent, those from California who were fishing in Alaska at the time of the study. The representativeness of the Barilotti Sample is also limited, due in large part to the greater participation of Santa Barbara fishermen, and the more limited participation of Ventura and Channel Islands Harbor fishermen.

3. On monopoly in the squid fishery, Hackett (in press) writes, "California receiver/processors can be characterized as oligopsonists (few buyers, relative high concentration, and costly entry) in the market for fish. It is important to note, however, that a more concentrated market structure (such as oligopsony) does not necessarily imply that firms can exercise market power, and the question of market power is beyond the scope of this report."

4. Economic overfishing does not necessarily lead to exit from the fishery, especially if social, economic and/or regulatory conditions limit participants' alternatives. The squid fishery is only one component of the larger wetfish fishery (in geographic and species terms), such that economic overfishing of squid may be offset by emerging opportunities with other species (e.g., sardine). Moreover, recent and pending regulatory changes have led to and will likely lead to further changes in this situation.

5. This outcome may or may not be realized, depending on the extent of overcapitalization prior to implementing ITQs and to the extent to which ITQs actually reduce capacity – which will depend on how the ITQ program is designed.

6. Bird Watching was estimated at 2.6 million participants, Viewing Other Wildlife at about 2.6 million participants, and Viewing or Photographing Scenery at about 4.2 million participants. The total of 6.3 million participants in all viewing activities eliminates double counting due to the fact that people participate in multiple activities. There may be some double counting in days of activity as well.

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Appendix A

A Socioeconomic Overview of the Santa Barbara and Ventura Counties as it Relates to Marine Related Industries and Activities

Originally Published, June 2000

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Appendix A

INTRODUCTION

Background

The CINMS is currently involved in a management plan revision, a process that is mandated to take place approximately every five years. Two major issues have emerged from public scoping meetings on the management plan revision; 1) Boundary Expansion and 2) Ecological or Marine Reserve(s) or "no take areas". Changes with respect to either of these issues was entail management actions and regulations that may have socioeconomic impacts on current and future user groups.

For the management plan revision, the CINMS organized a Sanctuary Advisory Council (SAC) made-up of various stakeholders. For the ecological or marine reserve (s), the CINMS organized a Marine Reserve Working Group (MRWG), also made-up of various stakeholders, that was develop alternatives and make a recommendation to the SAC and the CINMS with regard to establishment of marine reserves. A science panel and socioeconomics team have been established to advise the CINMS, SAC and MRWG for both the boundary expansion and marine reserve (s).

The socioeconomics team has hired three contractors who performed the data collection for the recreation industry and the commercial fishing industry to support the socioeconomic impact analysis of the marine reserves (s). The Socioeconomics Team is led by two NOAA economists, Dr. Vernon R. (Bob) Leeworthy and Peter C. Wiley. For the recreation industry, Dr. Charles Kolstad, Professor of Economics at the University of California-Santa Barbara, was contracted to collect information. For the commercial fisheries, two contractors were hired to collect information; Dr. Craig Barilotti of Sea Foam Enterprises in San Diego, California and Dr. Caroline Pomeroy of the University of California-Santa Cruz. Dr. Barilotti collected information from all commercial fishermen that fish in the CINMS, other than squid fishermen, and Dr. Pomeroy collected information from squid fishermen that fish the CINMS.

The information was collected to support the socioeconomic impact analysis of the marine reserve (s) is being collected and compiled in a manner so as to capture both the temporal and spatial variation in activities for the recreation industry and catch and value for the commercial fisheries. The information was placed in a geographical information system (GIS) using the ArcView software. The information from both the recreation industry and the commercial fishing industry was collected using a one square minute unit of resolution.

The information organized in the GIS are linked with economic parameters from existing studies and were used to develop estimates of economic impacts as measured by changes in both market economic values (e.g., sales/output, income and employment) and non market economic values (e.g., consumer's surplus and economic rents). Socioeconomic profiles of those potentially impacted were compared against all users from a given user group and against the general population of the local area (e.g., Santa Barbara and Ventura Counties).

To accomplish the above required a review of the existing literature and data bases available and compiling this information in a manner that it was used in the socioeconomic impact analyses.

Even though our focus here is on Santa Barbara and Ventura counties as the primary study areas for estimating economic impact, we have learned that some impacts was experienced in Los Angeles, Orange and San Diego counties. Impacts from kelp harvesting take place in San Diego County. A significant portion of the market squid catch is landed in San Pedro in Los Angeles County. And, we have also learned that several recreational fishing and diving operations operate out of Los Angeles County. So in our final analyses these impacts was have to be accounted for, however, they were not significant relative to the entire county economies for this county. They were important for our purposes of estimating the impacts on users, both direct and indirect.

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Appendix A

Purpose

The purpose of this document is to provide the necessary background information on the local social and economic (socioeconomic) environment for which changes in management actions in the Channel Islands National Marine Sanctuary (CINMS) were analyzed in this socioeconomic impact analysis. The information presented here is what we have found to date to be the "best available information".

For the issues of boundary expansion and marine reserves, three direct uses are potentially impacted; 1) tourist/recreational use, 2) commercial fishing (including kelp harvesting) and 3) offshore oil and gas. With respect to the local economies, each of these three uses will have ripple or multiplier effects as measured by market economic values (e.g., output/sales, income, employment and tax revenues). In this report, we attempt to review available information to assess how important these three industries are to the Santa Barbara and Ventura County economies. In addition, we present information on the currently known spatial distribution of recreational uses, and commercial fishing in the marine reserve study area. We also present what is known about social and economic parameters that are used in socioeconomic impact analyses for proposed management changes or regulatory changes in the two study areas.

Demographic and Economic Profile

Population. Historical population estimates presented here are from the U.S. Department of Commerce, Census Bureau (http://www.census.gov), while population projections are from the University of California-Santa Barbara, Economic Forecast Project. Ventura County has almost twice the population of Santa Barbara County and has been growing faster since 1980. Through the 1990s', Ventura County population has been growing faster than both the State of California and Santa Barbara County. Santa Barbara County has been growing slightly slower than the State of California. Santa Barbara County is projected to grow faster between 1998-2002 than Ventura County (7.8% vs. 6.0%), but then slower between 2002-2006 (3.1% vs. 5.8%). See Table 1.

Although, Ventura County's population is larger and has been growing faster than Santa Barbara's, the relative compositions of both populations are quite similar in terms of gender, race/ethnicity and age and, both counties are projected to change in the same general directions. For the 1990s', there appear to be no significant differences with regard to gender or race/ethnicity between Santa Barbara and Ventura Counties. However, there does appear to be a difference in age distributions. Santa Barbara appears to be a little older with a higher percent of population age 65 or older indicating a larger retirement community. For the projection periods, the most significant change expected is the proportion of population that was Latino. The populations of both counties are expected to become more Latino and less White, Not Latino, while the Black, Not Latino and Asian, Not Latino remain at approximately constant proportions. The projected proportions of retirement age populations are expected to remain constant in Santa Barbara County, while increasing slightly in Ventura County. See Table 2.

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Appendix A

Table 1. Population, Population Growth and Projected Growth for California, Santa Barbara and Ventura Counties

	California	Santa Barbara County	Ventura County
Population			
1990	29,950,100	370,900	671,600
1994	31,317,200	386,700	703,700
1998	32,682,800	389,500	732,100
Population Growth (%)			
1980-1990	25.7	23.7	26.4
1990-1994	4.6	4.3	4.8
1994-1998	4.4	0.7	4.0
1990-1999	11.2	5.8	11.4
Population Projections			
2002	n/a	419,800	776,000
2006	n/a	433,000	821,200
Population Projection Growth			
1998-2002	n/a	7.8	6.0
2002-2006	n/a	3.1	5.8

Sources: Population; U.S. Department of Commerce, Census Bureau (http://www.census.gov).
Population Projections; University of California-Santa Barbara, Economic Forecast Project, 1999 Economic Outlook Santa Barbara and Ventura Counties.

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Appendix A

Table 2. Demographic Profiles of Santa Barbara and Ventura County Populations

	1990	1994	1998	2002	2006
Santa Barbara County					
Gender					
Male	50.2	51.2	50.5	50.6	50.6
Female	49.8	48.8	49.5	49.4	49.4
Ethnicity					
White	66.2	63.7	63.1	62.1	60.7
Black	2.5	2.5	2.7	2.8	2.9
Asian	4.7	4.6	4.7	4.7	4.8
Latino	26.6	27.6	29.5	30.4	31.4
Age					
Less than 5	7.5	7.8	7.5	6.9	6.9
5 to 19	20.2	19.4	20.0	20.6	20.4
20 to 34	28.6	26.8	24.1	21.2	18.9
35 to 44	14.4	15.7	16.3	17.0	17.3
45 to 54	9.2	10.4	12.0	13.4	14.4
55 to 64	7.8	7.5	7.7	8.5	9.7
65 to 74	6.9	6.8	6.4	6.1	6.1
75 and Over	5.4	5.6	6.0	6.2	6.2
Ventura County					
Gender					
Male	50.4	50.5	50.5	50.6	50.6
Female	49.6	49.5	49.5	49.4	49.4
Ethnicity					
White	66.0	64.4	62.7	61.1	59.4
Black	2.2	2.2	2.1	2.3	2.3
Asian	5.4	5.4	5.5	5.6	5.9
Latino	26.4	28.0	29.7	31.0	32.4
Age					
Less than 5	8.3	8.3	7.9	7.4	7.4
5 to 19	22.4	22.1	22.2	22.1	21.4
20 to 34	25.7	23.2	21.2	20.2	19.8
35 to 44	16.3	16.7	16.3	15.3	13.9
45 to 54	10.6	12.3	13.6	14.4	14.6
55 to 64	7.3	7.7	8.6	10.0	11.3
65 to 74	5.5	5.7	5.8	6.2	6.9
75 and Over	3.8	4.1	4.3	4.5	4.7

Source: University of California – Santa Barbara, Economic Forecast Project, 1999 Economic Outlook Santa Barbara and Ventura Counties.

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Appendix A

Labor Force. As with population, the labor force of Ventura County is almost twice that of Santa Barbara County. Unlike population, however, the labor force of both counties have followed different growth patterns than that of the State of California. In the early 1990s', both counties labor forces grew faster than that of the State of California. However, from 1994-1998, labor force growth came to almost a halt in both counties, actually declining in Santa Barbara. As with population, Ventura County's labor force grew faster than Santa Barbara County's from 1990 to 1998 (6.8% vs. 3.7%). Labor forces in both counties are projected to grow relatively fast between 1998-2002, but, as with population, both are expected to slow over the 2002-2006 period, more in line with projected population growths. Labor Force composition was not available on a time series basis, nor were there projections available. However, comparing 1990 labor forces in both counties, there were no significant differences between the counties and the patterns generally matched those of populations for the two counties. Although, as we shall discuss below, there is a difference between those that work in a county and those that live in a county. And, this was have important implications for assessing socioeconomic impacts.

Table 3. Labor Force, Labor Force Growth and Projected Labor Growth for
California, Santa Barbara and Ventura Counties

	California	Santa Barbara	Ventura
Labor Force			
1990	15,193,400	193,000	370,400
1994	15,450,000	196,900	385,300
1998	16,323,900	195,700	387,700
Labor Force Growth (%)			
1990-1994	1.7	2.0	4.0
1994-1998	5.7	-0.6	0.6
1990-1999	9.2	3.7	6.8
Labor Force Projections			
2002	n/a	208,900	412,900
2006	n/a	216,100	436,800
Labor Force Projection Growth			
1998-2002	n/a	6.7	6.5
2002-2006	n/a	3.4	5.8
Labor Force 1990			
Gender			
Male	56.0	55.4	56.7
Female	44.0	44.6	43.3
Ethnicity			
White	60.3	67.8	68.2
Black	6.2	2.2	2.1
Hispanic	23.6	25.2	24.3
Native American	0.6	0.8	0.5
Asian/Pacific Islander	9.0	3.9	4.9
Other	0.1	0.1	0.1

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Appendix A

Employment and Income. In conducting economic impact analyses, an important first step is defining the study area. In developing regional economic impact models it is important to understand the interrelationships between surrounding areas. The county political unit and metropolitan statistical areas (MSAs) are used to organize statistical information about employment and income. MSAs attempt to define areas that cross political boundaries but are economically closely linked because of numerous interrelationships. There is no Santa Barbara-Ventura County MSA indicating that these two counties are not highly linked economically. The only MSA in the two-county area exists within Santa Barbara County, e.g., Santa Barbara-Lompoc-Santa Maria MSA. Therefore, we only report Santa Barbara County and Ventura County information here.

Income is reported from two perspectives; 1) income by place of residence and 2) income by place of work. Income and employment by place of work are further reported by industry. Income and employment by place of work is also reported for wage and salary workers versus proprietors (business owners). Differences in these measurements often reveal important differences about the nature of the local economies that are important for socioeconomic impact analyses. For example, a large difference between income by place of residence and income by place of work might reveal that the economy of the area under study is largely driven by income earned from sources unrelated to work in the area and this was dampen the impacts of management changes that impact local work related income and employment. A large number of proprietors indicate the prevalence of small businesses which receive special treatment under Federal Regulatory Impact Reviews.

Income by Place of Residence versus Income by Place of Work. In 1990, Santa Barbara County's income by place of work was only 48.8% of the income by place of residence. This was much higher than the 36.2% for the State of California, but much lower than the 76.0% for Ventura County. From 1990 to 1997, the proportion of income by place of work rose for Santa Barbara County (from 48.8% to 59.6%), but declined for Ventura County (from 76.0% to 72.1%). Santa Barbara County is driven much more by forces unrelated to work in the county than Ventura County.

Table 4. Personal Income by Place of Residence and by Place of Work
For California, Santa Barbara and Ventura Counties

	Income by Place of Residence (000's $)	Income by Place of Work (000's $)	Work as % of Residence
1990			
California	639,297,540	469,355,580	36.2
Santa Barbara	8,282,659	5,567,203	48.8
Ventura	14,744,992	8,378,763	76.0
1994			
California	718,321,442	517,993,813	38.7
Santa Barbara	9,311,405	5,887,111	58.2
Ventura	16,557,595	9,799,145	69.0
1997			
California	846,838,798	607,976,152	39.3
Santa Barbara	10,760,412	6,743,656	59.6
Ventura	19,173,001	11,138,553	72.1

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Appendix A

There are several sources of income unrelated to work in a county that are recorded and they are generally referred to as transfer payments and property income. Social security and pensions are two of the most important transfer payments and dividends, interest and rent are the most important sources of property income. Social Security and Medicare deductions from current workers are recorded as a deduction in income by place of work in deriving income by place of residence. The other difference between income by place of work and residence is called the residence adjustment. The residence adjustment is the net flow of income to a county that results from some residents that work outside the county of residence and bring income into the county (inflow of income) versus residents from other counties that work inside the county but take their incomes home to their counties of residence (outflow of income).

In 1990, Santa Barbara had a net outflow of income or a residence adjustment of about -$131 million. By 1997 this figure had grown to almost -$150 million. Ventura County, however, has a net inflow of income based on the residence adjustment. In 1990, the Ventura County residence adjustment was about $2.95 billion and by 1997 rose to over $3 billion.

The Census of Intercounty Commuters for 1990 reveals the nature of the above net flows (see Appendix Table 1). The 1990 Census of Intercounty Commuters shows that Santa Barbara County had a net inflow of workers into the county of 4,397. There were 10,236 residents of Santa Barbara County that commuted to work outside the county and there were 14,633 non-residents that worked inside the county. This net flow of workers into the county results in a net outflow of income from the county as non-resident workers take their earned incomes home to their counties of residence.

In 1990, Ventura County had a net outflow of workers of –55,392. There were 84,838 residents that commuted to work outside the county and 29,446 non-residents that worked inside the county. The net outflow of workers resulted in a net inflow of income as residents that worked outside the county brought their incomes home to Ventura County. Los Angeles County accounted for the overwhelming majority of residents that commute to work outside the county (92.5%). Los Angeles and Ventura counties are highly connected with 23,635 of the 26,354 (or 89.7%) non residents that work inside Ventura County coming from Los Angeles County.

Ventura County and Santa Barbara County are not highly connected. Relatively small proportions of both counties work forces live in the neighboring county. In 1990, only 2,433 residents of Santa Barbara County commuted to work in Ventura County and only 5,594 Ventura County residents commuted to work to Santa Barbara County. Ventura County residents only made up only about 3% of all Santa Barbara County workers and Santa Barbara County residents made up less than one percent (0.8%) of all Ventura County workers.

Proprietors. Proprietors account for a significant proportion of both income and employment in both Santa Barbara and Ventura counties. In 1990, proprietors accounted for 18.7% of income and 20.2% of employment in Santa Barbara County and 15.65% of income and 19.9% of employment in Ventura County. In the 1990s, the relative importance of proprietors in both counties increased. In 1997, proprietors accounted for 19.1% of the income and 22.3% of the employment in Santa Barbara County and 16.8% of the income and 23.1% of the employment in Ventura County. These proportions were relatively higher than that for the entire State of California. This is a fairly good indicator that small businesses are very important in both counties. See Table 5.

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Table 5. Proprietors Income and Employment for California, Santa Barbara and Ventura Counties

	Proprietors Income (000's $)	%	Proprietors Employment	%
1990				
California	60,048,930	12.8	2,908,845	17.2
Santa Barbara	1,041,631	18.7	43,583	20.2
Ventura	1,307,970	15.6	65,577	19.9
1994				
California	73,643,501	14.2	3,287,440	19.6
Santa Barbara	1,100,644	18.7	47,273	21.7
Ventura	1,668,389	17.0	77,455	22.2
1997				
California	86,155,451	14.2	3,608,489	20.0
Santa Barbara	1,289,111	19.1	51,809	22.3
Ventura	1,870,996	16.8	83,690	23.1

Indicators of Economic Health and Wealth. Unemployment rates and per capita incomes are probably the two most popular measures used as indicators of the health and wealth of communities, states or nations. Through the 1990s both unemployment and real per capita income (per capita income in 1999 $ i.e., adjusted for inflation using the Consumer Price Index) moved in the same directions in both Santa Barbara and Ventura counties. Throughout the 1990s unemployment rates in Santa Barbara and Ventura counties were lower than that for the entire State of California. Santa Barbara's unemployment rate has always been below that of Ventura County and, except for 1994, Santa Barbara's unemployment rate was lower than that for the entire U.S. Ventura County's unemployment rate has remained somewhere between that for the entire State of California and the U.S.

Real per capita incomes in Santa Barbara and Ventura counties were higher than that for the entire State of California and for the U.S throughout the 1990s. Santa Barbara's real per capita income is slightly higher than Ventura County's and has grown faster than Ventura County's. In 1990, real per capita income was 1.6% higher in Santa Barbara County than in Ventura County, by 1998 Santa Barbara County's real per capita income was 3.5% higher than Ventura County's. This is largely explained by a higher proportion of Santa Barbara County's income coming from dividends and interests from investments. The 1990s were are relatively good time for return on investments in stocks.

Other comparisons between the two counties reveal another source of the difference in real per capita incomes between the two counties. Average Earnings Per Job and Average Wage & Salaries reveal that real average earnings per job and real average wages & salaries declined in Santa Barbara County from 1990 to 1997, while in Ventura County there was a more mixed result. From 1990-1997, real average earnings per job decreased, while real average wage & salaries increased. In addition, real average nonfarm proprietor's income increased in Ventura County, while declining in Santa Barbara County (see Appendix Table A.2). Again we see from these patterns that Santa Barbara County incomes are much more dependent on sources not related to work in the county than in Ventura County.

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Appendix A

Table 6. Unemployment Rates and Per Capita Incomes for U.S., California, Santa Barbara And Ventura Counties

	U.S.	California	Santa Barbara County	Ventura County
Unemployment (%)				
1990	5.6	5.8	4.9	5.7
1994	5.6	8.6	7.2	7.8
1998	4.5	5.9	4.4	5.6
1999	4.2	5.2	3.9	4.8
Per Capita Income ($)				
1990	19,156	21,363	22,361	22,002
1994	22,056	22,953	24,406	23,690
1997	25,288	26,314	27,839	26,563
1998	26,482	27,579	28,678	27,699
Per Capita Income (1999 $)				
1990	24,328	27,131	28,398	27,943
1994	24,703	25,707	27,335	26,533
1997	26,300	27,367	28,953	27,626
1998	27,012	28,131	29,252	28,253

For Santa Barbara County, the disparity between the trends in real per capita income and measures of income from work in the county reveal a pattern often cited about the distribution of income and wealth becoming more concentrated amongst higher income groups. Neither workers nor proprietors in Santa Barbara shared the gains in income and wealth indicated by the increase in real per capita income through the 1990s. Workers and proprietors have faired relatively better in Ventura County. On average, workers now earn more in Ventura County than in Santa Barbara County. Although, the trend for the average real earning of proprietors is on the decline in Santa Barbara County and increasing in Ventura County, Ventura County proprietors still earn, on average, significantly less than Santa Barbara County proprietors.

Income and Employment by Industry. For purposes of economic impact analyses, in terms of income and employment impacts, income and employment by industry is critical because it provides the necessary control totals in the economic accounting system. A limitation of this accounting system is that it is still based on the old industrial economy and generally is not designed to yield direct insights into how the use of natural resources and the environment are connected to the economy. Linking the economy and the environment is the very heart of the Socioeconomic Team's task. We need to be able to answer the question, if the use of the natural resources of the CINMS is changed, what was the impact on the income and employment in the local economies? To answer this question requires supplemental information organized so that it maps directly into the current system of accounting. In some cases, the income and employment by industry statistics can give us upper bound estimates of the direct portion of impact (i.e., not counting multiplier impacts) for particular uses. Our approach here is to first look at the most aggregated information, then proceed to evaluate information collected by other institutions and how it maps into the more aggregated statistics. Each step along the way our objective is to see how close we can get to linking the economy with the environment and assessing the relative importance to the economy of natural resource base uses.

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Appendix A

Figures 1 and 2 show the percentages of income and employment by industry to Santa Barbara and Ventura counties (see Appendix Tables A.3 and A.4 for more details and comparisons for different years). At this very aggregated level, the distributions for both income and employment by industry are very similar for the two counties. Commercial fisheries would be included under the category "Agricultural Services, Forestry, Fishing and Other". In 1997, this category accounted for only 2.2% of income by place of work in Santa Barbara County and only 2.3% in Ventura County. This serves as a first step upper bound on the proportion of income by place of work for the direct impacts of the harvesting portion (not including multiplier impacts) of commercial fishing. Other direct impacts of commercial fishing would include some portion of Wholesale Trade (e.g., fish houses and buyers) and some portion of Manufacturing (fish processing).

The category "Mining" includes oil and gas extraction and production activities. In 1997, this category accounted for only 1.2% of income by place of work in both Santa Barbara and Ventura counties. This estimate serves as a first step upper bound on the proportion of income by place of work for the direct impacts of the extraction and production portion of offshore oil and gas activities. Other direct impacts of oil and gas extraction and production activities would include some portion of Construction and some portion of Transportation, Communication and Public Utilities (e.g., pipelines, tankers, port and towing).

The Retail Trade and Services sectors are where the direct impacts of tourism/recreation would be included. However, these categories are too broad to yield any useful bounds for estimation of the direct impacts for tourism/recreation. The accounts, as stated above, were simply not designed for this purpose. In any case, the first step of linking the three natural resource use activities to the economy yielded only limited insights.

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Appendix A

Figure 1. Personal Income Percentage by Industry for California and Santa Barbara & Ventura Counties. 1997

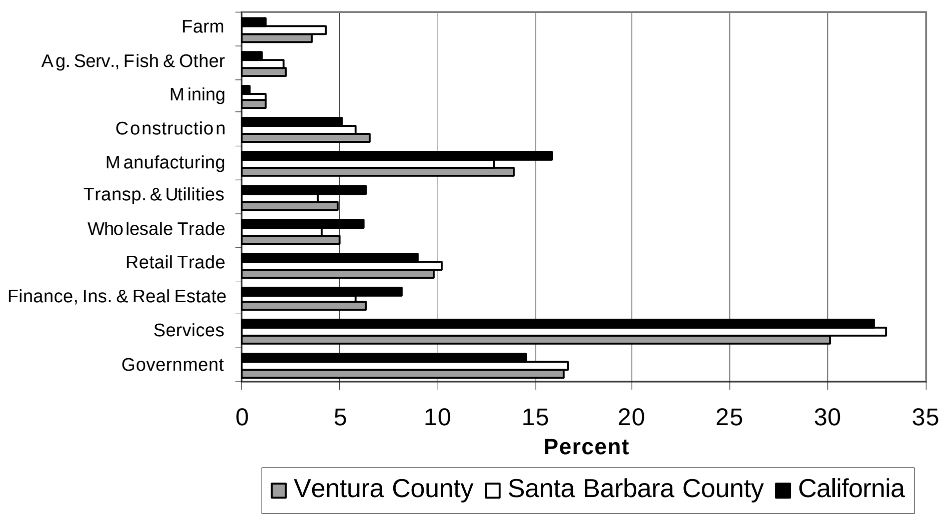
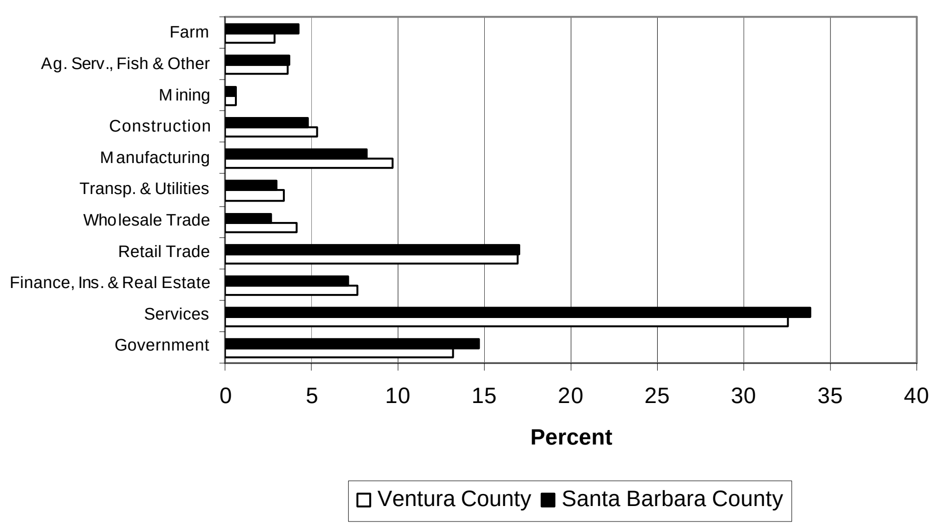


Figure 2. Employment Percent by Industry for Santa Barbara and Ventura Counties, 1997



Income and Employment: Step 2 Additional Disaggregation. The accounts reviewed above are what are called two-digit SIC (Standard Industrial Classification) level of aggregations. The SIC system of accounting can actually go down to four and six digit levels, which contain more specificity about the activity. However, because of nondisclosure rules to protect the privacy of business information, the four digit level is the best available for large counties and even here there are many categories for which information is not reported due to nondisclosure. In this step, we explore how much detail we can glean about the three sectors that are our primary interest. Only income is reported at the lower levels of disaggregation.

Commercial Fishing Industry. In 1997, fishing income was a little over $4.8 million in Santa Barbara County and over $5.9 million in Ventura County. This represents less than one percent of the incomes by place of work in both counties (0.07% in Santa Barbara and 0.05% in Ventura). Again, this would be the income received by harvesters or commercial fishermen including crews and proprietors of the harvesting operations. It would not include buyers and fish houses or processors of commercial fish products.

Table 7. Direct Income to Commercial Fishing Harvesting Sector: Santa Barbara And Ventura Counties 1991 – 1997

Year	Santa Barbara County (000s $)	Ventura County (000s $)	Santa Barbara County (000s 1999 $)	Ventura County (000s 1999 $)
1991	3,520	3,010	4,306	3,682
1992	2,912	3,105	3,458	3,687
1993	2,618	3,644	3,018	4,201
1994	3,384	3,895	3,804	4,379
1995	5,194	6,618	5,678	7,235
1996	4,708	5,731	4,999	6,085
1997	4,811	5,937	4,994	6,163

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (http://www.bea.doc.gov) and University of Virginia Library (http://fisher.lib.virginia.edu).

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Appendix A

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Appendix A

APPENDIX TABLES AND SOURCES

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Appendix A

APPENDIX TABLES AND SOURCES (Continued)

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Appendix A

Table A.1 1990 Census of Intercounty Commuters for Santa Barbara and Ventura Counties

Santa Barbara County			
Total Workers in County			183,655
Total Working Residents of County			179,258
Net Flow of Workers to County			**4,397**
Residents that Work in the County			169,022
Residents that Commute to Work Outside County			10,236
Surrounding Counties:		7,978	
Ventura	2,433		
San Luis Obispo	3,584		
Kern	186		
Los Angeles	1,775		
Other Counties:		1,729	
Other States:		481	
Other Countries:		48	
Non Residents that Work Inside County			14,633
Surrounding Counties:		12,546	
Ventura	5,594		
San Luis Obispo	5,478		
Kern	207		
Los Angeles	1,267		
Other Counties:		1,390	
Ventura County			
Total Workers in County			299,794
Total Working Residents of County			355,186
Net Flow of Workers to County			**-55,392**
Residents that Work in the County			250,348
Residents that Commute to Work Outside County			84,838
Surrounding Counties:		78,208	
Santa Barbara	5,594		
Los Angeles	72,353		
Kern	261		
Other Counties:		5,513	
Other States:		912	
Other Countries:		205	
Non Residents that Work Inside County			29,446
Surrounding Counties:		26,354	
Santa Barbara	2,433		
Los Angeles	23,635		
Kern	286		
Other Counties:		2,873	

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Appendix A

Table A.2. Average Earnings Per Job, Average Wages & Salaries and Average Nonfarm Proprietors Income for U.S., California, Santa Barbara and Ventura Counties

	U.S.	California	Santa Barbara County	Ventura County
Avg. Earnings Per Job ($)				
1990	24,531	27,683	25,752	25,381
1994	28,171	30,952	27,036	28,032
1997	30,842	33,744	29,024	30,685
Avg. Wage & Salary ($)				
1990	23,430	26,239	23,632	24,099
1994	26,528	29,342	24,973	26,608
1997	29,814	32,971	27,562	30,285
Avg. Nonfarm Proprietor's Income ($)				
1990	17,055	19,815	21,551	16,060
1994	20,098	21,804	21,925	19,002
1997	21,508	23,430	22,993	20,379
Avg. Earnings Per Job (1999 $)				
1990	31,154	35,157	32,705	32,234
1994	31,552	34,666	30,280	31,396
1997	32,076	35,094	30,185	31,912
Avg. Wage & Salary (1999 $)				
1990	29,756	33,324	30,013	30,606
1994	29,711	32,863	27,970	29,801
1997	31,007	34,290	28,664	31,496
Avg. Nonfarm Proprietor's Income (1999 $)				
1990	21,660	25,165	27,370	20,396
1994	22,510	24,420	24,556	21,282
1997	22,368	24,367	23,913	21,194

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Table A.3. Personal Income by Industry for California, Santa Barbara and Ventura County: Comparisons 1990, 1994 and 1997

	California			Santa Barbara County			Ventura County		
Industry	1990	1994	1997	1990	1994	1997	1990	1994	1997
Farm	7,005,842	6,812,919	7,507,183	237,461	202,473	291,652	450,821	393,867	402,932
Agricultural Services, Forestry,	4,683,875	5,465,048	6,314,573	112,051	152,050	146,343	155,989	216,680	259,297
fish and other									
Mining	2,169,653	2,098,118	2,231,096	56,147	71,593	80,209	114,676	136,206	134,263
Construction	30,337,414	25,983,262	30,913,991	363,000	301,431	389,677	694,911	634,118	719,340
Manufacturing	80,850,964	81,727,019	96,393,224	903,182	840,098	871,241	1,186,769	1,261,513	1,542,983
Transportation and Public Utilities	27,172,880	32,625,047	38,288,896	192,556	225,547	261,270	467,074	528,759	547,416
Wholesale trade	29,863,793	31,579,036	37,597,610	217,708	243,225	273,804	419,433	496,587	557,688
Retail trade	44,960,799	48,542,063	54,460,590	538,393	601,777	686,103	862,664	972,086	1,089,610
Finance, Insurance and Real estate	32,857,887	40,950,659	49,628,356	287,244	343,822	390,644	443,763	590,870	697,718
Services	137,928,814	160,540,316	196,643,496	1,792,528	1,938,617	2,227,804	2,102,144	2,871,550	3,352,905
Government	71,523,659	81,670,326	87,997,137	866,933	966,478	1,124,909	1,480,519	1,696,909	1,834,401
Total	469,355,580	517,993,813	607,976,152	5,567,203	5,887,111	6,743,656	8,378,763	9,799,145	11,138,553
Farm	1.5	1.3	1.2	4.3	3.4	4.3	5.4	4	3.6
Agricultural Services, Forestry,	1	1.1	1	2	2.6	2.2	1.9	2.2	2.3
fish and other				0			0		0
Mining	0.5	0.4	0.4	1	1.2	1.2	1.4	1.4	1.2
Construction	6.5	5	5.1	6.5	5.1	5.8	8.3	6.5	6.5
Manufacturing	17.2	15.8	15.9	16.2	14.3	12.9	14.2	12.9	13.9
Transportation and Public Utilities	5.8	6.3	6.3	3.5	3.8	3.9	5.6	5.4	4.9
Wholesale trade	6.4	6.1	6.2	3.9	4.1	4.1	5	5.1	5
Retail trade	9.6	9.4	9	9.7	10.2	10.2	10.3	9.9	9.8
Finance, Insurance and Real estate	7	7.9	8.2	5.2	5.8	5.8	5.3	6	6.3
Services	29.4	31	32.3	32.2	32.9	33	25.1	29.3	30.1
Government	15.2	15.8	14.5	15.6	16.4	16.7	17.7	17.3	16.5
Total	100	100	100	100	100	100	100	100	100

Appendix A

Table A.4. Employment by Industry for California, Santa Barbara and Ventura Counties: Comparisons: 1994 and 1997 (000's $ and Percent)

Industry	Santa Barbara County 1994	Santa Barbara County 1997	Ventura County 1994	Ventura County 1997
Farm	7,814	10,095	10,313	10,499
Agricultural Services, forestry, fish and other	9,959	8,636	13,149	13,051
Mining	1,514	1,421	2,601	2,121
Construction	9,136	11,077	17,736	19,335
Manufacturing	18,898	19,000	32,778	35,246
Transportation, Communication and Public Utilities	6,265	6,971	13,025	12,428
Wholesale trade	6,416	6,369	14,076	15,168
Retail trade	37,375	39,606	57,354	61,308
Finance, Insurance and Real Estate	15,791	16,564	26,463	28,003
Services	71,802	78,550	113,069	117,943
Government	32,380	34,062	49,008	47,895
Federal, Civilian	3,452	3,493	11,053	9,106
Military	4,302	4,348	7,766	7,080
State and Local	24,626	26,221	30,189	31,709
State	7,152	7,449	3,139	2,409
Local	17,474	18,772	27,050	29,219
Total	217,750	232,351	349,572	362,997
Wage and Salary	170,477	180,542	272,117	279,307
Proprietors	47,273	51,809	77,455	83,690
Farm	3.6	4.3	3.0	2.9
Agricultural Services, forestry, fish and other	4.6	3.7	3.8	3.6
Mining	0.7	0.6	0.7	0.6
Construction	4.2	4.8	5.1	5.3
Manufacturing	8.7	8.2	9.4	9.7
Transportation, Communication and Public Utilities	2.9	3.0	3.7	3.4
Wholesale trade	2.9	2.7	4.0	4.2
Retail trade	17.2	17.0	16.4	16.9
Finance, Insurance and Real Estate	7.3	7.1	7.6	7.7
Services	33.0	33.8	32.3	32.5
Government	14.9	14.7	14.0	13.2
Federal, Civilian	1.6	1.5	3.2	2.5
Military	2.0	1.9	2.2	2.0
State and Local	11.3	11.3	8.6	8.7
State	3.3	3.2	0.9	0.7
Local	8.0	8.1	7.7	8.0
Total	100.0	100.0	100.0	100.0
Wage and Salary	78.3	77.7	77.8	76.9
Proprietors	21.7	22.3	22.2	23.1

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Table A.5. Santa Barbara County Ports - Ex Vessel Value and Total Income Generated (000's $)

Year	Urchins	Shrimp & Prawn	Spiny Lobster	Sea Cucumbers	Market Squid	Other Crab	Ground-fish	California Halibut	Total Ex Vessel
1988	2,512	234	305	b/	0	182	398	377	5,691
1989	4,140	240	492	b/	0	335	286	352	8,764
1990	6,126	175	679	15	1	585	197	378	10,119
1991	9,637	167	762	31	b/	531	197	333	13,262
1992	9,142	154	773	35	b/	451	236	184	13,584
1993	9,745	180	652	57	b/	505	239	107	14,274
1994	9,035	379	880	54	13	456	552	151	13,804
1995	5,319	400	1,200	127	2	581	413	154	10,217
1996	4,706	777	933	27	524	618	273	166	9,953
1997	3,976	835	1,529	47	354	729	254	219	8,852
1998	2,797	847	966	53	24	736	320	171	6,726

b/ less than 3 buyers, not reported for confidentiality reasons.

Year	Urchins	Shrimp & Prawn	Spiny Lobster	Sea Cucumbers	Market Squid	Other Crab	Ground-fish	California Halibut	Total Ex Vessel
Total Income									
1994	17,739	887	1,696	193	63	1,338	828	313	27,476
1995	10,531	1,059	2,301	417	9	1,615	544	319	20,724
1996	9,407	1,914	1,793	94	2,492	1,741	327	348	21,861
1997	8,112	1,928	2,939	176	1,754	2,043	305	462	19,458
1998	5,702	1,944	1,881	197	74	2,068	385	365	13,306
Total Income to Ex Vessel Value									
1994	2.0	2.3	1.9	3.6	4.8	2.9	1.5	2.1	2.0
1995	2.0	2.6	1.9	3.3	4.5	2.8	1.3	2.1	2.0
1996	2.0	2.5	1.9	3.5	4.8	2.8	1.2	2.1	2.2
1997	2.0	2.3	1.9	3.7	5.0	2.8	1.2	2.1	2.2
1998	2.0	2.3	1.9	3.7	3.1	2.8	1.2	2.1	2.0

Table A.6. Ventura County Ports - Ex Vessel Value and Total Income Generated (000's $)

Year	Urchins	Shrimp & Prawn	Spiny Lobster	Sea Cucumbers	Market Squid	Other Crab	Ground-fish	California Hailbut	Total Ex Vessel
1988	3,016	189	390	-	3,531	84	735	262	13,379
1989	5,230	390	491	-	2,696	92	1,266	292	12,560
1990	6,204	432	401	b/	1,933	76	1,203	404	11,797
1991	7,139	485	456	45	2,505	128	1,267	471	13,605
1992	7,091	461	412	61	459	204	1,226	311	11,015
1993	6,310	729	419	b/	4,370	99	1,073	292	15,151
1994	6,297	859	283	71	9,396	62	561	326	22,272
1995	5,723	746	514	149	16,321	57	835	354	27,044
1996	4,150	932	476	328	25,556	58	919	512	34,846
1997	3,219	1,318	777	144	12,680	131	922	376	21,659
1998	1,785	1,441	451	255	1,510	202	570	395	7,801
Total Income									
1994	12,359	1,700	544	235	38,311	184	895	672	64,581
1995	11,344	1,544	986	460	68,099	163	1,385	733	90,168
1996	8,342	1,906	915	1,081	92,309	170	1,460	1,070	n/a
1997	6,576	2,602	1,490	526	57,028	373	1,505	787	77,925
1998	3,693	2,875	880	868	4,854	565	896	840	19,487
Income to Ex Vessel Value									
1994	2.0	2.0	1.9	3.3	4.1	3.0	1.6	2.1	2.9
1995	2.0	2.1	1.9	3.1	4.2	2.9	1.7	2.1	3.3
1996	2.0	2.0	1.9	3.3	3.6	2.9	1.6	2.1	n/a
1997	2.0	2.0	1.9	3.7	4.5	2.8	1.6	2.1	3.6
1998	2.1	2.0	2.0	3.4	3.2	2.8	1.6	2.1	2.5

Appendix B

Appendix B.
Data Collection and Estimation Methods Used for Commercial Fishing and Recreation Industry Use of the Channel Islands National Marine Sanctuary

Appendix B

Forward

The documentation of data collection methods presented here is part of the ongoing work being conducted by the Socioeconomic Panel for the Channel Islands National Marine Sanctuary (CINMS). CINMS is in the process of updating its five-year management plan. The creation of marine reserves is one of the major issues being addressed in the five-year management plan revision. The Socioeconomic Panel was formed to provide information and analyses to the Marine Reserve Working Group (MRWG) of the Sanctuary Advisory Council (SAC) of the CINMS. The MRWG is comprised of a broad group of stakeholders and was charged with the task of designing and forwarding a consensus based alternative for marine reserves in the CINMS.

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Appendix B

Introduction

This report documents the data sources and methods used to estimate the both the total amount of usage and the spatial distribution of usage of the Channel Islands National Marine Sanctuary (CINMS). This information was developed by the Socioeconomic Panel that was created to support the Marine Reserve Working Group (MRWG) of the Sanctuary Advisory Council (SAC). The MRWG was charged with designing and forwarding a consensus recommendation for marines reserves (no take areas) within the CINMS. Usage here meaning the commercial fishing catch and the ex vessel value of the catch (i.e., what the fisherman receives for his catch) and the number of person-days of recreation activity. Maps and tables summarizing the information can be found in “Data Distributions and Exclusion Zones: Commercial Fishing – Recreation” (Leeworthy and Wiley, 2001a). This report has been commonly referred to as the “Binder”.

Commercial Fishing

Contractors. Two contractors were selected by NOAA to gather information for the commercial fisheries in the CINMS. Criteria for selection were that commercial fishermen had personal knowledge of the contractor and would trust the contractor with access to proprietary information. In addition, the contractor had to be considered to be neutral and acceptable to NOAA as an objective researcher.

NOAA selected Dr. Craig Barilotti of Sea Foam Enterprises, Inc. located in San Diego, California for the contract to collect information from all commercial fisheries, except squid and wetfish (e.g., anchovies, sardines and mackerel). For squid and wetfish, Dr. Caroline Pomeroy of the University of California-Santa Cruz was selected. Dr. Barilotti had formerly worked for Kelco (now ISP Alginates) the only harvester of kelp in the CINMS. Dr. Barilotti also was involved in developing stock assessment information for red urchins. Dr. Pomeroy had an ongoing Sea Grant-sponsored study of the changing social and economic organization of the squid fishery (R/MA-39, with Co-PI Margaret FitzSimmons). Both contractors had developed significant knowledge and working relationships with the commercial fishermen in the region of study. NOAA ran the contracts through a contract with Tetra Tech, which was hired to support a variety of activities associated with CINMS’s five-year management plan revision. Both contractors, by the nature of their work, became part of the Socioeconomic Panel.

Questionnaires. NOAA provided both contractors with Office of Management and Budget (OMB) approved questionnaires to guide the data collection (OMB Approval #: 0648-0408, expiration date: 6/30/2003). The questionnaires were designed to be flexible across applications in different regions and in different fisheries. This afforded some latitude to each contractor in modifying the questionnaire to accomplish the general information requirements. Because of the ongoing work by Dr. Pomeroy in her Sea Grant-sponsored project, the socioeconomic data from the squid/wetfish fishery is more detailed than that obtained by Dr. Barilotti.

Maps and Coding Sheets. NOAA provided maps and coding sheets and formats for how data on catch/ex vessel value would be recorded and entered into databases. Catch/ex vessel value was to be obtained from each fisherman in 1-minute by 1-minute grid cells within the 22 10-minute by 10-minute California Department of Fish and Game (CDFG) blocks that were selected as best approximating the CINMS. CDFG uses 10-minute by 10-minute blocks to organize commercial fish catch/ex vessel value from the fish ticket reporting system. Maps were developed from NOAA nautical charts that provided necessary details for reference points to assist fishermen in identifying the location of their catch. The 1-minute by 1-minute grid cells were overlade on the nautical charts. Each grid cell was numbered for data recording and database construction.

Databases/GIS. Contractors were instructed to deliver catch/ex vessel distribution information in Excel spreadsheets. Excel spreadsheets were then easily read into the Archview Geographic Information System (GIS) for further processing and analysis.

Appendix B

Squid/Wetfish Fisheries-Pomeroy Sample

In late April 2000, Dr. Pomeroy and three project team members (D. Reese, M. Hunter and M. Los Huertos) began work. The team developed two survey instruments (within the purview of the OMB Approved instruments provided by NOAA), one each for catcher vessels (purse seiners) and light boat skippers. Protocols appropriate for the squid fishery were also developed. The team met (by phone and in person) with key members of the squid fishery to solicit their input and feedback on the instruments and protocols, to secure their participation, and to gain their support for the study and their help in bringing others from the fishery's diverse membership on board. In addition, permission was secured, under a strict confidentiality agreement, to use landings data from the Pacific Fisheries Information Network (PacFIN) database, maintained by the Pacific States Marine Fisheries Commission, to complement the data to be collected through interviews.

Dr. Pomeroy's knowledge of the fishery and its participants (including that acquired through extensive ethnographic fieldwork), the PacFIN database, the CDFG squid permittee list, and squid industry participants' input to develop a list of participants in the CINMS squid fishery. In mid May, the survey instruments were pre-tested and refined. Data was then collected over the ensuing six weeks.

The data collection worked as follows: fishermen were contacted (usually on the dock) and provided with an information package. The information package included: 1) a cover letter explaining the study and its relationship to Dr. Pomeroy's ongoing study of the statewide squid fishery. The cover letter also asked for permission to draw upon the ongoing study information already collected for the current application to the CINMS., 2) a draft schedule of the CINMS process, 3) a sub-set of socioeconomic questions, and 4) a set of maps with a request that fishermen think about where they caught squid and other species around the CINMS between 1996 and 1999. Fishermen were asked to review the information provided and to consider participating in the study. Fishermen were encouraged to contact Dr. Pomeroy with any questions or concerns then contacted the following day (or soon after) to secure their participation and to set up a convenient time to meet and complete the interview. Overall, 37 interviews were completed. These included interviews with 29 purse seine skippers and 8 light boat skippers. One of the light boats was also classified as a scoop or brail boat.

Data collection required extensive fieldwork, involving face-to-face contact with fishermen on the docks in San Pedro, Ventura, Monterey and elsewhere. Although good coverage was achieved in terms of the percent of total catch/ex vessel revenue, the sample is probably not representative of the entire fleet in terms of socioeconomic characteristics. Fishermen involved in the CINMS squid fishery are involved in fisheries from San Diego to Alaska. During the survey period, it was not possible to reach many of these fishermen (especially those from out of state). Data from Pomeroy's Sea Grant-sponsored project afforded a more representative sample of the fleet for socioeconomic characterization. Comparisons were made on several key socioeconomic characteristics. There were not significant differences in investment in boats and equipment, but there were differences in where the fishermen come from and our samples accounted for a higher proportion of catch/ex vessel value.

Distribution of Catch/Ex Vessel Value. Fishermen first marked on the maps the places where they fished. The 1-minute by 1-minute grids were then overlade on the maps. The fishermen were then asked to assign points to each cell where they indicated they caught fish (e.g., squid/wetfish/tunas/other species). Points were assigned as follows: for each fisherman, cells that covered less than or equal to 50% were set equal to 0.5. Cells that covered greater than 50% were coded equal to 1. Cells not covered were coded zero. For each fisherman, a normalized distribution (i.e., one that summed to 100 percent across all cells) was created. To aggregate across sampled fishermen required weighting for catch/ex vessel value using the average reported catch/ex vessel value for 1996-1999 from PacFIN for each fishermen. This provided a normalized percentage distribution across all cells in the study area (again, normalized percentage adding to 100 percent across all fishermen and all cells).

MAP Generation. Two maps were generated. One based on the information provided by the purse seiners and one based on the information provided by the light boat operators. In July 2000, the two maps were presented to the fishermen in San Pedro. The fishermen unanimously approved the map based on the light boat operators' input as the more accurate of the two and requested that this map be used by the MRWG representative to depict their fishery to the MRWG.

The next task was to assign ex vessel value to the map. Dr. Leeworthy obtained catch and ex vessel value for years 1988 to 1999 from CDFG. The Socioeconomic Panel had decided early in the project that the 1996-1999 annual average of ex vessel value would be used for prospective analysis, since this four year average captured the variability of catch and ex vessel value. Data from CDFG for 1996 however was incorrect. PacFIN sources reported much different ex vessel value for 1996, although the same quantity of catch. Our 1996-1999 annual average for ex vessel value was revised from $11 million to $13 million based on PacFIN revisions to the 1996 ex vessel value (personal communication, Will Daspit, Pacific State Marine Fisheries Commission). The 1996-199 estimated annual average from PacFIN was $13,046,664. This amount was distributed to each 1-minute by 1-minute grid cell according to our sample-normalized distribution. Our sample of squid fishing operations accounted for 21.89% of the squid fishing operations that operated in the CINMS, but accounted for 95.15% of the ex vessel value of squid caught in the CINMS.

The same procedures used for squid were followed for wetfish (anchovies, sardines and mackerel) and for tunas. The original contracts with Dr. Barilotti and Dr. Pomeroy did not include the tuna information from Dr. Pomeroy. However, after reviewing the data, the Socioeconomic Panel decided the "best" information on tunas came from the Pomeroy sample. Maps were also developed for "Other Species" caught by the squid/wetfish sample. These maps were developed for the purpose of analyzing impacts on individual fishing operations rather than for entire fisheries since they would include double counting across fisheries.

Summary. Three maps were developed from the squid/wetfish fisheries that are used in the socioeconomic impact analyses. Ex vessel value was chosen for map generation and placed in the Archview GIS for analysis. The 1996-1999 annual average of ex vessel value was mapped for each of the three maps. For squid, the 1996-1999 annual average ex vessel value was $13,046,664. For wetfish (anchovies, sardines and mackerel), the 1996-1999 average annual ex vessel value was $301,486. For tunas, the 1996-1999 average annual ex vessel value was $305,665.

For squid, our samples accounted for 21.89% of the squid vessels operating in the CINMS and over 95% of the ex vessel value of catch from the CINMS. For wetfish, our sample accounted for 54% of the fishing vessels operating in the CINMS and 84.48% of the ex vessel value of catch from the CINMS. For tunas, our samples were somewhat weaker. The sample of tuna vessels accounted for 36.84% of the tuna vessels operating in the CINMS but only 13.62% of the ex vessel revenues from the CINMS. Maps and tables summarizing a comparison of the 1999 population and sample distributions for each fishery, in terms of fishing operations (vessels) and ex vessel value of catch are provided in (Leeworthy and Wiley, 2001a).

All Other Species/Species Groups-Barilotti Sample

In late April 2000, Dr. Barilotti and two project team members began work. Dr. Barilotti first assembled a group of fishermen and pre-tested the NOAA supplied, OMB approved questionnaire with the fishermen. The questionnaire was modified within the purview of the OMB approved questionnaire. The fishermen formed a Fishermen's Data Committee (FDC). The FDC wanted to be able to review all data and maps and provide approval before any maps could be shown to the MRWG. The FDC decided that individual maps of species/species groups could not be shown to the public. The maps could be shown to the MRWG in closed working sessions, but had to be collected at the end of each working session. The map data could be entered into Archview GIS and be used by the Socioeconomic Panel for analysis, but the electronic database or paper maps could not be accessed by the Science Panel.

At the fishermen's first meeting, they decided not to provide individual catch information. The fishermen wanted to first produce what came to be called the Exclusion Zone maps. Exclusion zones were places in which the fishermen did not want marine reserves (no take areas). The data collection maps with the 1-minute by 1-minute grid cells were colored in for cells in which the fishermen did not want marine reserves. This was done for crabs, sea cucumbers, kelp, live fish or near shore rockfish, spiny lobster, Nets(swordfish, seabass, halibut and shark, prawn, and urchin. A total map was also created which simply summed the number of species/species groups from the individual species/species group maps for each grid cell. This mapped data was sent to NOAA and entered into the Archview GIS. Maps were produced and sent back to the FDC for approval to be distributed to the MRWG. The FDC made these maps available to the public.

The fishermen were informed that the Exclusion Zone maps would not be adequate for the socioeconomic impact analyses. Fishermen were organized in group meetings to fill in individual maps for each species/species group they caught in the CINMS. Fishermen were uncomfortable meeting in the groups when providing individual information as each attempted to conceal their information from other fishermen. Fishermen did not want to reveal their individual fishing locations to other fishermen. All future data collections were done one-on-one with project team data collectors.

Data was collected to support the development of 11 species/species group maps. The kelp map was developed from data provided by Dale Glantz of ISP Alginates (the sole harvester of kelp in the CINMS). Other maps included urchin, spiny lobster, rockfish, prawn, crab, CA sheepshead, flatfish, sea cucumber, sculpin & bass and shark. The Barilotti sample included 59 fishermen. Most of the fishermen caught multiple species/species groups. The Barilotti sample was not adequate for rockfish, prawn and crabs. For these species/species groups, CDFG 10-minute by 10-minute data combined with the exclusion zone maps were used to derive distributions at the 1-minute by 1-minute spatial resolution. This will be described below.

Distribution of Catch/Ex Vessel Value. The data collection followed similar procedures used in the squid/wetfish fisheries. One-on-one meetings were set-up with fishermen. Maps and questionnaires were filled out working with the project team. A different scoring system was used in the Barilotti sample. Each fisherman was given a 50-point budget. Each fisherman was asked to assign a number of either 1 or 2 to each map cell for each species/species group. The number 2 indicating they caught more of their catch in that cell. Very few actually assigned a value of 2 to any one cell. Many went over their budget of 50 because they fished in many more cells. The scores were all normalized to 50 for each fisherman, then normalized to 100 percent across cells. As with the Pomeroy sample, the distributions were weighted by individual catch/ex vessel value. Each sampled fisherman was asked to sign an affidavit that gave Dr. Barilotti access to CDFG trip ticket and logbook information on each fisherman. Weighted distributions for each species/species groups were then produced. Percentage distributions that add to 100 percent across all cells were produced.

Map Generation. As with the squid/wetfish fishery, the 1996-1999 annual average ex vessel value for each species/species group was distributed across the 1-minute by 1-minute grid cells in Archview GIS. The maps were then sent then presented to the FDC for review and approval. As noted above, these maps are not available in (Leeworthy and Wiley, 2001a) because the FDC would not allow access to the public or the Science Panel. The maps and data were only made available to the Socioeconomic Panel for analysis and to the MRWG in closed sessions.

As noted above, for rockfishes, crab and prawn, the sample distributions were not completely adequate. For rockfish, we had good distribution information west of 119 degrees 50' West Longitude. The sample contained no information east of this point. We used the sample distribution for the western portion and the CDFG 10-minute by 10-minute block data along with the Exclusion Zone maps for the eastern portion. For the eastern area, the ex vessel value for each 10-minute by 10-minute block was distributed to the 1-minute by 1-minute cells equally for each cell in the 10-minute by 10-minute block that was included in the Exclusion Zone map. The CDFG 10-minute by 10-minute block data confirm what our sample revealed, i.e., that the eastern area of the CINMS is relatively unimportant for rockfish. The 1996-1999 average annual ex vessel value for rockfish was $507,758 for the western area and $41,561 for the eastern area.

For crab, we followed the same procedure as for rockfish for the western area. For the eastern area, Exclusion Zone information was not available. We distributed the CDFG 10-minute by 10-minute block totals to the 1-minute by 1-minute cells within each 10-minute by 10-minute to those cells within three miles from shore (the pattern in the western area). As with rockfish, the CDFG data confirm that catch of crabs from the eastern area of the CINMS is relatively small. The 1996-1999 average annual ex vessel value for the western area was $304,029 and $39,565 for the eastern area.

For prawn, there were only three fishermen in our sample. We used the CDFG 10-minute by 10-minute block totals and distributed the these totals within the 10-minute by 10-minute blocks evenly to the 1-minute by 1-minute cells included in the Exclusive Zone maps. Prawn distributions extend out to the edges of the CINMS and into blocks outside our 22-block definition of the CINMS. We accounted for this by taking the data from CDFG block 690 and distributing its total to the 1-minute by 1-minute Exclusion Zone cells in 690, 671 and 672. Also, data from CDFG block 711 was distributed to the 1-minute by 1-minute cells in CDFG blocks 711 and 730.

Summary. The Barilotti sample included 59 fishing operations and accounted for 25 percent of the 1996-1999 average annual ex vessel value of catch from the CINMS. Together with the Pomeroy sample, our two samples included 96 fishing operations which represent 13 percent of the fishing operations that fished in the CINMS, but accounted for 79 percent of the total ex vessel value of catch from the CINMS.

Species/Species Groups Not Mapped at the 1-minute by 1-minute Resolution or Not Mapped

The following table summarizes the other species/species groups either not mapped at the 1-minute by 1-minute cell resolution or not mapped at all and the percent of ex vessel value each species/species group accounted for over the 1996-1999 period. All these species/species groups accounted for less than 1.5 percent of the total ex vessel value from the CINMS, including abalone. Abalone has not been commercially harvested since 1997 in the CINMS. Excluding abalone, these species/species groups accounted for only a little over one half of one percent of the total ex vessel value from the CINMS.

Species/Species Group	1996-1999 Avg. Value	Percent of CINMS	
Abalone	178,027	0.878273	mapped at 10 by 10 mile
Swordfish	39,090	0.192845	mapped at 10 by 10 mile
Roundfish	33,262	0.164094	mapped at 10 by 10 mile
Other	22,990	0.113418	mapped at 10 by 10 mile
Yellowtail	6,891	0.033996	mapped at 10 by 10 mile
Shrimp	5,813	0.028678	mapped at 10 by 10 mile
Mussels, Snails	4,694	0.023157	mapped at 10 by 10 mile
Salmon	1,411	0.006961	mapped at 10 by 10 mile
Rays & Skates	1,164	0.005742	mapped at 10 by 10 mile
Surf Perch	695	0.003429	not mapped
Grenadiers	211	0.001041	not mapped
Octopus	196	0.000967	not mapped
Total	294,444	1.452601	
Total, Excluding Abalone	116,417	0.574328	

Appendix B

Recreation Industry

The Recreation Industry data included information organized into consumptive and nonconsumptive activities and within each of these categories whether the activity was done from a charter/party boat or guide service (for hire operation) of from a private household owned boat. The charter/party boat or guide service activity was obtained through a contract with Dr. Charles Kolstad of the University of California – Santa Barbara. Dr. Kolstad was able to obtain a census i.e., all operators that operated in the CINMS in 1999. Dr. Kolstad's team used a NOAA provided OMB Approved questionnaire (OMB Approval #: 0648-0408, expiration date: 6/30/2003. Information was obtained on person-days of activity, by activity type along with revenues, operating and capital costs and profits associated with each activity. Person-days of activity, by type of activity, were mapped in 1-minute by 1-minute cells for all the cells in the CINMS. For private household boat use data was obtained from multiple sources which will be explained below.

Charter/Party Boat or Guide Service – For Hire Operations

A total of 51 operators of charter/party boat or guide services were identified as having operated in the CINMS in 1999. Operators often engaged in providing multiple activities, sometimes both consumptive and nonconsumptive activities. Therefore, the addition of the number of operators across activities will add to more than 51. Person-days of activities, revenues, costs and profits are not double counted across activities.

Nautical charts with the 1-minute by 1-minute cell grid overlade were provided to the Kolstad team by NOAA. Dr. Kolstad used students at UC-Santa Barbara to collect the information. The students went to the offices of each operation to collect the information. Person-days of activity, by type of activity, were mapped for each operation and entered into Excel spreadsheets. Excel spreadsheets were then entered into the Archview GIS for each operation. Person-days of activity, by type of activity, were then summed across operations. Since a census of operations was achieved, the sum of the sample represents the population estimate.

Charter/PartyBoat Fishing. In 1999, there were 18 operators that accounted for 158,768 person-days of fishing in the CINMS.

Charter/Party Boat Consumptive Diving. In 1999, there were 10 operators that accounted for 17,935 person-days of consumptive diving in the CINMS.

Charter/Party Boat Whale Watching. In 1999, there were 8 operators that accounted for 25,984 person-days of whale watching in the CINMS.

Charter/Party Boat Non-Consumptive Diving. In 1999, there were 7 operators that accounted for 10,776 person-days of non-consumptive diving in the CINMS.

Charter/Party Boat Sailing. In 1999, there were 8 operators that accounted for 4,015 person-days of activity in the CINMS.

Guide Service for Kayaking/Island Sightseeing. In 1999, there were 4 operators that accounted for 1,233 person-days of kayaking/island sightseeing in the CINMS.

Private Household Boat Use Estimation

The data distribution for private household boat fishing and consumptive diving in the marine reserves study area was estimated in three steps.

The **first step** involved compiling and incorporating all of the existing geo-referenced data sources for private boat usage in the study area. Data was incorporated from the following sources:

- Recreational Fisheries Information Network (RecFIN). These data include a sample of anglers in the Southern California Region. Data elements include mode, gear, annual person days and species as well as the geographic coordinates of activity. The sample was not sufficient to provide a dense enough coverage of the study area to be the sole data source, however it did provide a rough distribution and also much needed parameters such as the breakdown of gear usage (e.g. hook and line, diving (e.g. spearfishing), etc.).
- The Sanctuary Aerial Monitoring Spatial Analysis Program (SAMSAP). This is an Aerial Survey conducted by sanctuary personnel, which, among other things, provides geo-referenced point data broken down by boat type. Boat categories include "recreation," which is defined as private boats. The assumption was used that the breakdown between fishing and consumptive diving is the same as the RecFIN sample. The sample was also not of a sufficient size to be used as a sole distribution data source.
- Channel Islands National Park (anchorage data). This data was from a program of visitor statistics compilation conducted by National Park Rangers. The data collection includes a breakout of data for private vessels in the National Park anchorages. Park staff use a multiplier of 5.5 persons per private vessel (for private boats). Again, the assumption was used that the breakdown between fishing and consumptive diving is the same as the RecFIN sample.
- Yacht Clubs and Marinas. A written request for private boat usage patterns was sent to area yacht clubs and marinas. Unfortunately, the response to this effort was dismal. We received responses from two yacht clubs and one marina. However, this added to our aggregate picture of the distribution of private boat usage.
- The Nature Conservancy (TNC) and the Professional Association of Dive Instructors (PADI). Data was also received from these organizations, however, because this data was in no way geo-referenced, it was not incorporated into the distribution estimation process.

As is mentioned above, none of these data sources could be used as a stand-alone source for the estimation of private boat activity distribution. However for each grid cell for which we had data, the data was entered and in the next two steps, the estimation of activity distribution was completed.

Step two involved extrapolating the existing data to the remainder of the study area. The assumption was made that the private boat activity distribution was approximately the same as charter/party boat consumptive activity. For each grid cell for which no data was available, the cell value was estimated using the following formula.

$$x=ay/b$$

where
- x= The grid cell value estimate for private boat usage grid cells containing no data from the above sources.
- a= The equivalent grid cell value from the charter/party boat distribution for the grid cell missing private boat usage data.
- b= The mean of grid cell values from the charter/party boat distribution for the grid cells containing private boat usage data.
- y= The mean of grid cell values from the private boat distribution for the grid cells containing private boat usage data.

Step three involved fine tuning the distribution estimate based on the rough private boat data distributions. Although we may not have had a sufficient density of data to capture the distribution at the required one-by-one minute grid cells, we did have a rough geographic distribution of the data. In cases where this rough distribution suggested that the method in step two was incorrect, an adjustment was made to reflect the variance between the distribution of private boat and charter/party boat usage. For example, the yacht club and marina data clearly indicated that the private boat activity distribution was concentrated closer to the islands.

For private household boat fishing, 214,015 person-days of activity were estimated for the CINMS in 1999. For private household boat consumptive diving, 47,190 person-days of activity were estimated for the CINMS in 1999. ***Nonconsumptive activities from private household boats could not be estimated. There were no known sources of information.***

References

Leeworthy, Vernon R. and Wiley, Peter C. 2001a. ***Data Distributions and Exclusion Zones: Commercial Fishing – Recreation.*** Prepared for the Channel Islands National Marine Sanctuary, Marine Reserves Working Group. Socioeconomic Panel Report. National Oceanic and Atmospheric Administration, National Ocean Service, Special Projects Office, Silver Spring, Maryland. Can be found in portable document format (pdf) at http://www.cinms.nos.noaa.gov/MRWGsocioec/panel.html

APPENDIX C

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APPENDIX C

1. Commercial Fisheries

Map Distributions

For urchins, spiny lobsters, flatfish, sea cucumbers, sculpin & bass, and sharks, we used the sample distributions of catch by the 1 by 1 minute blocks obtained from the fishermen through a contract with Sea Foam Enterprises (Dr. Craig Barilotti). These distributions are normalized to equal 100 percent across all blocks. We then calculated the 1996 – 1999 Average Annual Ex Vessel Values for each species/species group (see our list of species in each species group) and each of the 22 he California Department of Fish and Game (CDFG) blocks that define the Channel Islands National Marine Sanctuary (CINMS). The totals across all 22 blocks are then distributed to the 1 by 1 minute blocks.

For rockfishes, crab, and prawns, the sample distributions were not completely adequate. For rockfish, we had good distribution information west of 119 Degrees 50' West Longitude (see rockfish map). The sample contained no information east of this point. So we used the sample distribution and the CDFG 10 block totals for the western area to derive the 1 by 1 mile distribution on the western half. For the eastern half, we used the CDFG 10 by 10 mile total for each block and distributed them equally within the block to the 1 by 1 mile blocks included in the Exclusion Zone maps. The CDFG 10 by 10 mile block data confirm that our sample is correct in maintaining that little of the rockfish catch comes from the eastern half. The 1996-1999 Average Annual Rockfish ex vessel value was $507,758 for the western half and $41,561 for the eastern half.

For crab, we followed the same procedure as for rockfish for the western half. For the eastern half, Exclusion Zone information was not available. We distributed the CDFG 10 by 10 mile block totals to the 1 by 1 mile blocks within each 10 by 10 mile block to those 1 by 1 mile blocks within three miles from shore (the pattern on the western half). As with rockfish, the CDFG data confirm that catches from the eastern half is relatively small. The 1996-1999 Average Annual ex vessel value for the western half was $304,029 and $39,565 for the eastern half.

For prawn, there were only three fishermen in our sample. We used the CDFG 10 by 10 mile block totals and distributed the these totals within the 10 by 10 mile blocks evenly to the 1 by 1 mile blocks included in the Exclusion Zone maps. Prawn distributions extend out to the edges of the CINMS and into blocks outside our 22 block definition (see map). We accounted for this by taking the data from CDFG block 690 and distributing its total to the 1 by 1 mile Exclusion Zone blocks in 690, 671 and 672. Also, data from CDFG block 711 was distributed to the 1 by 1 mile blocks in 711 and 730.

For squid, wetfish (Anchovies & Sardines and Mackerel) and tuna, we use the sample distributions obtained from the squid/wetfish fishermen through a contract with Dr. Carrie Pomeroy of UC-Santa Cruz. These distributions were normalized to 100 percent across the 1 by 1 mile blocks. We then calculated the 1996 – 1999 Average Annual Ex Vessel Values for each species/species group (see our list of species in each species group) and each of the 22 he California Department of Fish and Game (CDFG) blocks that define the Channel Islands National Marine Sanctuary (CINMS). The totals across all 22 blocks are then distributed to the 1 by 1 mile blocks.

Please Note: Our current estimates for squid ex vessel values are still preliminary. From CDFG, we estimate the 1996-1999 Annual Average to be around $11 million, while PacFIN estimates this at about $13 million. The difference has to do with interpolation of missing values where pounds of landing are reported. We are still evaluating the PacFIN method for interpolating missing value. Most of the current disagreement is for 1996 values. We hope to have this resolved before we analyze boundary alternatives.

Species/Species Groups Not Mapped at the 1 by 1 mile Resolution or Not Mapped

The following table summarizes the other species/species groups either not mapped at the 1 by 1 mile block resolution or not mapped at all and the percent of ex vessel value each species/species group accounted for over the 1996-1999 period. All these species/species groups accounted for less than 1.5 percent of the total ex vessel value from the CINMS, including abalone. Abalone has not been commercially harvested since 1997 in the CINMS. Excluding abalone, these species/species groups accounted for only a little over one half of one percent of the total ex vessel value from the CINMS.

Table C.1.

Species/Species Group	1996-1999 Avg. Value	Percent of CINMS	
Abalone	178,027	0.878273	mapped at 10 by 10 mile
Swordfish	39,090	0.192845	mapped at 10 by 10 mile
Roundfish	33,262	0.164094	mapped at 10 by 10 mile
Other	22,990	0.113418	mapped at 10 by 10 mile
Yellowtail	6,891	0.033996	mapped at 10 by 10 mile
Shrimp	5,813	0.028678	mapped at 10 by 10 mile
Mussels, Snails	4,694	0.023157	mapped at 10 by 10 mile
Salmon	1,411	0.006961	mapped at 10 by 10 mile
Rays & Skates	1,164	0.005742	mapped at 10 by 10 mile
Surf Perch	695	0.003429	not mapped
Grenadiers	211	0.001041	not mapped
Octopus	196	0.000967	not mapped
Total	294,444	1.452601	
Total, Excluding Abalone	116,417	0.574328	

APPENDIX C

Quality Assessment

We have attempted to provide a quality assessment for each species/species group map. We also have attempted to provide information to assess how representative our sample would be of the population of fishing operations in the CINMS.

There are significant differences in the distributions of catch between the population of fishing operations and our samples for each species/species groups. So without sample weighting, extrapolating sample means (averages) to derive population totals would not be advisable. We are also evaluating the impact this might have on socioeconomic profiles. However, we are more confident in our spatial distributions for the maps. Still some maps are better than others. To help assess the quality of the maps, we provide the sample size in parentheses, the CDFG control totals for the 1996-1999 Annual Averages, and what percent of that total our sample accounted for. As you will see from the population distributions of fishing operations and ex vessel value, in many cases, a small percent of the fishing operations account for a large percentage of the ex vessel value. Overall our two samples (Barilotti and Pomeroy) accounted for about 79 percent of the ex vessel value of catch from the CINMS for the 1996-1999 period (excluding Kelp). So overall, we are highly confident that we are capturing the commercial fishing values.

For each mapped distribution of species/species groups, we provide the population distributions of the number of fishing operations that operated in the Channel Islands National Marine Sanctuary (CINMS) and the ex vessel value (amount received by fishermen) from catch in the CINMS. The data is from the California Department of Fish and Game (CDFG) and is reported by fisherman and CDFG 10 by 10 mile blocks. We use 22 of the CDFG blocks to define the CINMS.

For comparison purposes, we also provide the sample distributions for the number of fishing operations and their ex vessel value from the CINMS.

The population distributions from CDFG were for 1999 and were gathered in the spring of 2000. These numbers were preliminary and the totals don’t agree with the control totals you will find in a summary table included in you package. The differences in the totals are not significant.

APPENDIX C

Table C.2. Population
All Species in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	737	100.00	36,718,444	100.00
GE $500,000	19	2.58	12,809,041	34.88
GE $100,000	78	10.58	25,866,209	70.44
GE $50,000	141	19.13	30,110,099	82.00
GE $20,000	268	36.36	34,469,665	93.88
LT $20,000	469	63.64	2,248,779	6.12
LT $10,000	389	52.78	1,127,487	3.07
LT $5,000	286	38.81	367,003	1.00
LT $1,000	170	23.07	75,105	0.20

Note that, in 1999, 78 or 10.58 percent of the fishing operations accounted for 70.44 percent of the ex vessel revenue. The Barilotti sample (all species/species groups except squid, wetfish and tunas) accounted for about 25 percent of the 1996-1999 Average Annual Ex Vessel Value. The Pomeroy sample (squid, wetfish and tunas) accounted for 95 percent of squid, 84.5 percent of wetfish and 13.62 percent of tuna. But across all three species/species groups, the Pomeroy sample accounts for 54.12 percent of the total 1996-1999 value. The Barilotti sample included 59 fishing operations and the Pomeroy sample included 37 fishing operations for a total of 96 fishing operations or 13 percent of all CINMS fishing operations which accounted for about 79 percent of the total ex vessel value in the CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

Table C.3.

Commercial Fishing Ex Vessel Value for the CDFG 22 Block Definition of the CINMS

Species/Species Group	Sum of 1988 - 1999 Value $	Percent	1999 Value $	Percent	Avg. 1996-1999 Value $	Percent	Rank 1999	Rank 1996-1999
Squid	58,414,283	40.79	26,558,813	72.31	11,249,837	55.42	1	1
Urchins	56,515,080	39.46	5,963,876	16.24	5,265,233	25.94	2	2
Spiny Lobster	6,774,501	4.73	952,991	2.59	922,098	4.54	3	3
Rockfishes	4,659,502	3.25	549,446	1.50	549,319	2.71	5	5
Prawn	3,558,714	2.48	743,159	2.02	703,186	3.46	4	4
sub-total (TOP 5)	**129,922,080**	**90.72**	**34,768,285**	**94.66**	**18,689,673**	**92.07**		
Abalone	2,544,275	1.78	47	0.00	178,027	0.88	n/a	11
Crab	2,378,003	1.66	313,289	0.85	343,664	1.69	8	6
Anchovy & Sardines	1,378,517	0.96	548,944	1.49	234,367	1.15	6	8
CA Sheepshead	1,326,089	0.93	153,147	0.42	235,928	1.16	10	7
Flatfish	1,105,209	0.77	324,685	0.88	183,871	0.91	7	10
sub-total (6-10)	**8,732,093**	**6.10**	**1,340,112**	**3.65**	**1,175,857**	**5.79**		
Total TOP 10	**138,654,173**	**96.82**	**36,108,397**	**98.31**	**19,865,530**	**97.86**		
Total TOP 8, excluding Abalone	**136,109,898**	**95.04**	**36,108,350**	**98.31**	**19,687,503**	**96.98**		
Total All Species	**143,209,999**	**100.00**	**36,730,499**	**100.00**	**20,299,548**	**100.00**		
Sea Cucumbers	737,031	0.51	267,842	0.73	167,700	0.83	9	12
Mackerel	550,216	0.38	59,921	0.16	67,119	0.33	12	13
Sculpin&Bass	568,354	0.40	88,547	0.24	60,327	0.30	11	14
Tuna	958,499	0.67	53,694	0.15	205,884	1.01	13	9
Swordfish	824,731	0.58	21,472	0.06	39,090	0.19	17	15
Shark	373,328	0.26	41,638	0.11	34,751	0.17	14	16

APPENDIX C

Table C.4. Species Included in Each Species Group for Commercial Fisheries Analyses

Species Group Code	Species Group Name	CDFG Species Code	Common Name	Scientific Name
1	Tuna	1	Tuna, yellowfin	Thunnus albacares
		2	Tuna, skipjack	Katsuwonus pelamis
		3	Bonito, Paciffic	Sarda chilienis
		4	Tuna, bluefin	Thunnus thynnus
		5	Tuna, albacore	Thunnus alalunga
		6	Tuna, unspecified	Scombridae
		8	Tuna, bigeye	Thunnus obesus
		9	Tuna, skipjack, black	Euthynnus lineatus
2	Mackerel	19	Mackerel, bullet	Auxis rochei
		50	Mackerel, unspecified	Scomber / Trachurus
		51	Mackerel, Pacific	Scomber japonicus
		55	Mackerel, jack	Trachurus symmetricus
3	Sharks	96	Shark, white	Carcharodon carcharias
		97	Shark, bigeye thresher	Alopias superciliosus
		98	Shark, pelagic thresher	Alopias pelagicus
		150	Shark, unspecified	Selachii spp.
		151	Shark, shortfin mako	Isurus oxyrinchus
		152	Shark, spiny dogfish	Squalus acanthias
		153	Shark, leopard	Triakis semifasciata
		154	Shark, brown smoothhound	Mustelus henlei
		155	Shark, thresher	Alopias vulpinus
		156	Shark, basking	Cetorhinus maximus
		158	Shark, smooth hammerhead	Sphyrna zygaena
		159	Shark, soupfin	Galeorhinus zyopterus
		161	Shark, sixgill	Hexanchus griseus
		162	Shark, sevengill	Notorynchus cepedianus
		163	Shark, swell	Cephaloscyllium ventriosum
		165	Shark, Pacific angel	Squatina californica
		167	Shark, blue	Prionace glauca
		169	Shark, horn	Heterodontus francisci
		179	Shark, gray smoothhound	Mustelus californicus
4	Rays & Skates	170	Ray, unspecified	Rajiformes
		171	Ray, bat	Myliobatis californica
		172	Ray, Pacific electric	Torpedo californica
		174	Guitarfish, shovelnose	Rhinobatos productus
		175	Skate, unspecified	Rajidae
5	Rockfishes	245	Rockfish, cowcod	Sebastes levis
		246	Rockfish, copper (whitebelly)	Sebastes caurinus
		247	Rockfish, canary	Sebastes pinniger
		249	Rockfish, vermilion	Sebastes miniatus
		250	Rockfish, unspecified	Sebastes spp.

APPENDIX C

Table C. 4. (continued)

Species Group Code	Species Group Name	CDFG Species Code	Common Name	Scientific Name
5	Rockfishes[1] (continued)	251	Rockfish, black-and-yellow	Sebastes chrysomelas
		252	Rockfish, black	Sebastes melanops
		253	Rockfish, bocaccio	Sebastes paucispinis
		254	Rockfish, chilipepper	Sebastes goodei
		255	Rockfish, greenspotted	Sebastes chlorostictus
		256	Rockfish, starry	Sebastes constellatus
		257	*Rockfish, darkblotched*	*Seabastes crameri*
		258	Rockfish, China	Sebastes nebulosus
		259	Rockfish, yellowtail	Sebastes flavidus
		260	Rockfish, California	Scorpaena guttata
		261	Cabezon	Scorpaenichthys marmoratu
		262	Thornyheads	Sebastolobus spp.
		263	Rockfish, gopher	Sebastes carnatus
		264	Rockfish, pinkrose	Sebastes simulator
		265	Rockfish, yelloweye	Sebastes ruberrimus
		267	Rockfish, brown	Sebastes auriculatus
		268	Rockfish, rosy	Sebastes rosaceus
		269	Rockfish, widow	Sebastes entomelas
		270	Rockfish, splitnose	Sebastes diploproa
		651	Rockfish, olive	Sebastes serranoides
		652	Rockfish, grass	Sebastes rastrelliger
		653	*Rockfish, pink*	*Sebastes eos*
		654	Rockfish, greenstripped	Sebastes elongatus
		655	Rockfish, copper	Sebastes caurinus
		657	Rockfish, flag	Sebastes rubrivinctus
		658	Rockfish, treefish	Sebastes serriceps
		659	Rockfish, kelp	Sebastes atrovirens
		660	*Rockfish, honeycomb*	*Sebastes umbrosus*
		661	Rockfish, greenblotched	Sebastes rosenblatti
		662	Rockfish, bronzespotted	Sebastes gilli
		663	Rockfish, bank	Sebastes rufus
		664	Rockfish, rosethorn	Sebastes helvomaculatus
		665	Rockfish, blue	Sebastes mystinus
		666	*Rockfish, squarespot*	*Sebastes hopkinsi*
		667	Rockfish, blackgill	Sebastes melanostomus
		668	*Rockfish, stripetail*	*Sebastes saxicola*
		669	Rockfish, speckled	Sebastes ovalis
		670	*Rockfish, swordspine*	*Sebastes ensifer*
		671	*Rockfish, calico*	*Sebastes dallii*
		672	*Rockfish, shortbelly*	*Sebastes jordani*
		673	*Rockfish, chameleon*	*Sebastes phillipsi*
		674	Rockfish, aurora	Sebastes aurora
		675	Rockfish, redbanded	Sebastes babcocki
		678	Thorneyhead, longspine	Sebastolobus altivelis
		679	Thorneyhead, shortspine	Sebastolobus alascanus

APPENDIX C

Table C. 4. (continued)

Species Group Code	Species Group Name	CDFG Species Code	Common Name	Scientific Name
5	Rockfishes (continued)	956	Rockfish, group bocaccio/chili	Sebastes/group
		957	Rockfish, group bolina	Sebastes/group
		958	Rockfish, group deepwater reds	Sebastes/group
		959	Rockfish, group red	Sebastes/group
		960	Rockfish, group small	Sebastes/group
		961	Rockfish, group rosefish	Sebastes/group
		962	Rockfish, group gopher	Sebastes/group
		970	Rockfish, quillback	Sebastes maliger
		971	*Rockfish, group canary/vermili*	*Sebastes/group*
		972	*Rockfish, group black/blue*	*Sebastes/group*
6	Sculpin & Bass	272	Sculpin, staghorn	Leptocottus armatus
		273	*Sculpin, yellowchin*	*Icelinus quadriseriatus*
		275	Bass, rock	Paralabrax spp.
		276	*Bass, spotted sand*	*Paralabrax maculatofasciat*
		277	Bass, kelp	Paralabrax clathratus
		278	*Bass, barred sand*	*Paralabrax nebulifer*
		280	Bass, giant sea	Stereolepis gigas
		400	Seabass, white	Atractoscion noblilis
7	Salmon	300	Salmon	Oncorhynchus spp.
		301	*Salmon, chum*	*Oncorhynchus keta*
		302	Salmon, chinook	Oncorhynchus tshawytscha
		303	*Salmon, pink*	*Oncorhynchus goruscha*
		304	Salmon, coho	Oncorhynchus kisutch
		306	*Salmon, Roe (Chinook and Coho)*	*Onchorhynchus spp.*
8	Crab	341	Crab, red rock	Cancer productus
		342	Crab, yellow rock	Cancer anthonyi
		343	Crab, brown rock	Cancer antennarius
		800	Crab, Dungeness	Cancer magister
		801	Crab, rock unspecified	Cancer spp.
		802	Crab, claws	Cancer spp.
		803	Crab, spider	Loxorhynchus spp.
		804	Crab, king	Paralithodes spp.
		805	Crab, sand	Emerita analoga
		806	Crab, shore	Pachygrapsus crassipes
		807	Crab, pelagic red	Pleuroncodes planipes
		808	Crab, tanner	Chionoecetes tanneri
		809	Crab, box	Lopholithodes foraminatus
9	Shrimp	810	Shrimp, bay	Crangonidae
		811	*Shrimp, ghost*	*Callianassa californiensis*
		812	Shrimp, Pacific Ocean	Pandalus jordani
		814	Shrimp, unspecified	Crustacea

APPENDIX C

Table C. 15. (continued)

Species Group Code	Species Group Name	CDFG Species Code	Common Name	Scientific Name
9	Shrimp			
	(continued)	*817*	*Shrimp, coonstriped*	*Pandalus hypsinotus*
		818	Shrimp, red rock	Lysmata californica
		819	*Shrimp, brine*	*Artemia salina*
10	Spiny Lobster	820	Lobster, California spiny	Panulirus interruptus
11	Urchins	752	Urchin, red	Strongylocentrotus francisc
		753	Urchin, purple sea	Strongylocentrotus purpurat
12	Sea Cucumbers	755	Cucumber, sea	Holothuroidea
13	Roundfish	190	Sablefish	Anoplopoma fimbria
		191	Louvar	Luvarus imperialis
		195	Lingcod	Ophiodon elongatus
		290	Greenling, kelp	Hexagrammos decagramm
		495	Whiting, Pacific	Merluccius productus
14	Grenadiers	198	Grenadiers	Macouridae
15	Yellowtail	40	Yellowtail	Seriola lalandi
16	Swordfish	91	Swordfish	Xiphias gladius
17	Flatfish	200	Sole, unspecified	Pleuronectiformes
		201	Flounder, arrowtooth	Atheresthes stomias
		202	*Sole, bigmouth*	*Hippoglossina stomata*
		203	Sole, rock	Pleuronectes bilineata
		204	Sole, fantail	Xystreurys liolepis
		205	Sole, sand	Psettichthys melanostictus
		206	Sole, English	Pleuronectes vetulus
		207	Sole, rex	Errex zachirus
		208	*Sole, butter*	*Pleuronectes isolepis*
		209	Sole, petrale	Eopsetta jordani
		210	*Sole, slender*	*Eopsetta exilis*
		211	Sole, Dover	Microstomus pacificus
		212	Sole, tongue	Symphurus atricauda
		220	Halibut, unspecified	Pleuronectiformes
		221	*Halibut, Pacific*	*Hippoglossus stenolepis*
		222	Halibut, California	Paralichthys californicus
		225	Sanddab	Citharichthys spp.
		226	*Sanddab, longfin*	*Citharichthys xanthostigma*
		227	Sanddab, Pacific	Citharichthys sordidus
		228	*Sanddab, speckled*	*Citharichthys stigmaeus*

APPENDIX C

Table C. 15. (continued)

Species Group Code	Species Group Name	CDFG Species Code	Common Name	Scientific Name
17	Flatfish	230	Flounder, unspecified	Pleuronectidae
	(continued)	231	Flounder, starry	Platichthys stellatus
		235	*Turbot, curlfin*	*Pleuronichthys decurrens*
		236	*Turbot, diamond*	*Hypsopsetta guttulata*
		237	*Sole, C-O*	*Pleuronichthys coenosus*
		238	*Turbot, hornyhead*	*Pleuronichthys verticalis*
		239	*Turbot, spotted*	*Pleuronichthys ritteri*
		240	Turbot	Pleuronectidae
18	Surf Perch	550	Surfperch, unspecified	Embiotocidae
		551	Surfperch, barred	Amphistichus argenteus
		552	Surfperch, black	Embiotoca jacksoni
		553	Surfperch, redtail	Amphistichus rhodoterus
		554	Surfperch, shiner	Cymatogaster aggregata
		556	*Surfperch, white*	*Phanerodon furcatus*
		557	Surfperch, walleye	Hyperprosopon argenteum
		558	Surfperch, rubberlip	Rhacochilus toxotes
		559	Surfperch, pile	Rhacochilus vacca
		560	*Surfperch, calico*	*Amphistichus koelzi*
		561	*Surfperch, dwarf*	*Micrometrus minimus*
		562	Surfperch, rainbow	Hypsurus caryi
		563	*Surfperch, pink*	*Zalembius rosaceus*
		601	*Kahawai*	*Annipis trutta*
		602	Zebraperch	Hermosilla azurea
19	Abalone	700	Abalone	Haliotis spp.
		701	Abalone, black	Haliotis cracherodii
		702	Abalone, red	Haliotis rufescens
		703	Abalone, green	Haliotis fulgens
		704	Abalone, pink	Haliotis corrugata
		705	Abalone, white	Haliotis sorenseni
		706	Abalone, threaded	Haliotis assimilis
		707	Abalone, pinto	Haliotis kamtschatkana
		708	Abalone, flat	Haliotis walallensis
		709	Limpet, unspecified	Archaeogastropoda
20	Squid	710	Squid, jumbo	Doscidicus gigas
		711	Squid, market	Loligo opalescens
21	Octopus	712	Octopus, unspecified	Octopus spp.
22	Mussels & Snails	730	Mussel	Mytilus spp.
		731	Whelk, Kellet's	Kelletia Kelleti
		732	Snail, sea	Gastropoda
		736	Snails, moon	Polinices spp.
		746	*Snail, bubble*	*Bulla gouldiana*

APPENDIX C

Table C.15. (Continued)

Species Group Code	Species Group Name	CDFG Species Code	Common Name	Scientific Name
22	Mussels & Snails (continued)	747	Snail, top	Astraea undosa
		749	Sea hare	Aplysia spp.
		751	Sea stars	Asteroidea
23	Anchovy & Sardines	110	Anchovy, northern	Engraulis mordax
		100	Sardine, Pacific	Sardinops sagax caeruleus
24	Herring & Roe	121	Herring, Pacific	Clupea pallasi
		122	Herring, roe	Clupea pallasi
25	Prawn	813	Prawn, ridgeback	Eusicyonia ingentus
		815	Prawn, spot	Pandalus platyceros
		816	*Prawn, golden*	*Penaeus Californiensis*
26	CA Sheephead	145	Sheephead, California	Semicossyphus pulcher
27	Other[2]	57	Wahoo	Acanthocybium solanderi
		80	Butterfish (Pacific pompano)	Peprilus simillimus
		130	Barracuda, California	Sphyraena argentea
		135	Mullet, striped	Mugil cephalus
		166	Ratfish, spotted	Hydrolagus colliei
		184	Jacksmelt	Atherinopsis californiensis
		189	Silversides	Atherinidae
		291	Triggerfish	Balistidae
		324	Shad, threadfin	Dorosoma petenense
		325	Shad, American	Alosa sapidissima
		346	Hardhead (freshwater)	Mylopharodon conocephalu
		340	Tilapia	Tilapia spp.
		420	Croaker, unspecified	Sciaenidae
		421	Croaker, black	Cheilotrema saturnum
		430	Grouper	Mycteroperca/Epinephelus
		432	Grouper, Broomtail	Mycteroperca xenarcha
		435	Croaker, white	Genyonemus lineatus
		440	Queenfish	Seriphus politus
		450	Eel	Osteichthyes
		452	Eel, California moray	Gymnothorax mordax
		454	Eel, wolf	Anarrhichthys ocellatus
		456	Eel, monkeyface	Cebidichthys violaceus
		457	Hagfishes	Eptatretus spp.
		467	Opah	Lampris guttatus
		473	Lizardfish, California	Synodus lucioceps
		475	Opaleye	Girella nigricans
		476	Needlefish, California	Strongylura exilis
		478	Halfmoon	Medialuna californiensis
		479	Blacksmith	Chromis punctipinnis
		480	Sargo	Anisotremus davidsonii
		481	Dolphin (fish)	Coryphaena hippurus

APPENDIX C

Table C.15. (Continued)

Species Group Code	Species Group Name	CDFG Species Code	Common Name	Scientific Name
27	Other (continued)			
		485	Midshipman, planifin	Porichthys notatus
		490	Whitefish, ocean	Caulolatilus princeps
		999	Fish, unspecified	Osteichthyes

1. Species in italics were not caught in any of the study areas.
2. All species under Other were caught in the study areas.

APPENDIX C

Table C5. Landings Distribution

Landings Distribution by Port: Squid

Port		Port Name	County	Value	Percent	Percent
	605	Port Hueneme	Ventura	50,048,318	0.817330157	81.7330
	606	Morro Bay	San Luis Obispo	17,140	0.00027991	0.0280
	608	Oxnard/Channel Islands Harbor	Ventura	6,601	0.0001078	0.0108
	611	Santa Barbara Harbor	Santa Barbara	559,666	0.009139806	0.9140
	613	Ventura Harbor	Ventura	3,949,838	0.0645041	6.4504
	745	Terminal Island	Los Angeles	1,317,869	0.021521884	2.1522
	748	New Port Beach	Orange	98	1.60042E-06	0.0002
OLA		Other Los Angeles	Los Angeles	7,746	0.000126499	0.0126
	770	San Pedro	Los Angeles	5,326,630	0.086988245	8.6988
		Total		61,233,906	1	100.0000

Landings Distribution by Port: Urchins

Port Code	Port Name	County	Value	Percent	Percent
608	Oxnard/Channel Islands Harbor	Ventura	133,556.24	0.082434273	8.2434
611	Santa Barbara Harbor	Santa Barbara	1,467,768.76	0.905943822	90.5944
613	Ventura Harbor	Ventura	2,645.20	0.001632684	0.1633
745	Terminal Island	Los Angeles	1,375.40	0.000848931	0.0849
770	San Pedro	Los Angeles	6,067.80	0.003745199	0.3745
880	San Diego	San Diego	8,740.89	0.005395097	0.5395
	Total		1,620,154.28	1	100.0000

Landings Distribution by Port: Spiny Lobsters

Port	Port Name	County	Value	Percent	Percent
608	Oxnard/Channel Islands Harbor	Ventura	1,415.75	0.003873061	0.3873
611	Santa Barbara Harbor	Santa Barbara	348,188.83	0.952538611	95.2539
613	Ventura Harbor	Ventura	15,151.20	0.041449069	4.1449
741	Avalon	Los Angeles	101.25	0.000276989	0.0277
770	San Pedro	Los Angeles	680.73	0.00186227	0.1862
	Total		365,537.76	1	100.0000

Landings Distribution by Port: Rockfishes

Port	Port Name	County	Value	Percent	Percent
606	Morro Bay	San Luis Obispo	4,023.15	0.11903353	11.9034
608	Oxnard/Channel Islands Harbor	Ventura	1,235.97	0.036568826	3.6569
611	Santa Barbara Harbor	Santa Barbara	28,365.35	0.839249776	83.9250
613	Ventura Harbor	Ventura	174	0.005148164	0.5148
	Total		33,798.46	1	100.0000

Landings Distribution by Port: Prawn

Port	Port Name	County	Value	Percent	Percent
605	Port Hueneme	Ventura	7,760.00	0.04686528	4.6865
608	Oxnard/Channel Islands	Ventura	134,689.00	0.813432701	81.3433
611	Santa Barbara Harbor	Santa Barbara	9,493.00	0.057331457	5.7331
613	Ventura Harbor	Ventura	13,639.00	0.082370562	8.2371
	Total		165,581.00	1	100.0000

APPENDIX C

Table C5. Landings Distribution (Cont.)

Landings Distribution by Port: Crab

Port	Port Name	County	Value	Percent	Percent
608	Oxnard/Channel Islands Harbor	Ventura	5,998.42	0.043971573	4.3972
611	Santa Barbara Harbor	Santa Barbara	129,800.75	0.951507765	95.1508
613	Ventura Harbor	Ventura	616.7	0.004520735	0.4521
	Total		136,415.86	1	100.0000

Landings Distribution by Port: Wetfish

Port	Port Name	County	Value	Percent	Percent
605	Port Hueneme	Ventura	841,713.00	0.84075538	84.0755
608	Oxnard/Channel Islands Harbor	Ventura	3,916.00	0.003911545	0.3912
613	Ventura Harbor	Ventura	330.00	0.000329625	0.0330
592	Moss Landing	Monterey	304.00	0.000303654	0.0304
770	San Pedro	Los Angeles	97,914.00	0.097802603	9.7803
745	Terminal Island	Los Angeles	56,926.00	0.056861235	5.6861
OLA	Other Los Angeles	Los Angeles	36.00	3.5959E-05	0.0036
	Total		1,001,139.00	1	100.0000

Landings Distribution by Port: CA Sheepshead

Port	Port Name	County	Value	Percent	Percent
606	Morro Bay	San Luis Obispo	6.00	0.001630213	0.1630
608	Oxnard/Channel Islands Harbor	Ventura	759.55	0.206371417	20.6371
611	Santa Barbara Harbor	Santa Barbara	901.10	0.244830865	24.4831
613	Ventura Harbor	Ventura	1,518.85	0.412674908	41.2675
770	San Pedro	Los Angeles	495.00	0.134492596	13.4493
	Total		3,680.50	1	100.0000

Landings Distribution by Port: Flatfish

Port	Port Name	County	Value	Percent	Percent
602	Avila/Port San Luis	San Luis Obispo	269.75	0.001598383	0.1598
608	Oxnard/Channel Islands Harbor	Ventura	101,568.10	0.601833859	60.1834
611	Santa Barbara Harbor	Santa Barbara	7,599.45	0.045029949	4.5030
613	Ventura Harbor	Ventura	59,295.05	0.351348196	35.1348
770	San Pedro	Los Angeles	32.00	0.000189614	0.0190
	Total		168,764.35	1	100.0000

Landings Distribution by Port: Sea Cucumbers

Port	Port Name	County	Value	Percent	Percent
608	Oxnard/Channel Islands Harbor	Ventura	48,429.70	0.774335519	77.4336
611	Santa Barbara Harbor	Santa Barbara	13,226.85	0.211482205	21.1482
770	San Pedro	Los Angeles	887.00	0.014182116	1.4182
	Total		62,543.56	1	100.0000

APPENDIX C

Table C5. Landings Distribution (Cont.)

Landings Distribution by Port: Sculpin & Bass

Port	Port Name	County	Value	Percent	Percent
608	Oxnard/Channel Islands Harbor	Ventura	9,952.36	0.522201141	52.2201
613	Ventura Harbor	Ventura	4,127.63	0.216577083	21.6577
770	San Pedro	Los Angeles	4,975.80	0.261080632	26.1081
	Total		19,058.48	1	100.0000

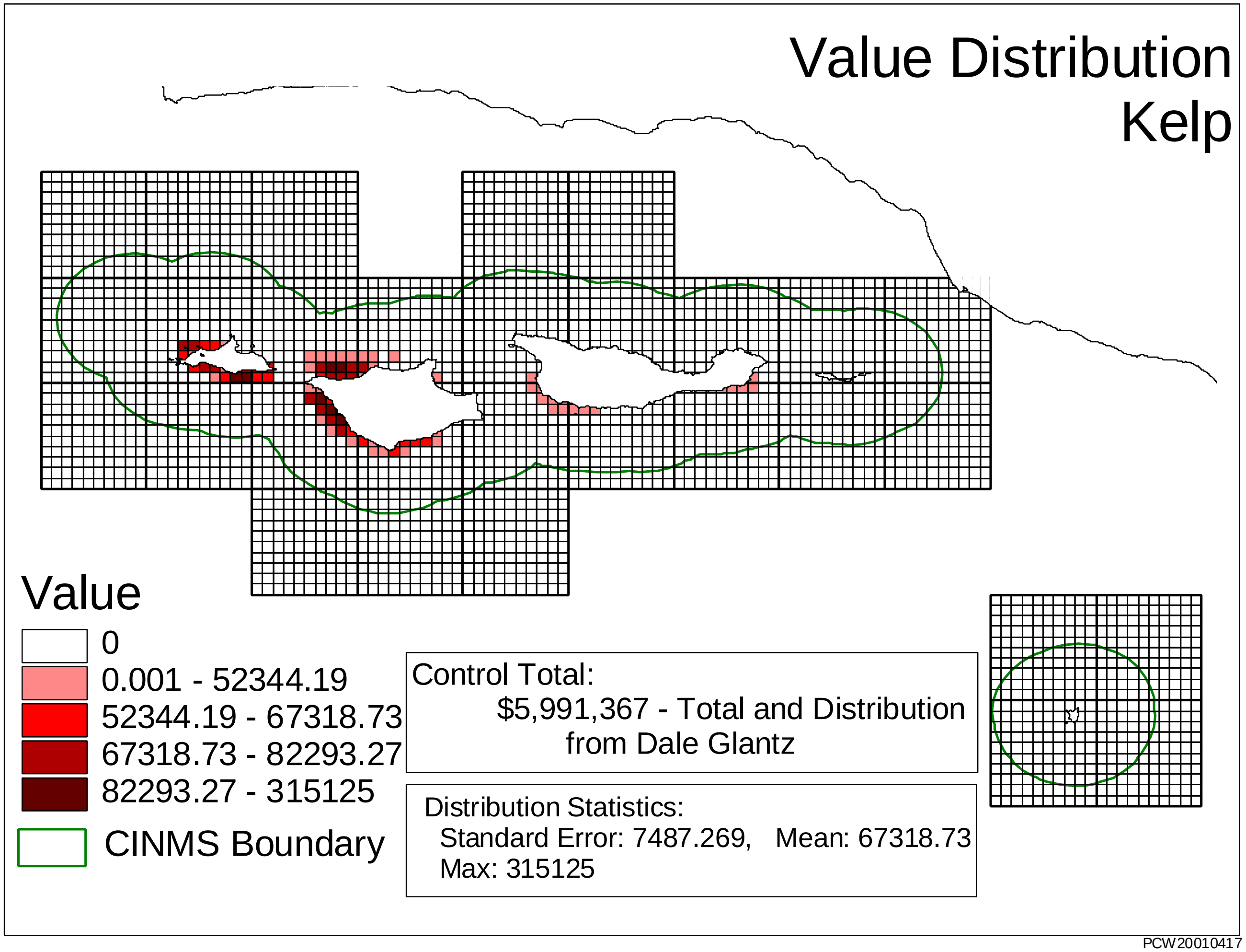
Landings Distribution by Port: Tuna

Port	Port Name	County	Value	Percent	Percent
605	Port Hueneme	Ventura	12,340	0.0314816	3.1482
608	Oxnard/Channel Islands Harbor	Ventura	3,290	0.008393392	0.8393
611	Santa Barbara Harbor	Santa Barbara	1,219	0.003109892	0.3110
613	Ventura Harbor	Ventura	294	0.000750048	0.0750
745	Terminal Island	Los Angeles	337,074	0.859937496	85.9937
748	New Port Beach	Orange	288	0.000734741	0.0735
770	San Pedro	Los Angeles	35,291	0.090033803	9.0034
880	San Diego	San Diego	2,179	0.005559028	0.5559
	Total		391,975	1	100.0000

Landings Distribution by Port: Sharks

Port	Port Name	County	Value	Percent	Percent
602	Avila/Port San Luis	San Luis Obispo	19	0.000714685	0.0715
608	Oxnard/Channel Islands Harbor	Ventura	13,175.60	0.495599987	49.5600
613	Ventura Harbor	Ventura	5,639.15	0.212116539	21.2117
745	Terminal Island	Los Angeles	6,910.00	0.259919542	25.9920
770	San Pedro	Los Angeles	787.4	0.029618039	2.9618
880	San Diego	San Diego	54	0.002031209	0.2031
	Total		26585.15	1	100.0000

APPENDIX C



Value Distribution
Kelp
Value
0
0.001 - 52344.19
52344.19 - 67318.73
67318.73 - 82293.27
82293.27 - 315125
CINMS Boundary
Control Total:
$5,991,367 - Total and Distribution
from Dale Glantz
Distribution Statistics:
Standard Error: 7487.269, Mean: 67318.73
Max: 315125
PCW20010417

APPENDIX C

POPULATION

Squid in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	169	100.00	26,545,014	100.00
GE $500,000	18	10.65	12,237,494	46.10
GE $100,000	69	40.83	24,241,115	91.32
GE $50,000	84	49.70	25,371,366	95.58
GE $20,000	108	63.91	26,148,240	98.51
LT $20,000	61	36.09	396,774	1.49
LT $10,000	45	26.63	178,302	0.67
LT $5,000	27	15.98	47,588	0.18
LT $1,000	10	5.92	4,319	0.02

SAMPLE

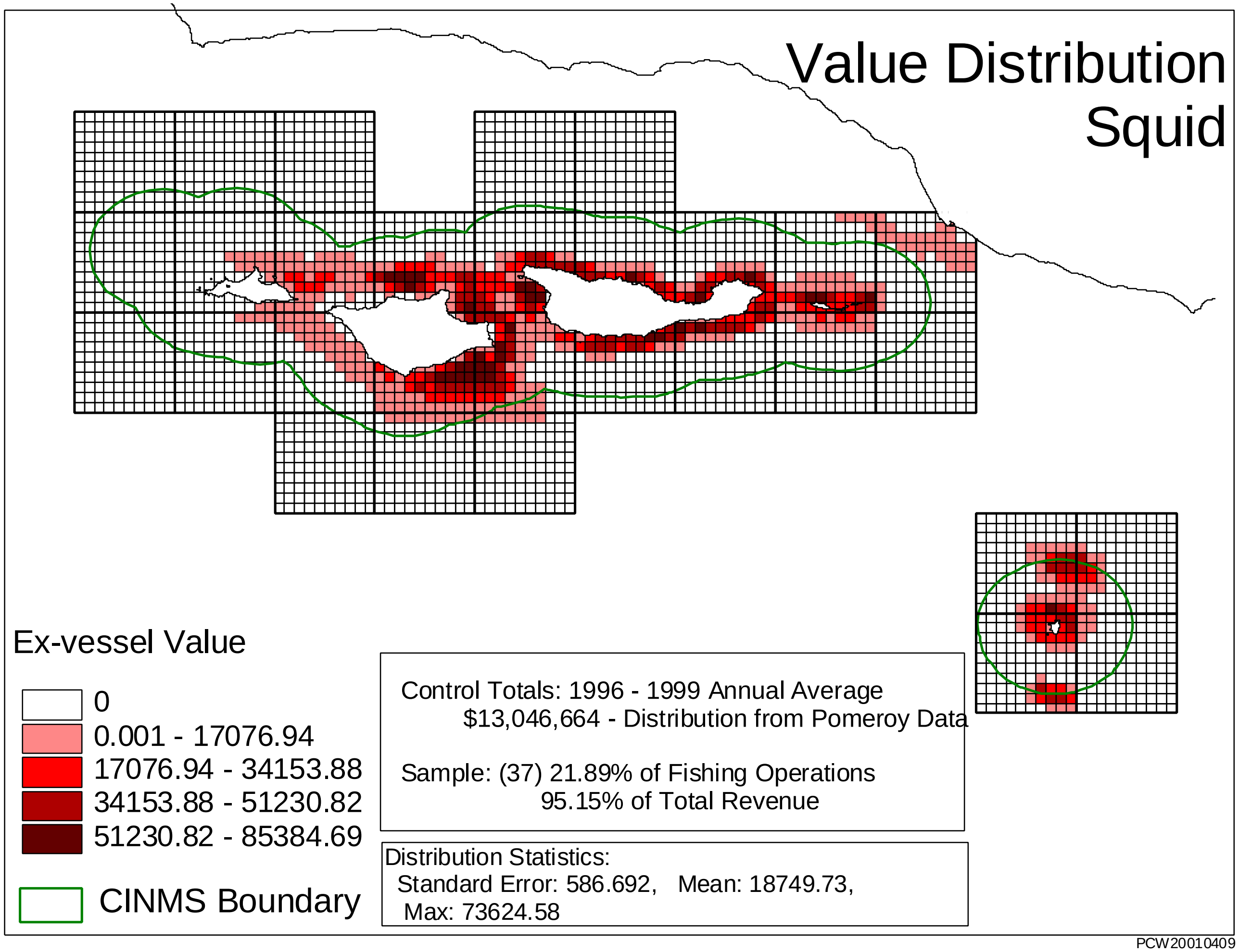
Squid in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	32	100.00	16,280,048	100.00
GE $500,000	17	53.13	13,100,449	80.47
GE $100,000	28	87.50	16,177,748	99.37
GE $50,000	29	90.63	16,275,110	99.97
GE $20,000	29	90.63	16,275,110	99.97
LT $20,000	4	12.50	4,938	0.03
LT $10,000	4	12.50	4,938	0.03
LT $5,000	4	12.50	4,938	0.03
LT $1,000	1	3.13	632	0.00

Sample is 21.89% of the squid fishing operations in CINMS and accounts for 95.15% of total squid revenue from the CINMS. Does not include revenue from four light boats in sample. Light boats get 20 percent of the revenue of the boats they provide lighting services.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C



Value Distribution
Squid
Ex-vessel Value
0
0.001 - 17076.94
17076.94 - 34153.88
34153.88 - 51230.82
51230.82 - 85384.69
CINMS Boundary
Control Totals: 1996 - 1999 Annual Average
$13,046,664 - Distribution from Pomeroy Data
Sample: (37) 21.89% of Fishing Operations
95.15% of Total Revenue
Distribution Statistics:
Standard Error: 586.692, Mean: 18749.73,
Max: 73624.58
PCW20010409

APPENDIX C

POPULATION

Wetfish in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	37	100.00	605,259	100.00
GE $50,000	4	10.81	396,316	65.48
GE $20,000	7	18.92	501,242	82.81
GE $10,000	10	27.03	544,952	90.04
GE $5,000	16	43.24	581,537	96.08
GE $1,000	24	64.86	603,299	99.68
LT $1,000	13	35.14	1,959	0.32
LT $500	12	32.43	1,425	0.24

SAMPLE

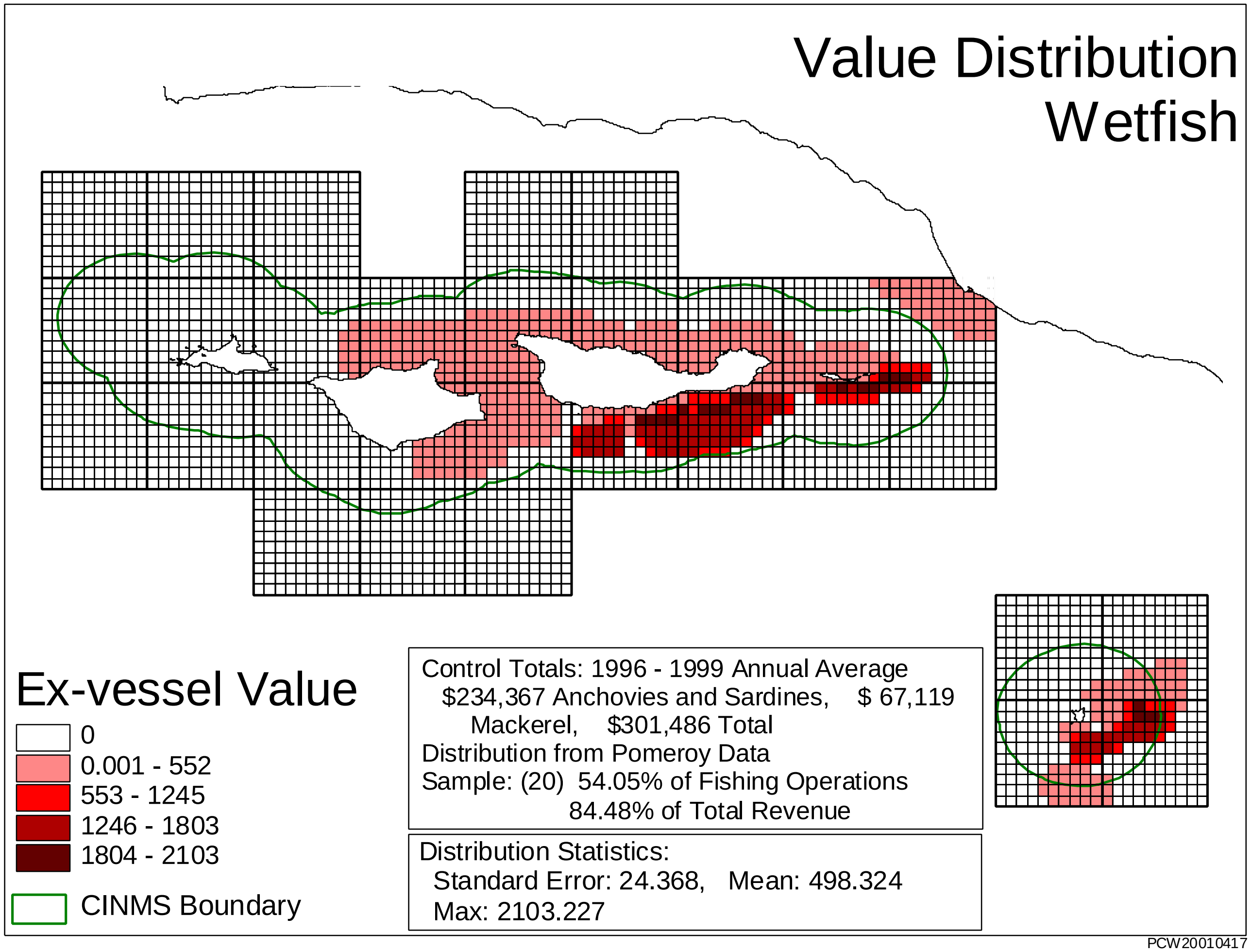
Wetfish in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	13	100.00	351,034	100.00
GE $50,000	2	15.38	275,031	78.35
GE $20,000	3	23.08	308,943	88.01
GE $10,000	4	30.77	319,843	91.11
GE $5,000	8	61.54	347,925	99.11
GE $1,000	9	69.23	349,892	99.67
LT $1,000	4	30.77	1,142	0.33
LT $500	3	23.08	587	0.17

Sample is 54.05% of wetfish fishing operations in the CINMS and accounts for 84.48% of the wetfish revenues from the CINMS. Wetfish are caught by the squid fishermen as they are often referred to as the squid/wetfish fleet.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C



Value Distribution
Wetfish
Ex-vessel Value
0
0.001 - 552
553 - 1245
1246 - 1803
1804 - 2103
CINMS Boundary
Control Totals: 1996 - 1999 Annual Average
$234,367 Anchovies and Sardines, $ 67,119
Mackerel, $301,486 Total
Distribution from Pomeroy Data
Sample: (20) 54.05% of Fishing Operations
84.48% of Total Revenue
Distribution Statistics:
Standard Error: 24.368, Mean: 498.324
Max: 2103.227
PCW20010417

APPENDIX C

POPULATION

Tuna in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	19	100.00	53,693	100.00
GE $10,000	2	10.53	39,270	73.14
GE $5,000	3	15.79	45,231	84.24
GE $1,000	7	36.84	50,662	94.36
LT $1,000	12	63.16	3,031	5.64
LT $500	9	47.37	1,358	2.53

SAMPLE

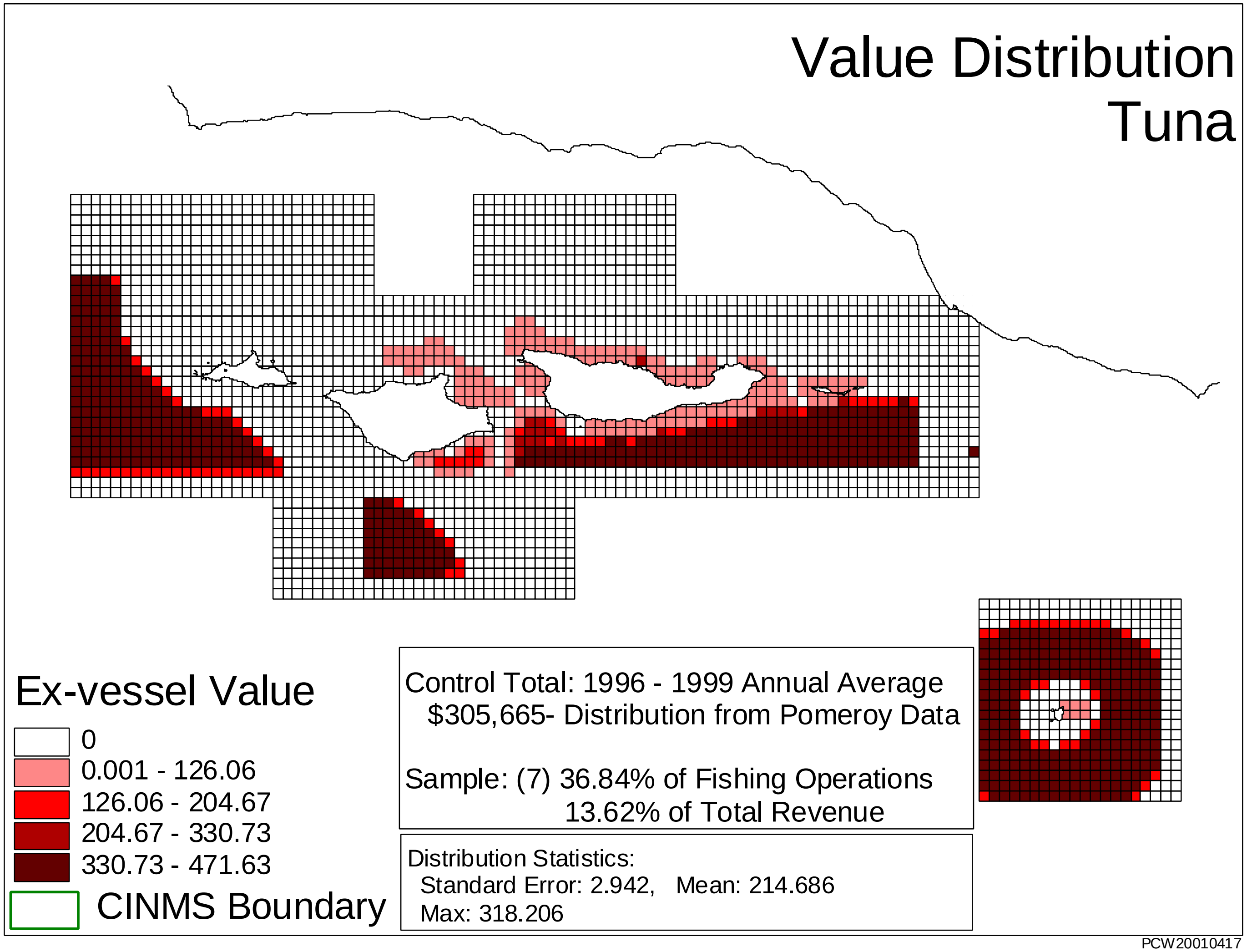
Tuna in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	4	100.00	4,181	100.00
GE $10,000	0	0.00	0	0.00
GE $5,000	0	0.00	0	0.00
GE $1,000	2	50.00	3,831	91.63
LT $1,000	2	50.00	350	8.37
LT $500	2	50.00	350	8.37

Sample is 36.84% of tuna fishing operations in the CINMS and accounts for 13.62% of the tuna revenues from the CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C



Value Distribution
Tuna
Ex-vessel Value
0
0.001 - 126.06
126.06 - 204.67
204.67 - 330.73
330.73 - 471.63
CINMS Boundary
Control Total: 1996 - 1999 Annual Average
$305,665- Distribution from Pomeroy Data
Sample: (7) 36.84% of Fishing Operations
13.62% of Total Revenue
Distribution Statistics:
Standard Error: 2.942, Mean: 214.686
Max: 318.206
PCW20010417

APPENDIX C

POPULATION

Urchins in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	331	100.00	5,969,017	100.00
GE $50,000	27	8.16	1,842,302	30.86
GE $40,000	53	16.01	3,028,599	50.74
GE $30,000	83	25.08	4,070,498	68.19
GE $20,000	111	33.53	4,774,826	79.99
GE $10,000	157	47.43	5,422,317	90.84
LT $10,000	174	52.57	546,699	9.16
LT $5,000	127	38.37	203,041	3.40
LT $1,000	61	18.43	35,721	0.60

SAMPLE

Urchins in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	40	100.00	1,620,154	100.00
GE $50,000	12	30.00	881,097	54.38
GE $40,00	18	45.00	1,149,884	70.97
GE $30,000	25	62.50	1,400,589	86.45
GE $20,000	29	72.50	1,502,880	92.76
GE $10,000	35	87.50	1,592,466	98.29
LT $10,000	5	12.50	27,688	1.71
LT $5,000	2	5.00	1,918	0.12
LT $1,000	1	2.50	543	0.03

Sample is 12.08% of all urchin fishing operations in CINMS and account for 27.17% of all urchin revenue from CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

Spiny Lobster in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	46	100.00	950,748	100.00
GE $50,000	7	15.22	475,993	50.07
GE $40,000	9	19.57	564,677	59.39
GE $30,000	14	30.43	741,798	78.02
GE $20,000	16	34.78	785,227	82.59
GE $10,000	22	47.83	874,524	91.98
LT $10,000	24	52.17	76,223	8.02
LT $5,000	18	39.13	28,607	3.01
LT $1,000	10	21.74	3,708	0.39

SAMPLE

Spiny Lobster in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	8	100.00	365,538	100.00
GE $50,000	3	37.50	247,226	67.63
GE $40,000	5	62.50	335,910	91.89
GE $30,000	5	62.50	335,910	91.89
GE $20,000	5	62.50	335,910	91.89
GE $10,000	7	87.50	361,112	98.79
LT $10,000	1	12.50	4,426	1.21
LT $5,000	1	12.50	4,426	1.21
LT $1,000	0	0.00	0	0.00

Sample is 17.39% of spiny lobster fishing operations in the CINMS and account for 38.36% of spiny lobster revenue from CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

Rockfishes in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	128	100.00	553,260	100.00
GE $50,000	1	0.78	154,300	27.89
GE $40,000	2	1.56	197,605	35.72
GE $30,000	3	2.34	231,151	41.78
GE $20,000	9	7.03	376,742	68.09
GE $10,000	10	7.81	393,077	71.05
LT $10,000	118	92.19	160,183	28.95
LT $5,000	106	82.81	72,092	13.03
LT $1,000	82	64.06	17,401	3.15

SAMPLE

Rockfishes in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	10	100.00	33,798	100.00
GE $50,000	0	0.00	0	0.00
GE $40,00	0	0.00	0	0.00
GE $30,000	0	0.00	0	0.00
GE $20,000	1	10.00	27,649	81.81
GE $10,000	1	10.00	27,649	81.81
LT $10,000	9	90.00	6,149	18.19
LT $5,000	9	90.00	6,149	18.19
LT $1,000	5	50.00	470	1.39

Sample is 7.81% of rockfish fishing operations in CINMS and accounts for 6.15% of rockfish revenues from the CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

Prawn in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	30	100.00	725,404	100.00
GE $50,000	5	16.67	421,453	58.10
GE $40,000	6	20.00	466,052	64.25
GE $30,000	9	30.00	576,109	79.42
GE $20,000	10	33.33	597,794	82.41
GE $10,000	17	56.67	698,507	96.29
LT $10,000	13	43.33	26,897	3.71
LT $5,000	11	36.67	13,693	1.89
LT $1,000	6	20.00	2,273	0.31

Barilotti Sample only contained three Prawn fishermen. CDFG 10 by 10 mile block data was distributed according to 1 by 1 mile blocks using Exclusion Zone maps provided by the fishermen. Data from block 690 was distributed to 1 by 1 mile blocks contained in blocks 690, 671 and 672 of the Exclusion Zone maps. Data from block 711 was distributed to to 1 by 1 mile blocks contained in blocks 711 and 730. The CDFG blocks around Santa Barbara Island showed low levels of catch, but the fishermen did not include any 1 by 1 mile blocks in the Exclusion Zone maps for this area.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

Crab in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	71	100.00	313,320	100.00
GE $20,000	5	7.04	209,805	66.96
GE $10,000	8	11.27	243,501	77.72
GE $5,000	14	19.72	280,081	89.39
GE $1,000	23	32.39	300,912	96.04
LT $1,000	48	67.61	12,408	3.96
LT $500	40	56.34	7,126	2.27

SAMPLE

Crab in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	12	100.00	136,416	100.00
GE $20,000	3	25.00	128,456	94.16
GE $10,000	3	25.00	128,456	94.16
GE $5,000	4	33.33	133,936	98.18
GE $1,000	5	41.67	135,162	99.08
LT $1,000	7	58.33	1,254	0.92
LT $500	6	50.00	750	0.55

Sample is 16.90% of crab fishing operations in CINMS and accounts for 43.54% of the crab fishing revenue from the CINMS. The Barilotti Sample did not include any information from fishermen catching crabs for the eastern half of the study area. CDFG data show a relatively low amount of crabs being caught from the eastern half. CDFG 10 by 10 mile grid totals were apportioned to 1 by 1 mile blocks within three miles from shorelines within the CDFG blocks. Block 706 contained $70.50 but contains no blocks within three miles from shore.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

CA Sheephead in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	92	100.00	153,140	100.00
GE $20,000	2	2.17	70,298	45.90
GE $10,000	4	4.35	95,393	62.29
GE $5,000	6	6.52	111,802	73.01
LT $5,000	86	93.48	41,338	26.99
LT $1,000	75	81.52	19,261	12.58
LT $500	63	68.48	10,445	6.82

SAMPLE

CA Sheephead in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	13	100.00	3,680	100.00
GE $20,000	0	0.00	0	0.00
GE $10,000	0	0.00	0	0.00
GE $5,000	0	0.00	0	0.00
LT $5,000	13	100.00	3,680	100.00
LT $1,000	12	92.31	2,666	72.45
LT $500	10	76.92	1,858	50.49

Sample is 14.13% of sheephead fishing operations in the CINMS but only accounts for 2.40% of sheephead revenue from the CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

Flatfishes in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	85	100.00	323,568	100.00
GE $50,000	3	3.53	213,068	65.85
GE $10,000	6	7.06	249,009	76.96
GE $5,000	9	10.59	274,809	84.93
GE $1,000	22	25.88	305,708	94.48
LT $1,000	63	74.12	17,860	5.52
LT $500	50	58.82	8,045	2.49

SAMPLE

Flatfishes in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	8	100.00	168,764	100.00
GE $50,000	2	25.00	158,385	93.85
GE $10,000	2	25.00	158,385	93.85
GE $5,000	3	37.50	167,499	99.25
GE $1,000	3	37.50	167,499	99.25
LT $1,000	5	62.50	1,265	0.75
LT $500	4	50.00	741	0.44

Sample is 9.41% of flatfish fishing operations in CINMS and accounts for 51.98% of the flatfish revenues from the CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

Sea Cucumbers in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	61	100.00	269,017	100.00
GE $20,000	3	4.92	99,855	37.12
GE $10,000	8	13.11	169,185	62.89
GE $5,000	16	26.23	226,574	84.22
GE $1,000	30	49.18	259,491	96.46
LT $1,000	31	50.82	9,526	3.54
LT $500	26	42.62	6,235	2.32

SAMPLE

Sea Cucumbers in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	11	100.00	62,544	100.00
GE $20,000	0	0.00	0	0.00
GE $10,000	2	18.18	31,760	50.78
GE $5,000	5	45.45	55,143	88.17
GE $1,000	7	63.64	60,337	96.47
LT $1,000	4	36.36	2,207	3.53
LT $500	2	18.18	779	1.25

Sample is 18.03% of Sea Cucumber fishing operations in the CINMS and accounts for 23.45% of the Sea Cucumber revenue from the CINMS. Urchin divers are the primary harvesters of Sea Cucumbers.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

Sculpin & Bass in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	43	100.00	103,379	100.00
GE $10,000	3	6.98	59,177	57.24
GE $5,000	5	11.63	73,413	71.01
GE $1,000	15	34.88	96,541	93.39
LT $1,000	28	65.12	6,838	6.61
LT $500	25	58.14	4,758	4.60

SAMPLE

Sculpin & Bass in the Channel Islands National Marine Sanctuary - 22 block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	5	100.00	19,058	100.00
GE $10,000	0	0.00	0	0.00
GE $5,000	1	20.00	8,037	42.17
GE $1,000	4	80.00	11,021	57.83
LT $1,000	0	0.00	0	0.00
LT $500	0	0.00	0	0.00

Sample is 11.63% of Sculpin & Bass fishing operations in CINMS and accounts for 21.52% of Sculpin & Bass revenue from the CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

APPENDIX C

POPULATION

Sharks in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	40	100.00	41,948	100.00
GE $10,000	1	2.50	14,080	33.57
GE $2,000	7	17.50	29,074	69.31
GE $1,000	12	30.00	36,007	85.84
LT $1,000	28	70.00	5,940	14.16
LT $500	25	62.50	3,751	8.94

SAMPLE

Sharks in Channel Islands National Marine Sanctuary - 22 Block Definition

Value	Number of Fishing Operations	Percent of Fishing Operations	Sum of 1999 Ex Vessel Value	Percent of 1999 Ex Vessel Value
GT $0	6	100.00	18,220	100.00
GE $10,000	1	16.67	14,081	77.28
GE $2,000	1	16.67	14,081	77.28
GE $1,000	3	50.00	17,241	94.63
LT $1,000	3	50.00	979	5.37
LT $500	2	33.33	467	2.56

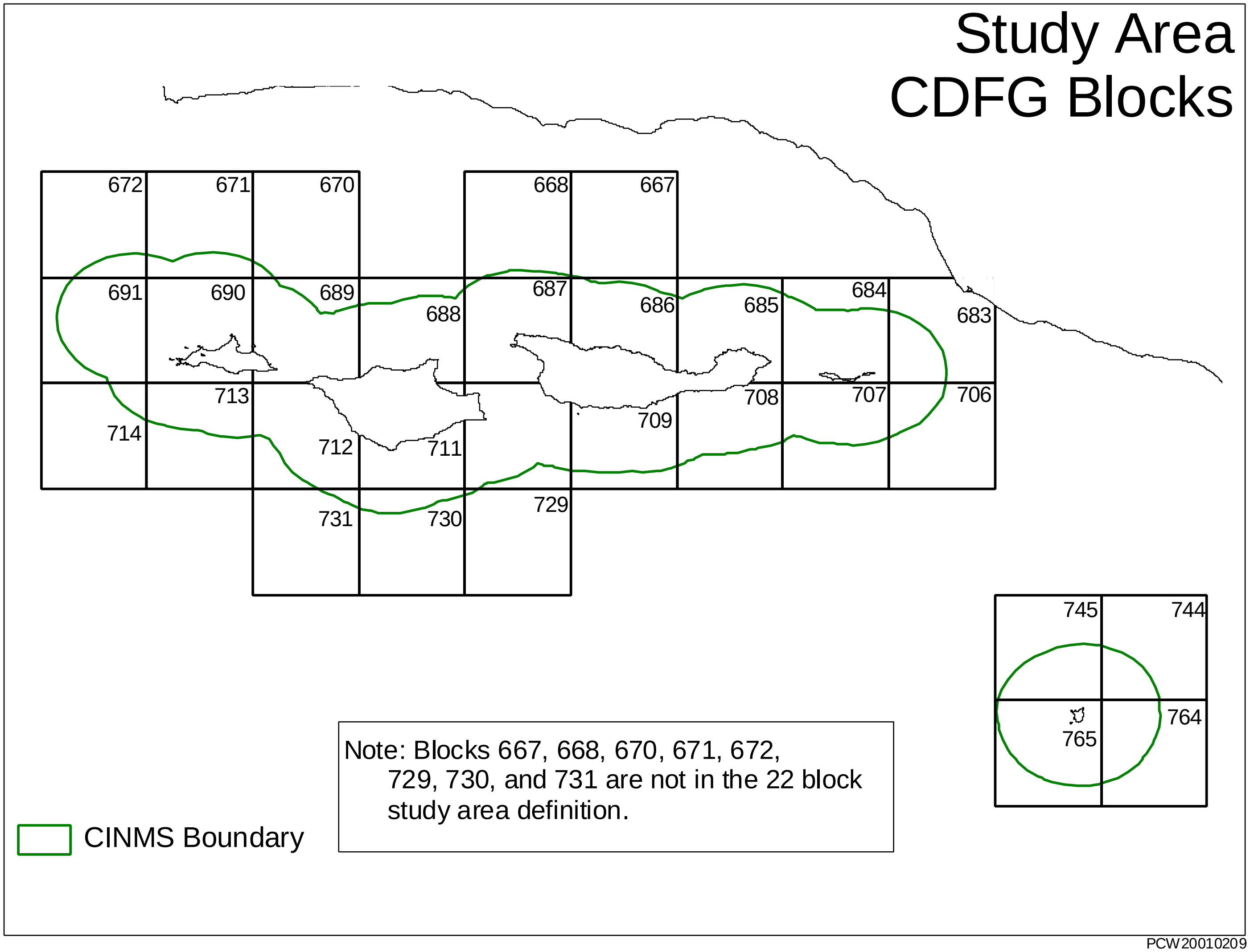
Sample is 15.0% of shark fishing operations in CINMS and accounts for 43.76% of shark revenues from the CINMS.

GT stands for Greater Than.
GE stands for Greater than or Equal to.
LT stands for Less Than.
LE stands for Less than or Equal to.

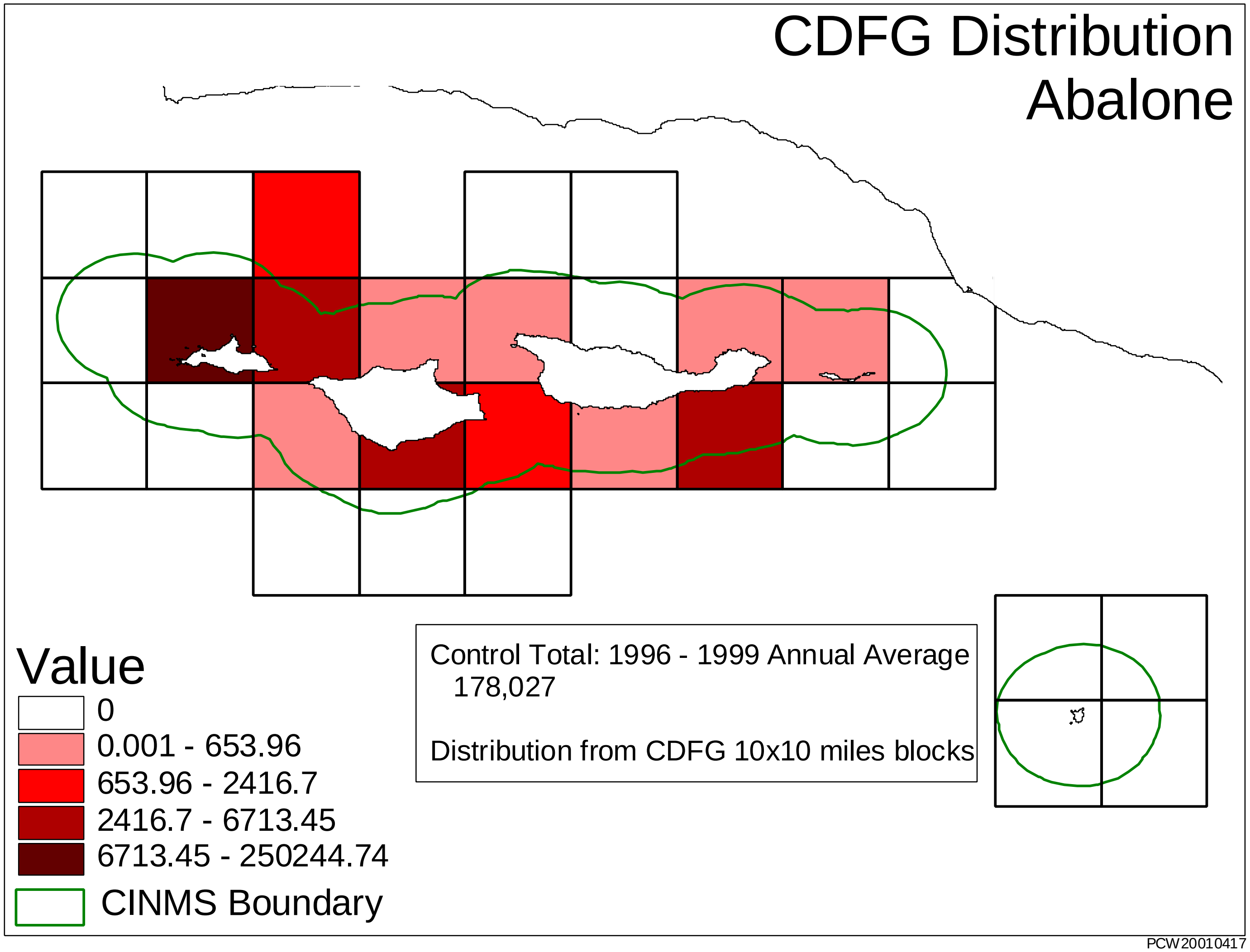
APPENDIX C

Species/Species Group	1996-1999 Avg. Value	Percent of CINMS
Abalone	178,027	0.878273
Swordfish	39,090	0.192845
Roundfish	33,262	0.164094
Other	22,990	0.113418
Yellowtail	6,891	0.033996
Shrimp	5,813	0.028678
Mussels, Snails	4,694	0.023157
Salmon	1,411	0.006961
Rays & Skates	1,164	0.005742
Surf Perch	695	0.003429
Grenadiers	211	0.001041
Octopus	196	0.000967
Total	294,444	1.452601
Total, Excluding Abalone	116,417	0.574328

APPENDIX C

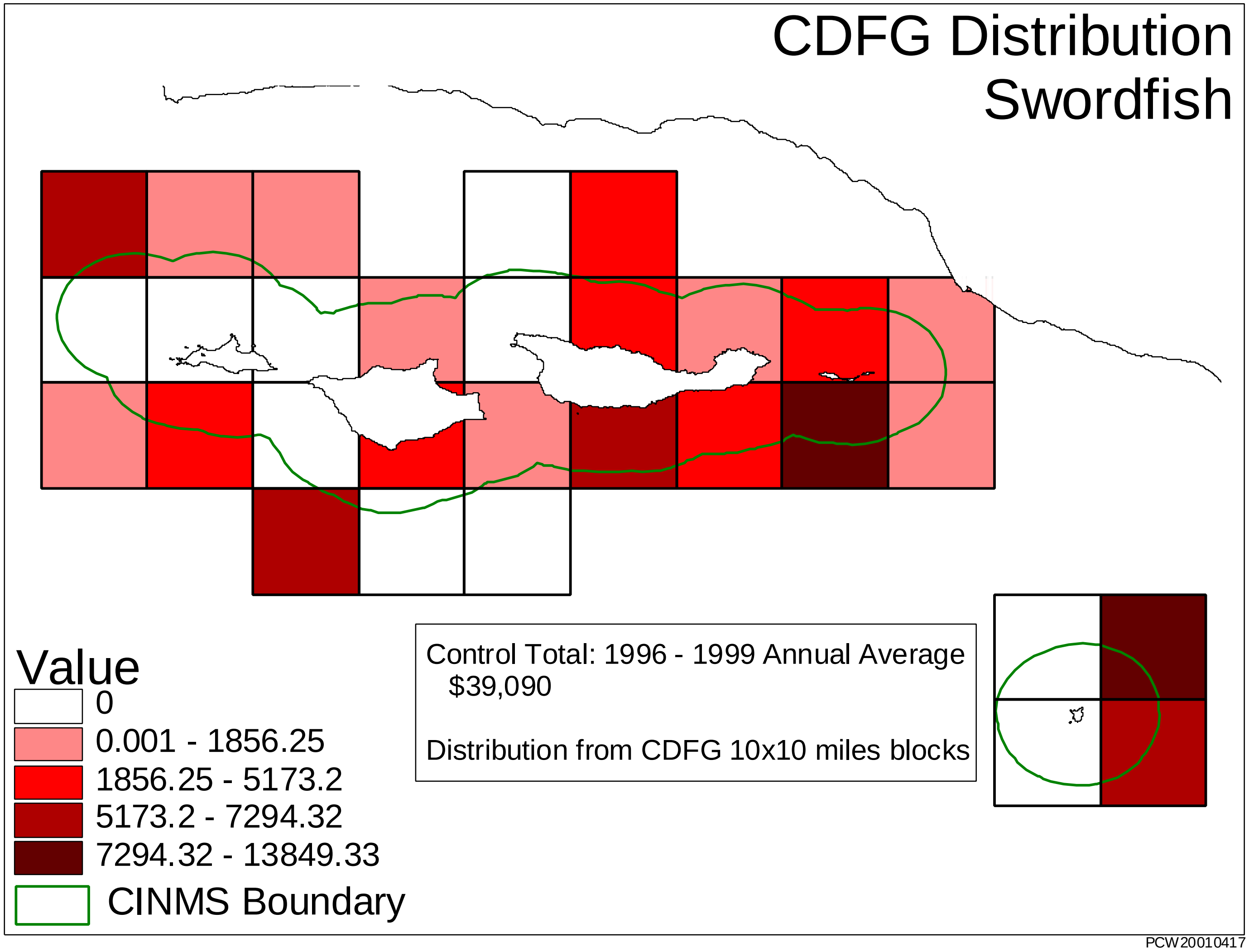

Study Area
CDFG Blocks
672
671
670
668
667
691
690
689
688
687
686
685
684
683
714
713
712
711
709
708
707
706
731
730
729
745
744
765
764
Note: Blocks 667, 668, 670, 671, 672, 729, 730, and 731 are not in the 22 block study area definition.
CINMS Boundary
PCW20010209

APPENDIX C

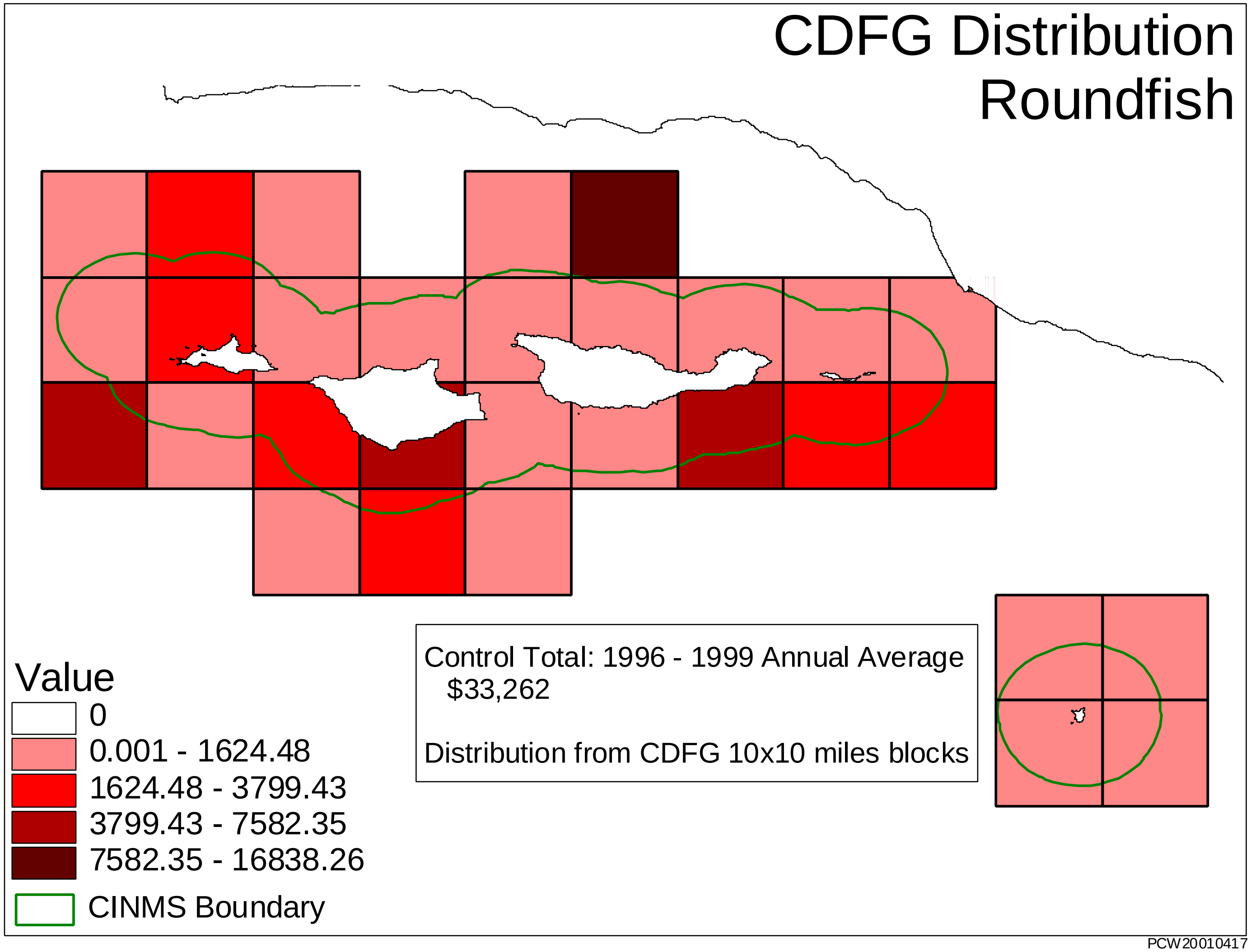


CDFG Distribution
Abalone
Value
0
0.001 - 653.96
653.96 - 2416.7
2416.7 - 6713.45
6713.45 - 250244.74
CINMS Boundary
Control Total: 1996 - 1999 Annual Average
178,027
Distribution from CDFG 10x10 miles blocks
PCW20010417

APPENDIX C

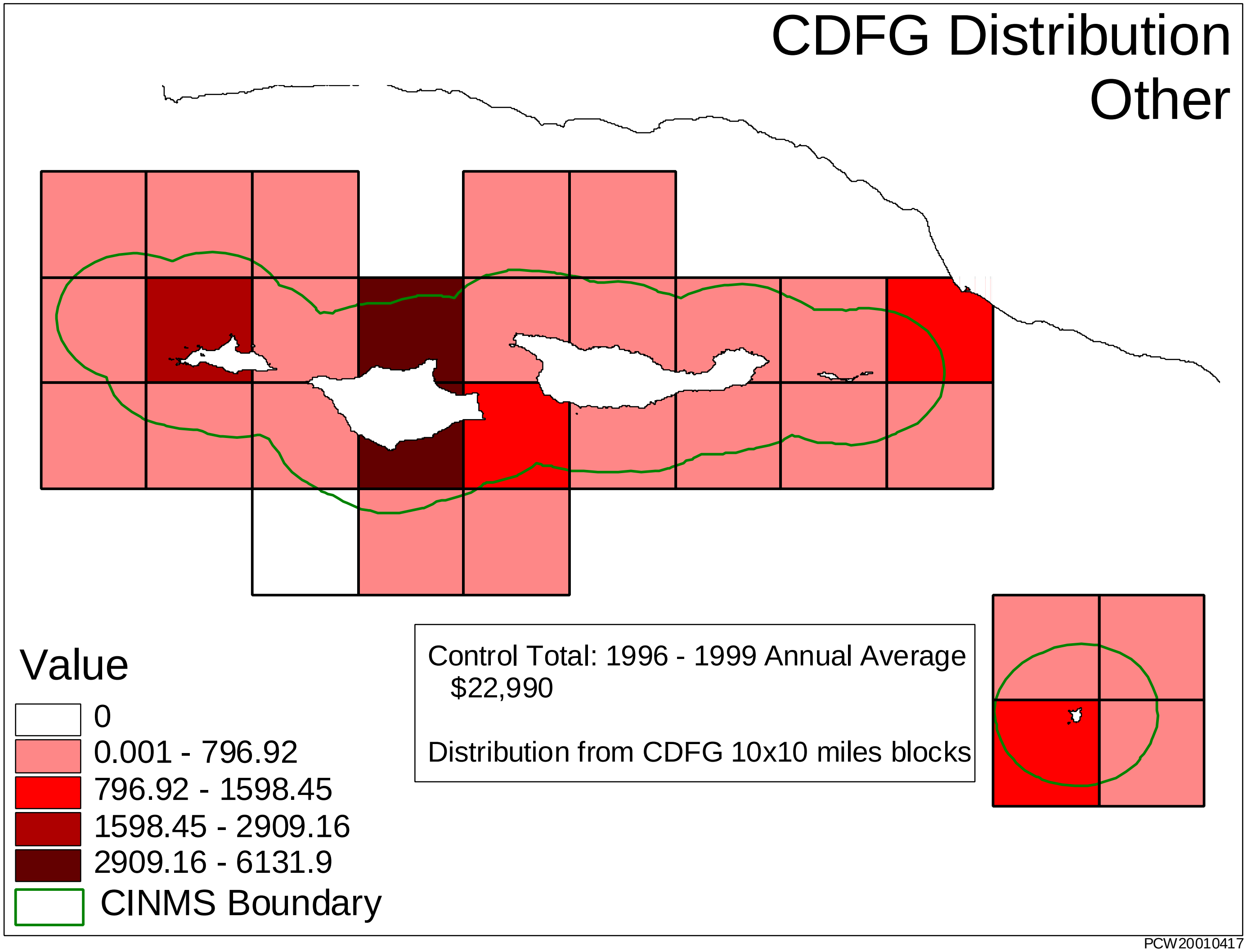

CDFG Distribution
Swordfish
Value
0
0.001 - 1856.25
1856.25 - 5173.2
5173.2 - 7294.32
7294.32 - 13849.33
CINMS Boundary
Control Total: 1996 - 1999 Annual Average
$39,090
Distribution from CDFG 10x10 miles blocks
PCW20010417

APPENDIX C

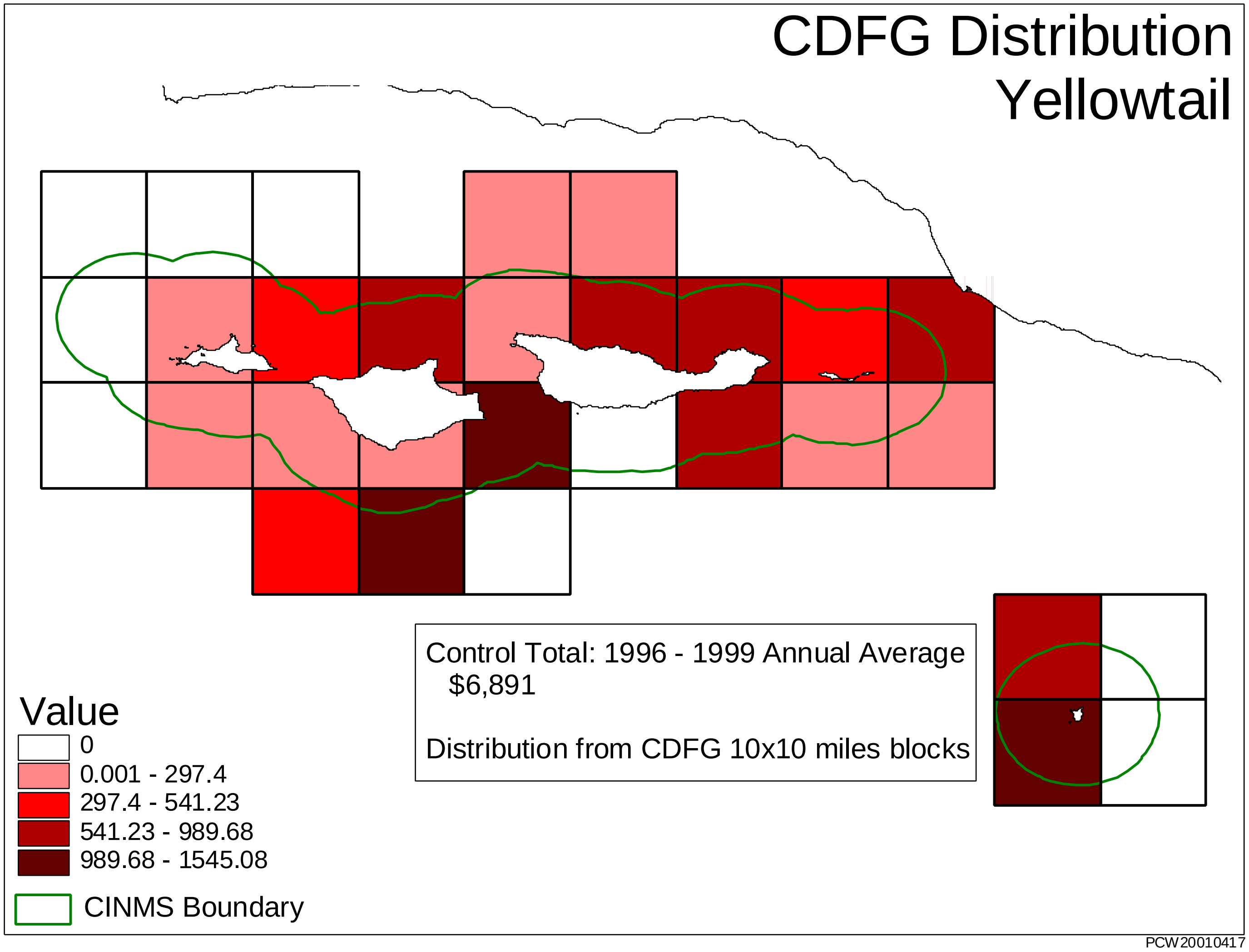


CDFG Distribution
Roundfish
Control Total: 1996 - 1999 Annual Average
$33,262
Distribution from CDFG 10x10 miles blocks
Value
0
0.001 - 1624.48
1624.48 - 3799.43
3799.43 - 7582.35
7582.35 - 16838.26
CINMS Boundary
PCW20010417

APPENDIX C

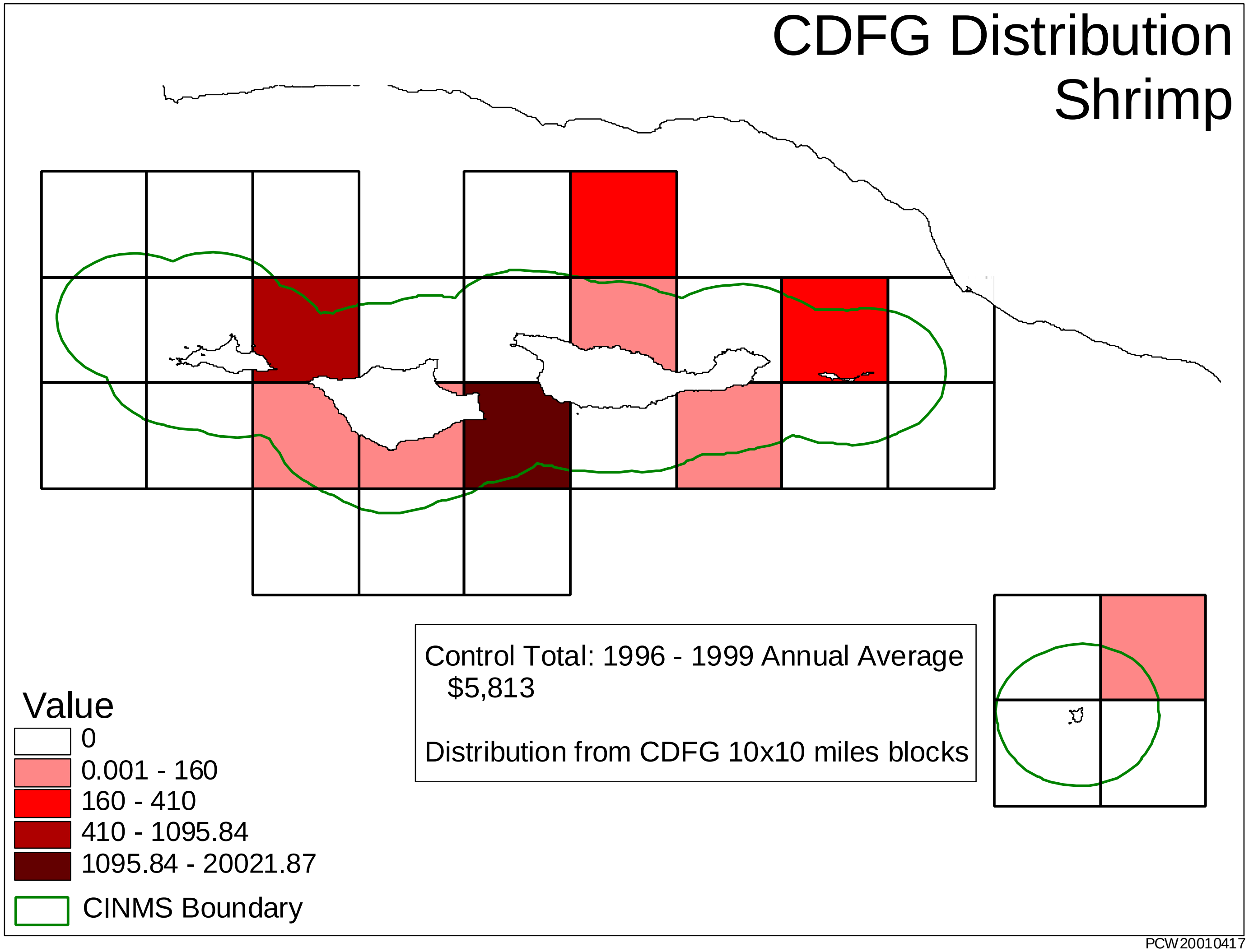

CDFG Distribution
Other
Value
0
0.001 - 796.92
796.92 - 1598.45
1598.45 - 2909.16
2909.16 - 6131.9
CINMS Boundary
Control Total: 1996 - 1999 Annual Average
$22,990
Distribution from CDFG 10x10 miles blocks
PCW20010417

APPENDIX C

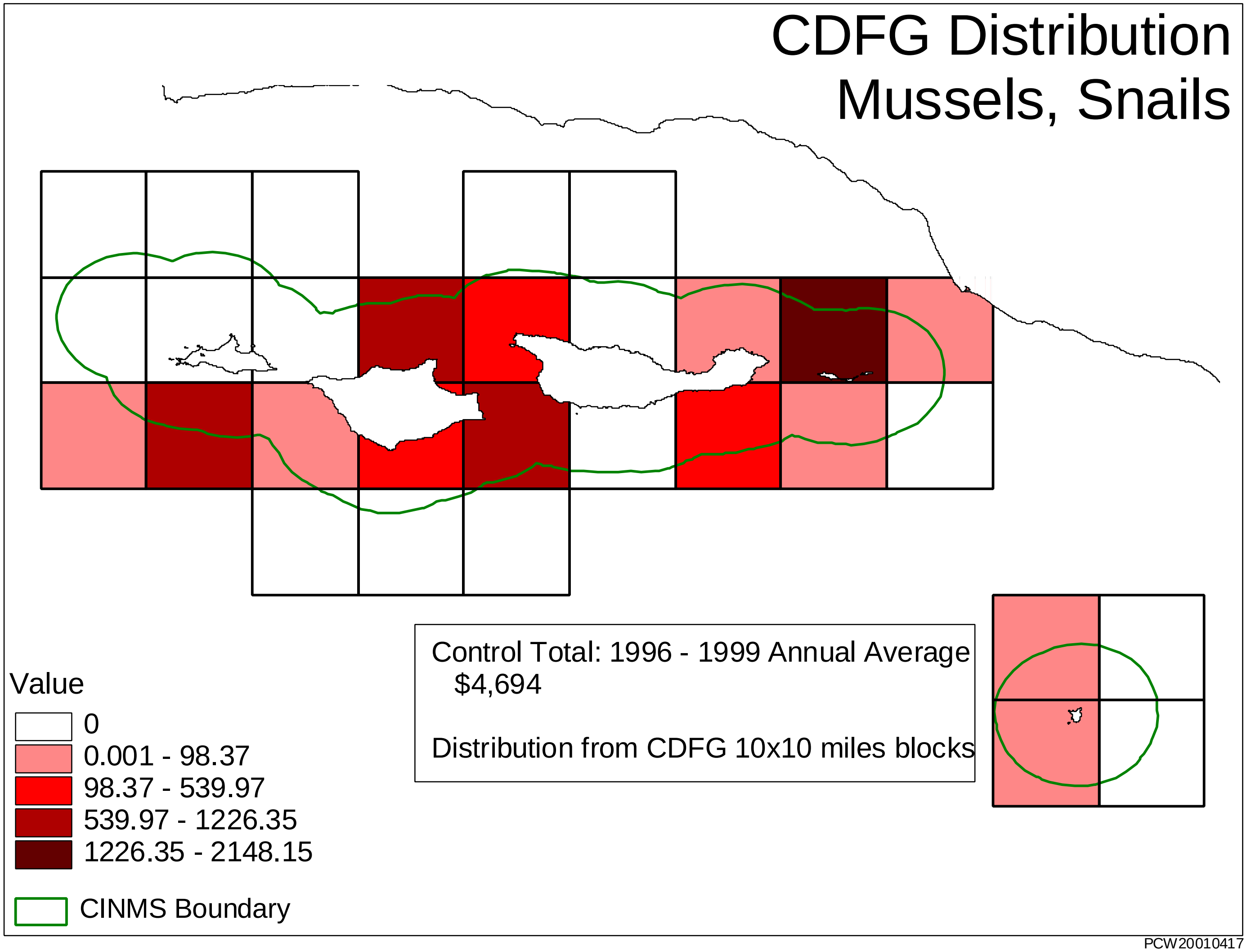


CDFG Distribution
Yellowtail
Control Total: 1996 - 1999 Annual Average
$6,891
Distribution from CDFG 10x10 miles blocks
Value
0
0.001 - 297.4
297.4 - 541.23
541.23 - 989.68
989.68 - 1545.08
CINMS Boundary
PCW20010417

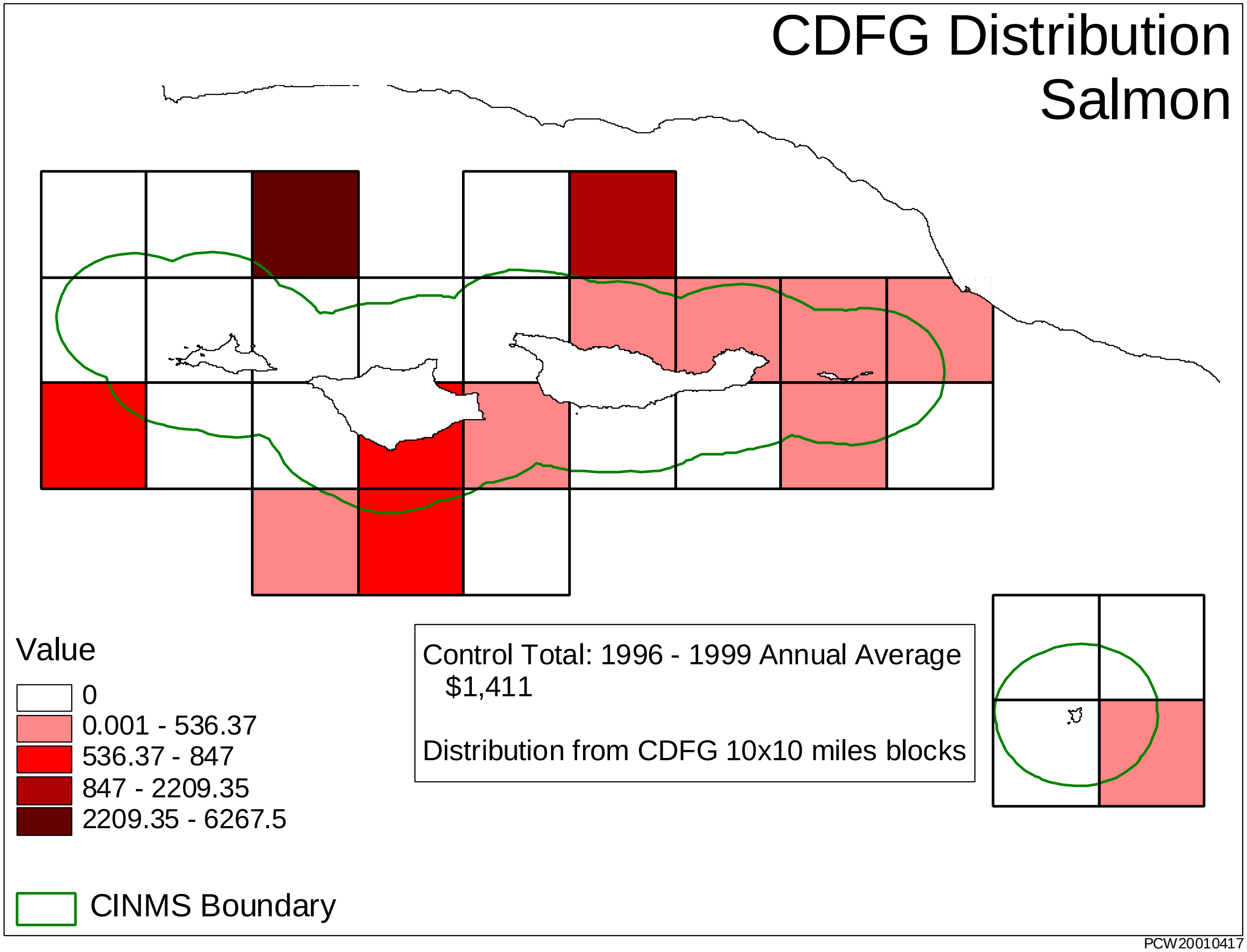
APPENDIX C


CDFG Distribution
Shrimp
Control Total: 1996 - 1999 Annual Average
$5,813
Distribution from CDFG 10x10 miles blocks
Value
0
0.001 - 160
160 - 410
410 - 1095.84
1095.84 - 20021.87
CINMS Boundary
PCW20010417

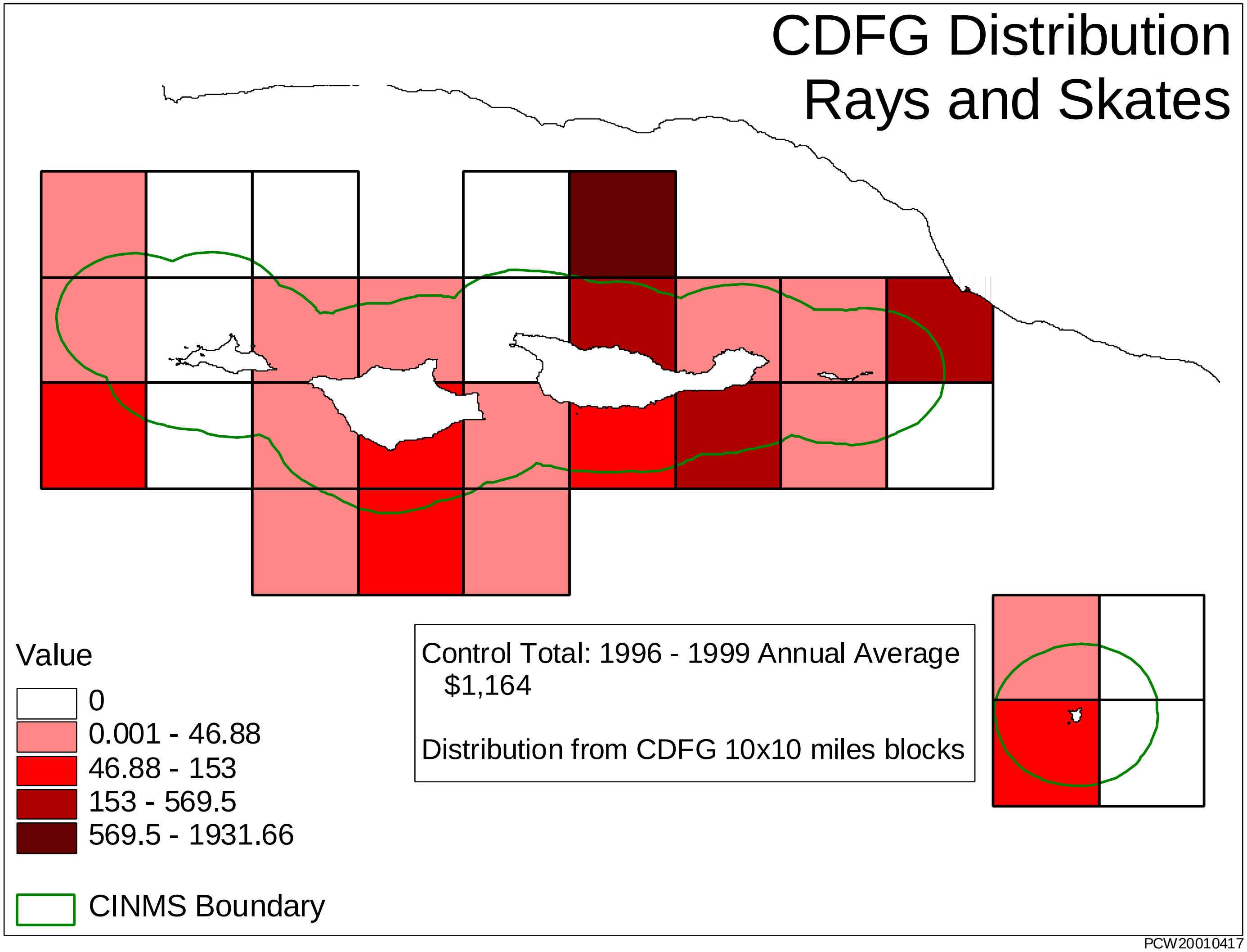
APPENDIX C



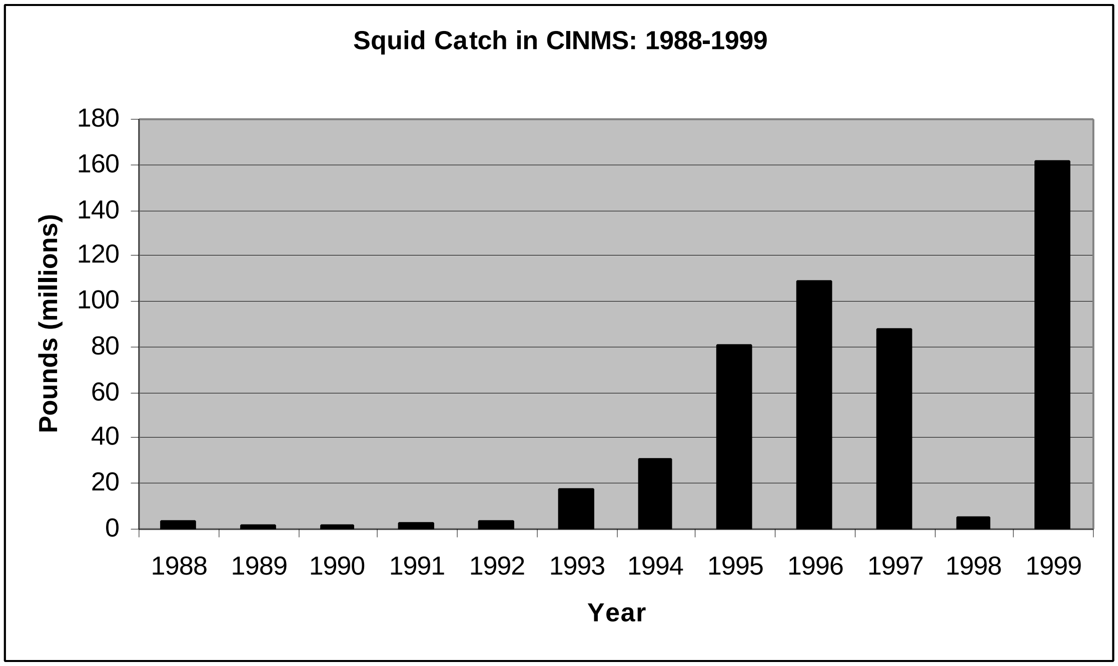
CDFG Distribution
Mussels, Snails
Control Total: 1996 - 1999 Annual Average
$4,694
Distribution from CDFG 10x10 miles blocks
Value
0
0.001 - 98.37
98.37 - 539.97
539.97 - 1226.35
1226.35 - 2148.15
CINMS Boundary
PCW20010417

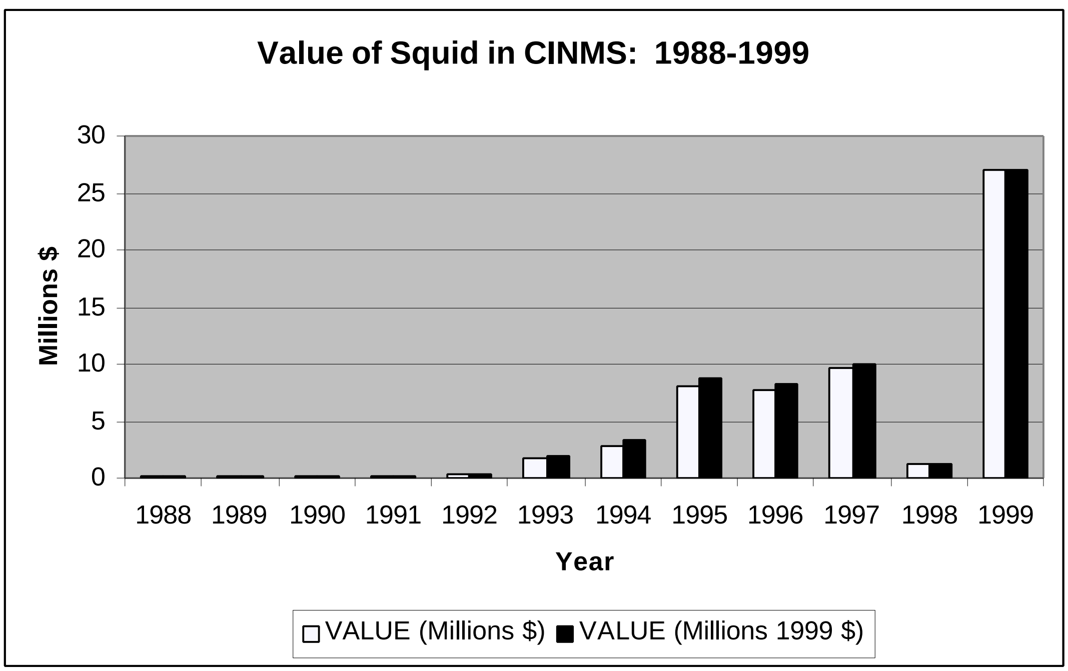

CDFG Distribution
Salmon
Value
0
0.001 - 536.37
536.37 - 847
847 - 2209.35
2209.35 - 6267.5
CINMS Boundary
Control Total: 1996 - 1999 Annual Average
$1,411
Distribution from CDFG 10x10 miles blocks
PCW20010417

APPENDIX C

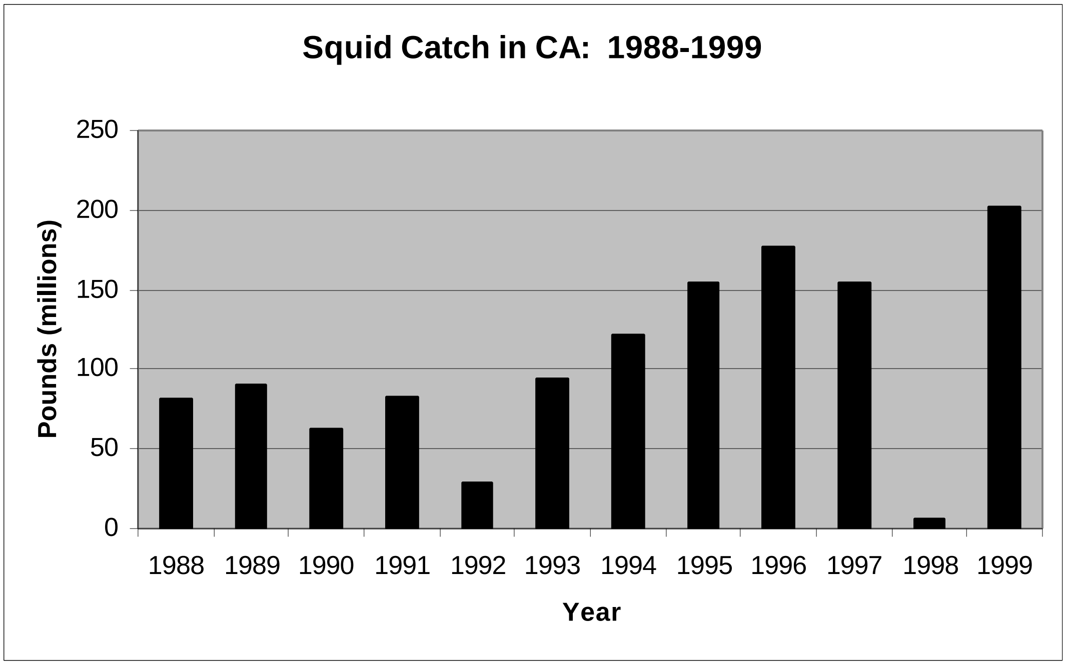

CDFG Distribution
Rays and Skates
Value
0
0.001 - 46.88
46.88 - 153
153 - 569.5
569.5 - 1931.66
CINMS Boundary
Control Total: 1996 - 1999 Annual Average
$1,164
Distribution from CDFG 10x10 miles blocks
PCW20010417

APPENDIX C

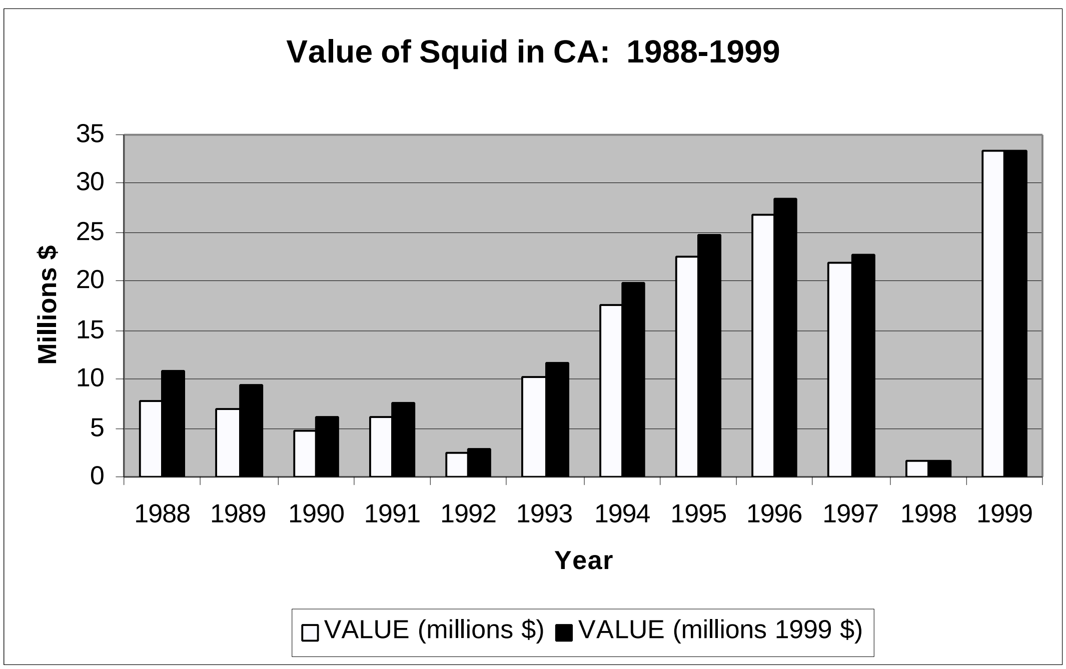

Squid Catch in CINMS: 1988-1999
Pounds (millions)
180
160
140
120
100
80
60
40
20
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year


Value of Squid in CINMS: 1988-1999
Millions $
30
25
20
15
10
5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (Millions $)
VALUE (Millions 1999 $)

APPENDIX C

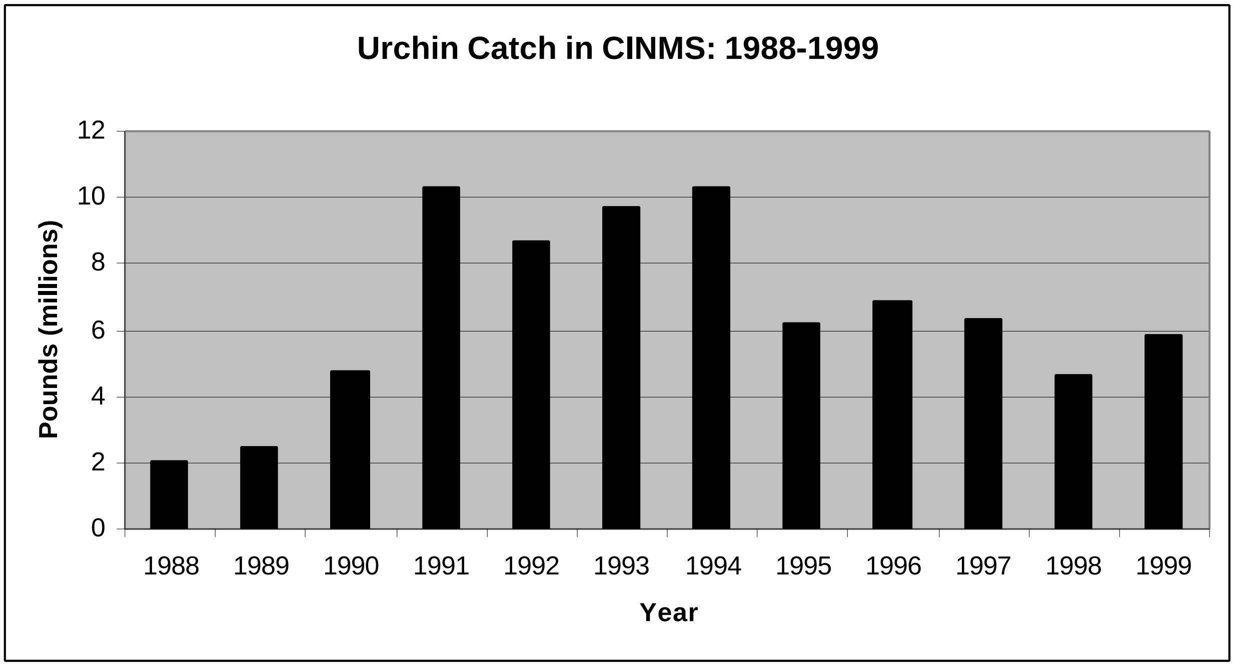


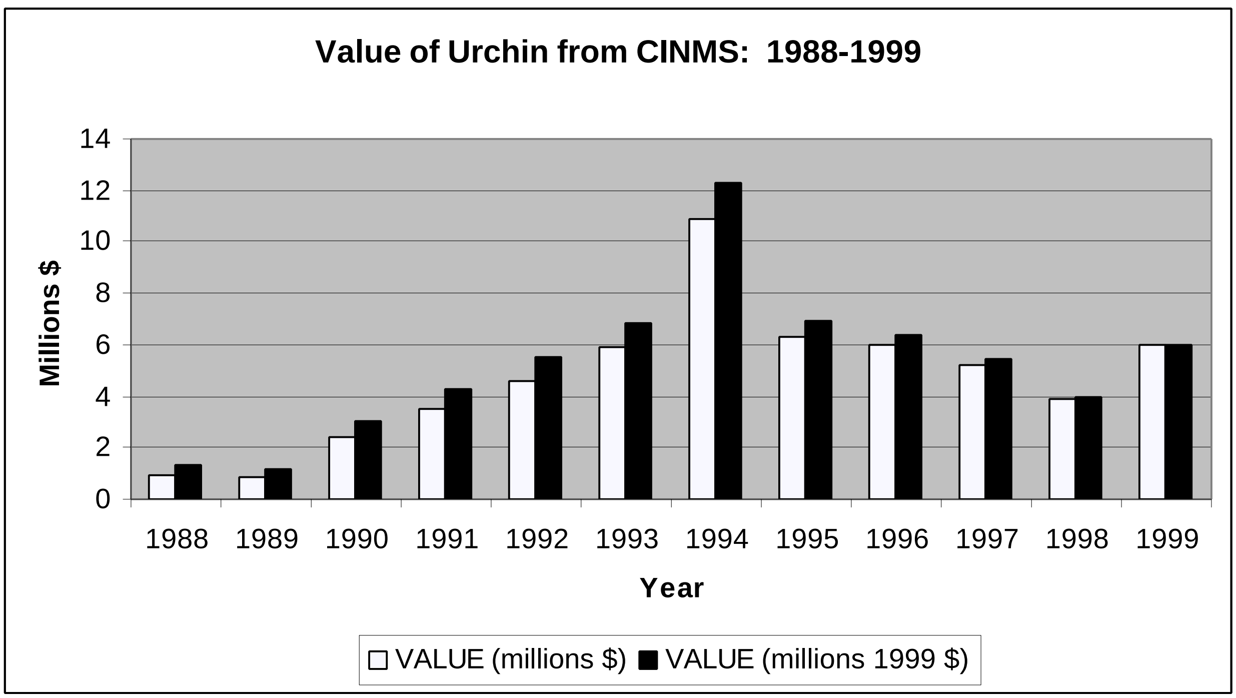
Squid Catch in CA: 1988-1999
250
200
150
100
50
0
Pounds (millions)
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year



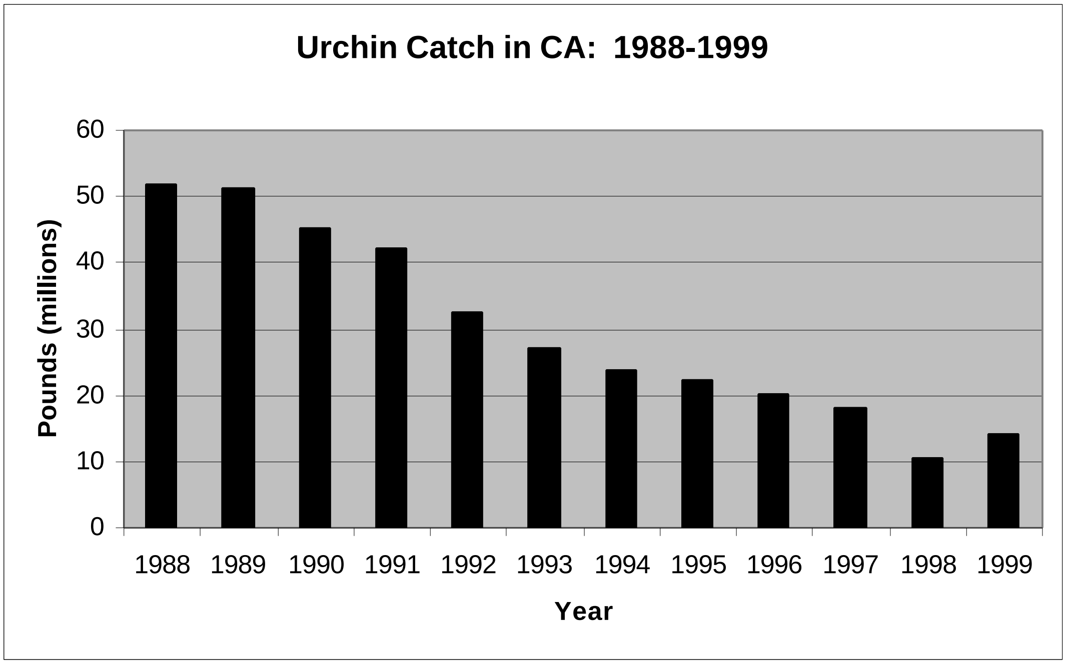
Value of Squid in CA: 1988-1999
35
30
25
20
15
10
5
0
Millions $
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

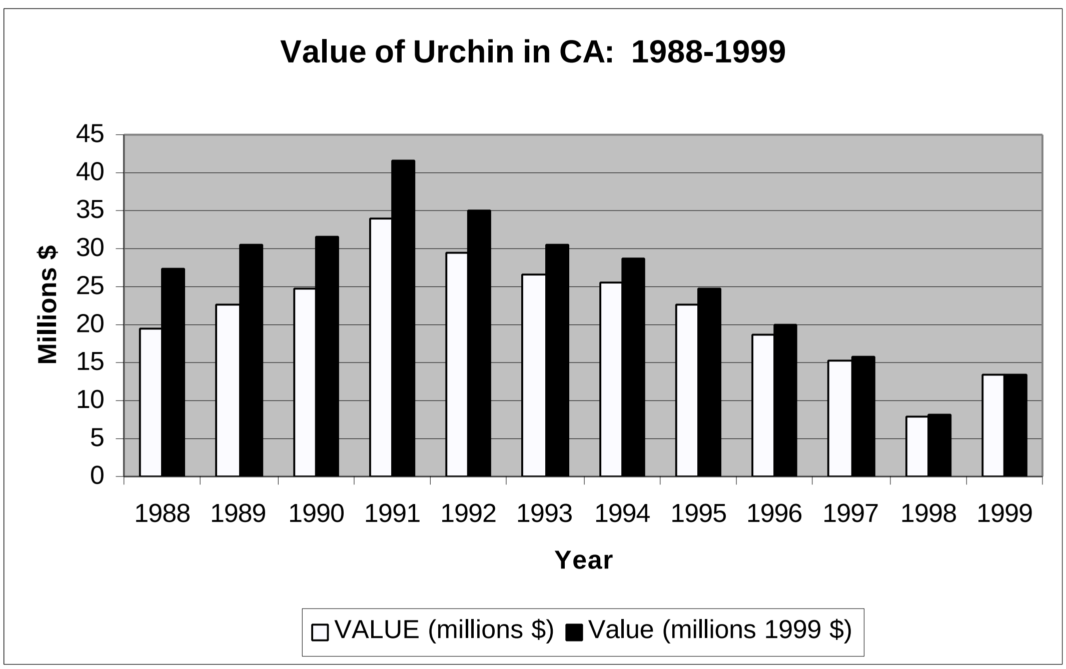
APPENDIX C


Urchin Catch in CINMS: 1988-1999
Pounds (millions)
0
2
4
6
8
10
12
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year

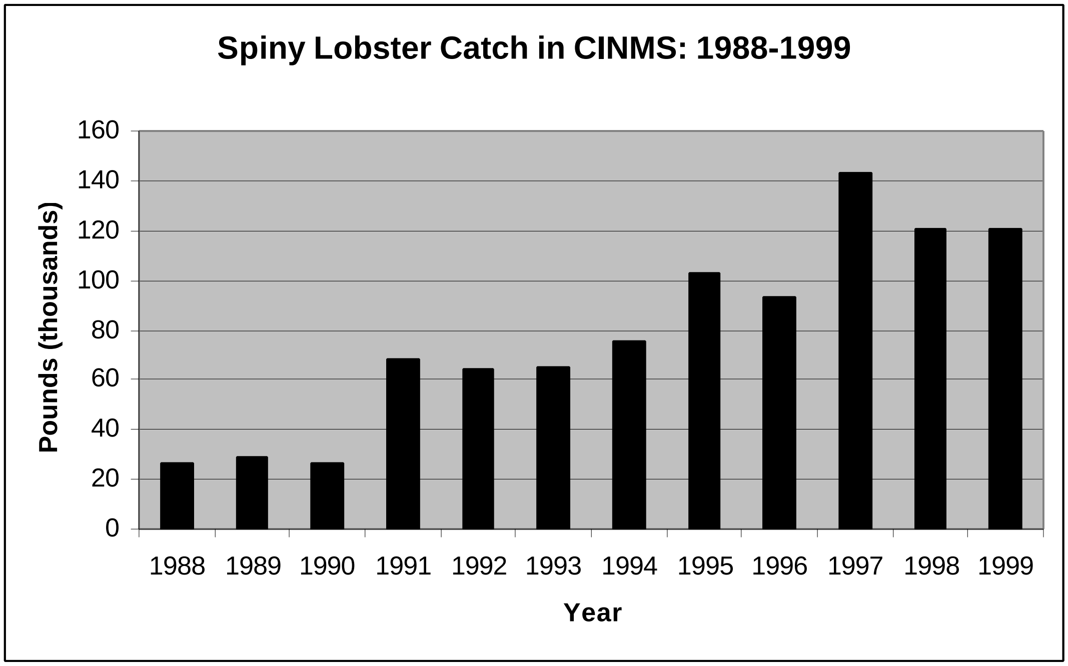

Value of Urchin from CINMS: 1988-1999
Millions $
0
2
4
6
8
10
12
14
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C

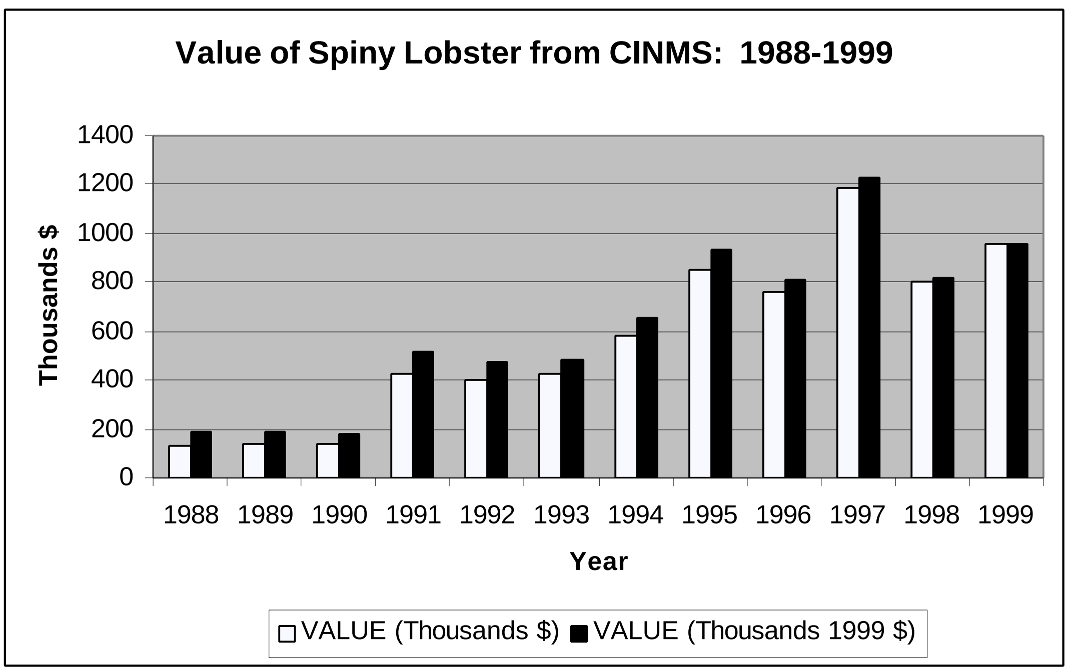

Urchin Catch in CA: 1988-1999
Pounds (millions)
0
10
20
30
40
50
60
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year


Value of Urchin in CA: 1988-1999
Millions $
0
5
10
15
20
25
30
35
40
45
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (millions $)
Value (millions 1999 $)

APPENDIX C

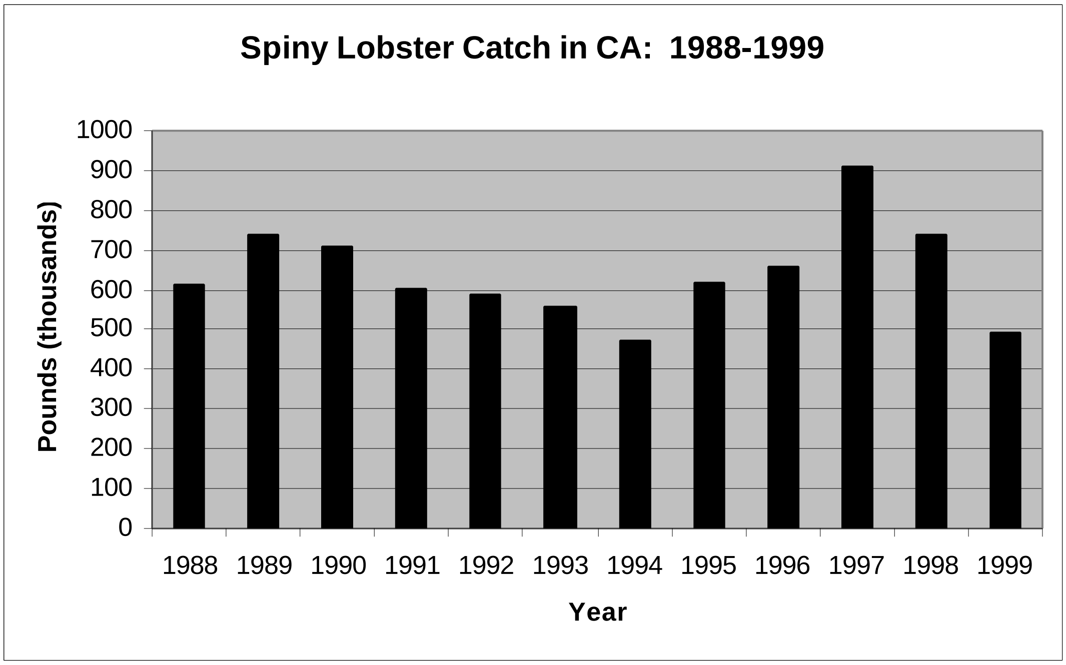


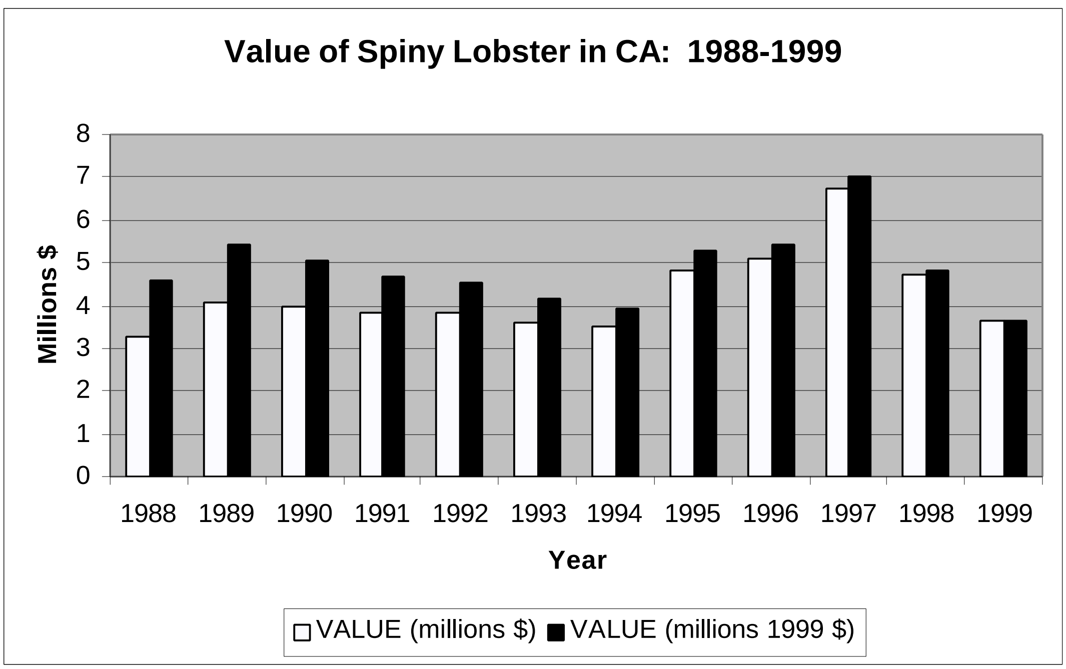
Spiny Lobster Catch in CINMS: 1988-1999
Pounds (thousands)
0
20
40
60
80
100
120
140
160
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year



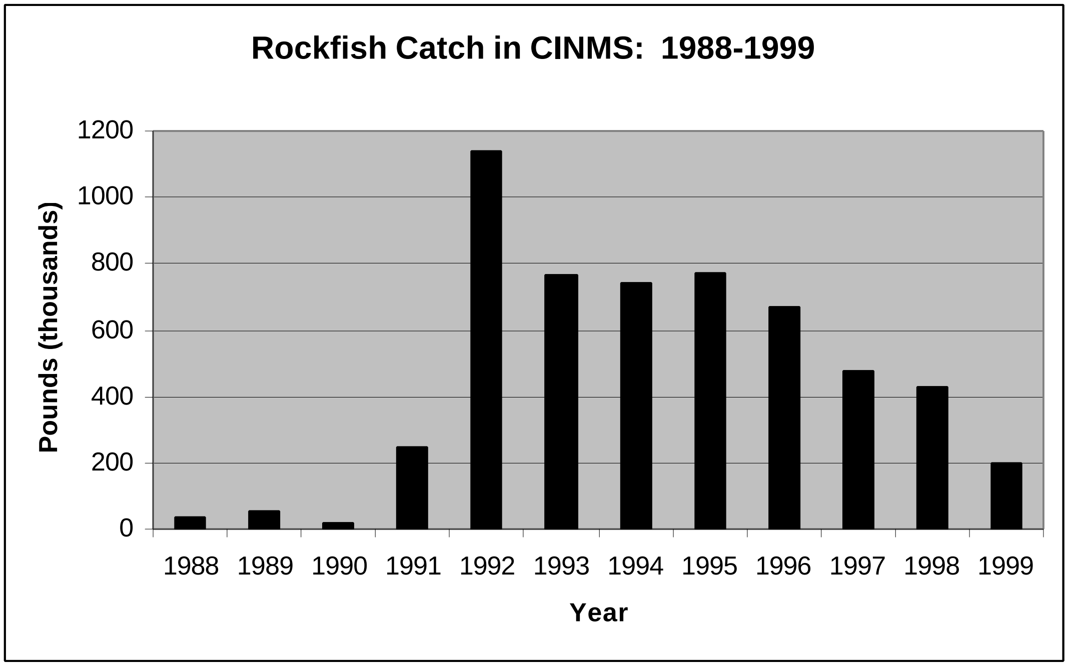
Value of Spiny Lobster from CINMS: 1988-1999
Thousands $
0
200
400
600
800
1000
1200
1400
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (Thousands $)
VALUE (Thousands 1999 $)

APPENDIX C

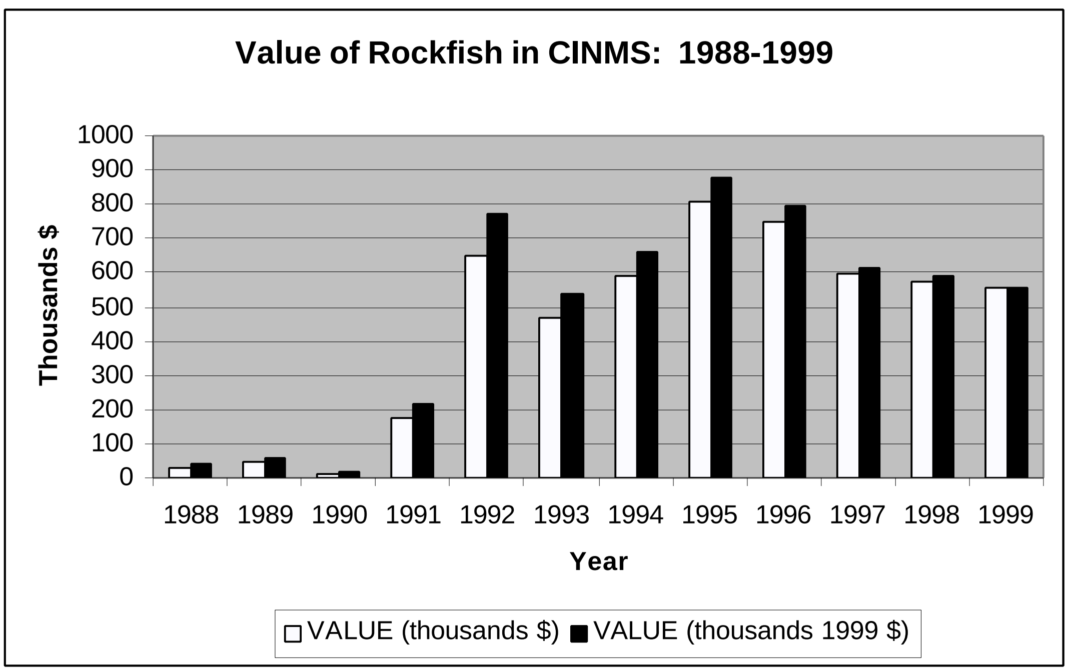

Spiny Lobster Catch in CA: 1988-1999
Pounds (thousands)
1000
900
800
700
600
500
400
300
200
100
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year


Value of Spiny Lobster in CA: 1988-1999
Millions $
8
7
6
5
4
3
2
1
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C

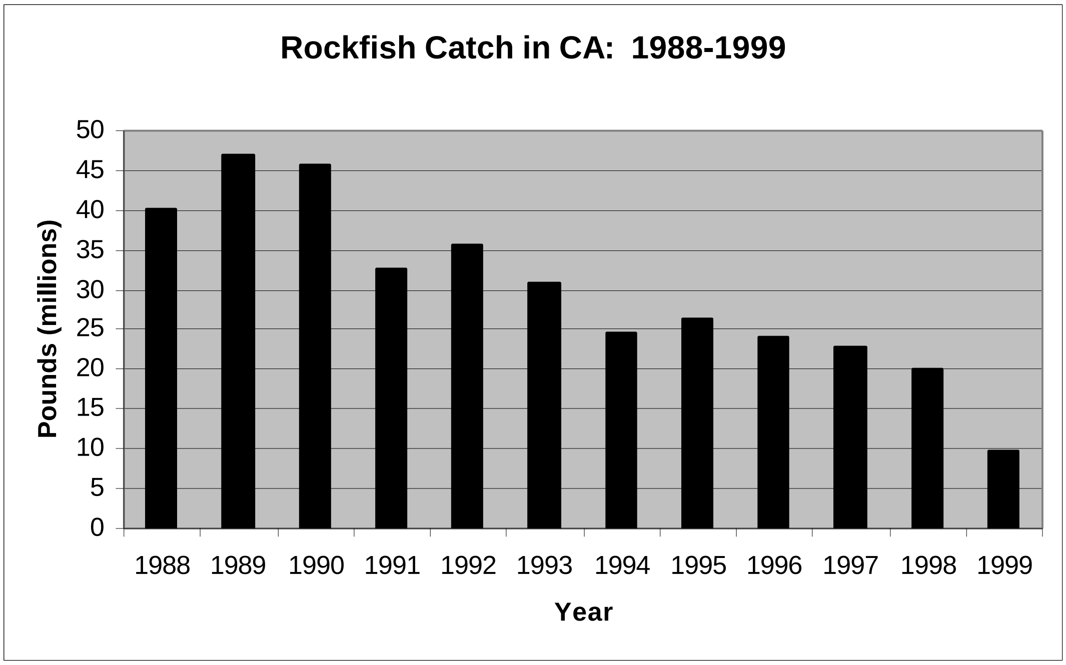


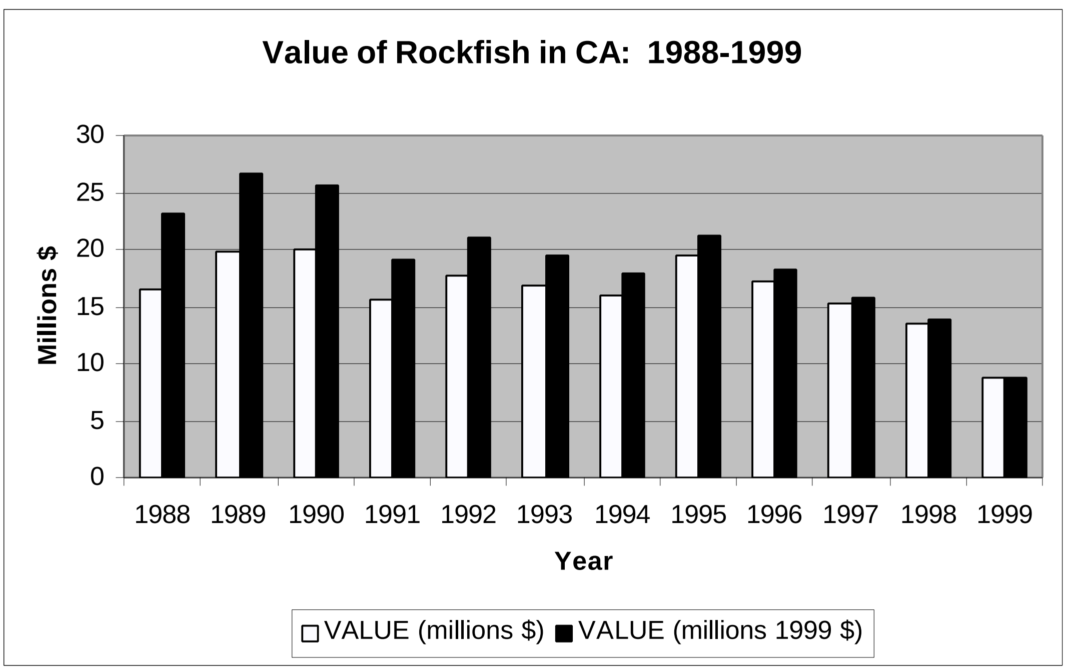
Rockfish Catch in CINMS: 1988-1999
Pounds (thousands)
0
200
400
600
800
1000
1200
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year



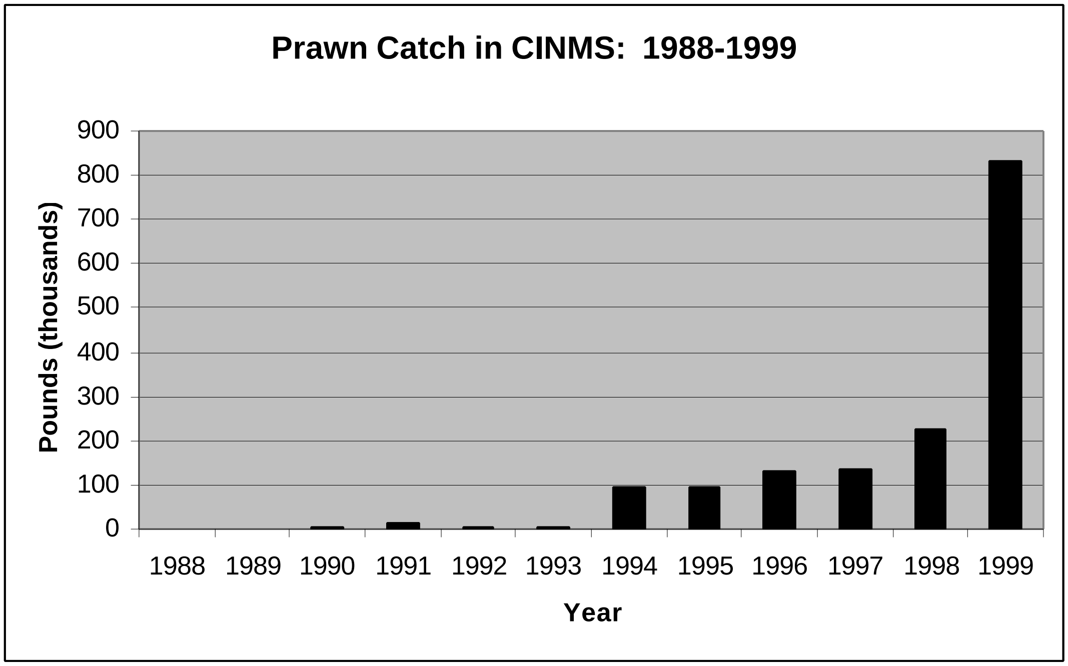
Value of Rockfish in CINMS: 1988-1999
Thousands $
0
100
200
300
400
500
600
700
800
900
1000
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

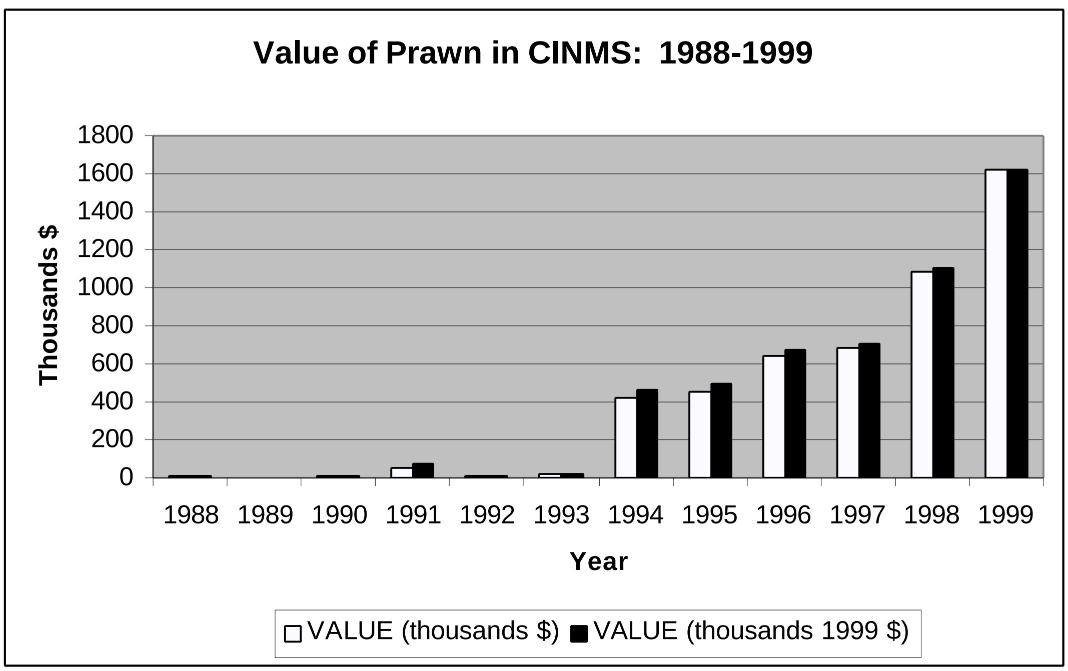

Rockfish Catch in CA: 1988-1999
Pounds (millions)
50
45
40
35
30
25
20
15
10
5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year


Value of Rockfish in CA: 1988-1999
Millions $
30
25
20
15
10
5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C



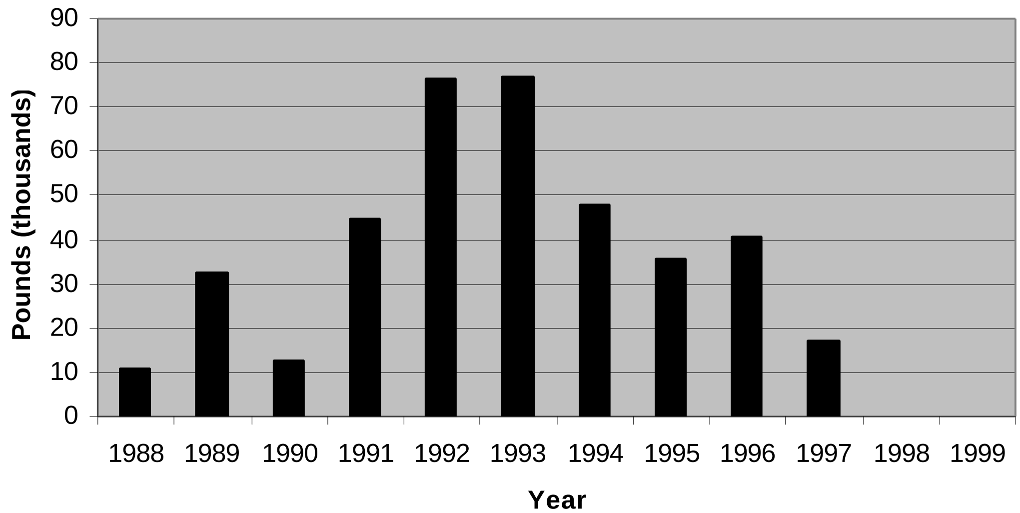
Prawn Catch in CINMS: 1988-1999
Pounds (thousands)
0
100
200
300
400
500
600
700
800
900
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year



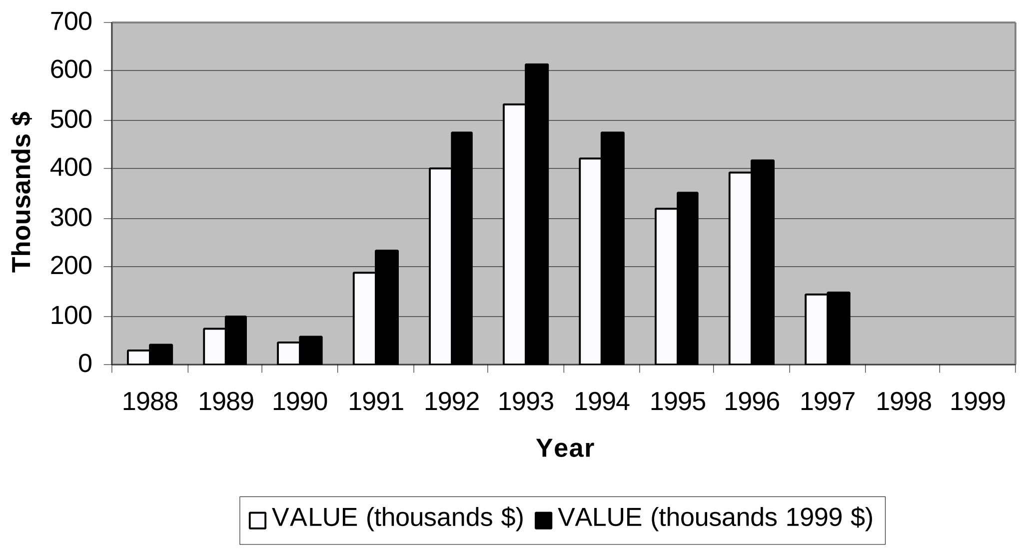
Value of Prawn in CINMS: 1988-1999
Thousands $
0
200
400
600
800
1000
1200
1400
1600
1800
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

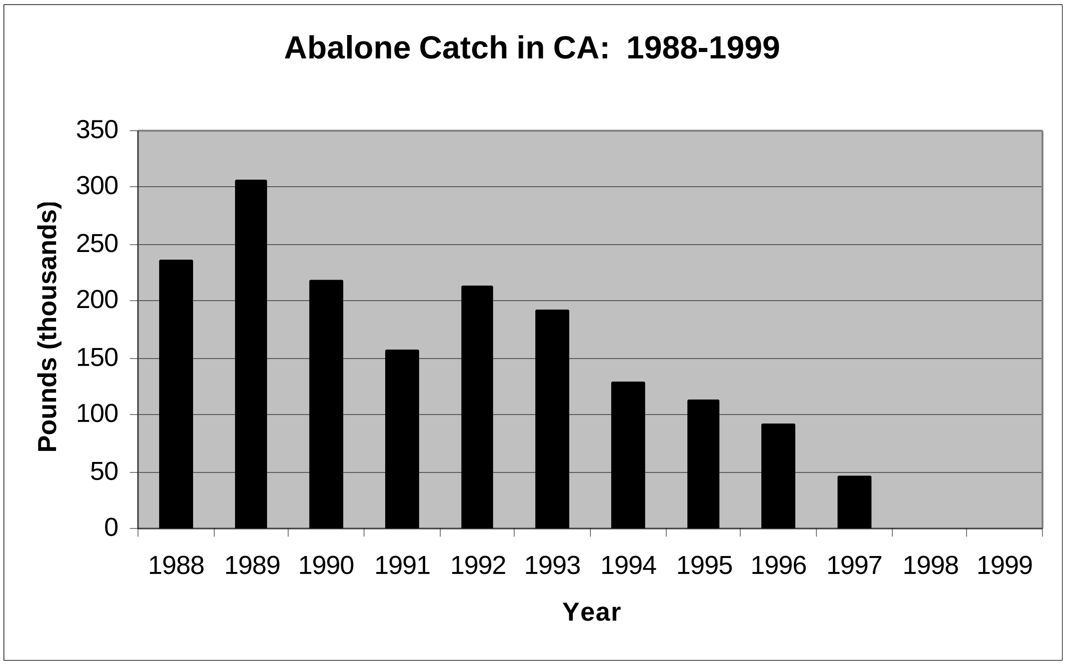
Abalone Catch in CINMS: 1988-1999



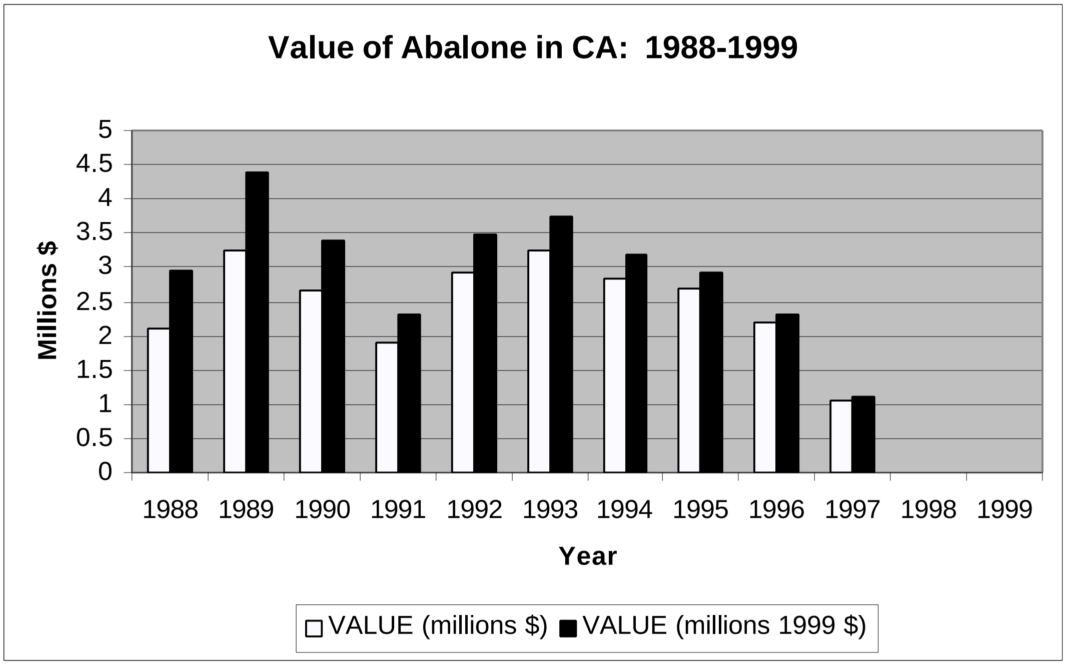
Value of Abalone in CINMS: 1988-1999



APPENDIX C

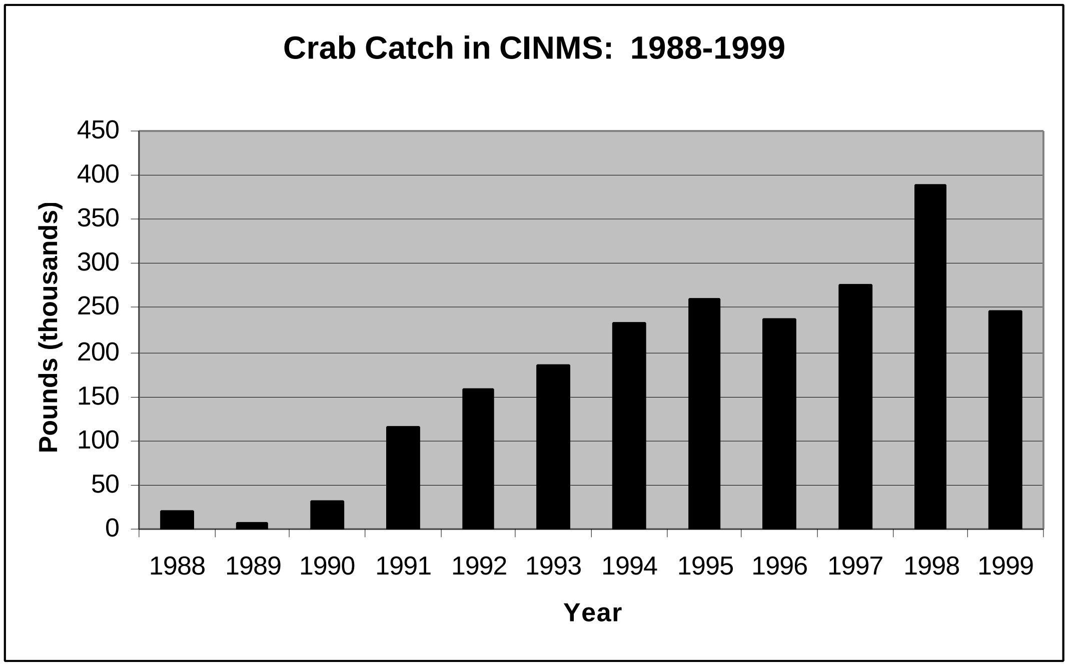


Abalone Catch in CA: 1988-1999
Pounds (thousands)
350
300
250
200
150
100
50
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year

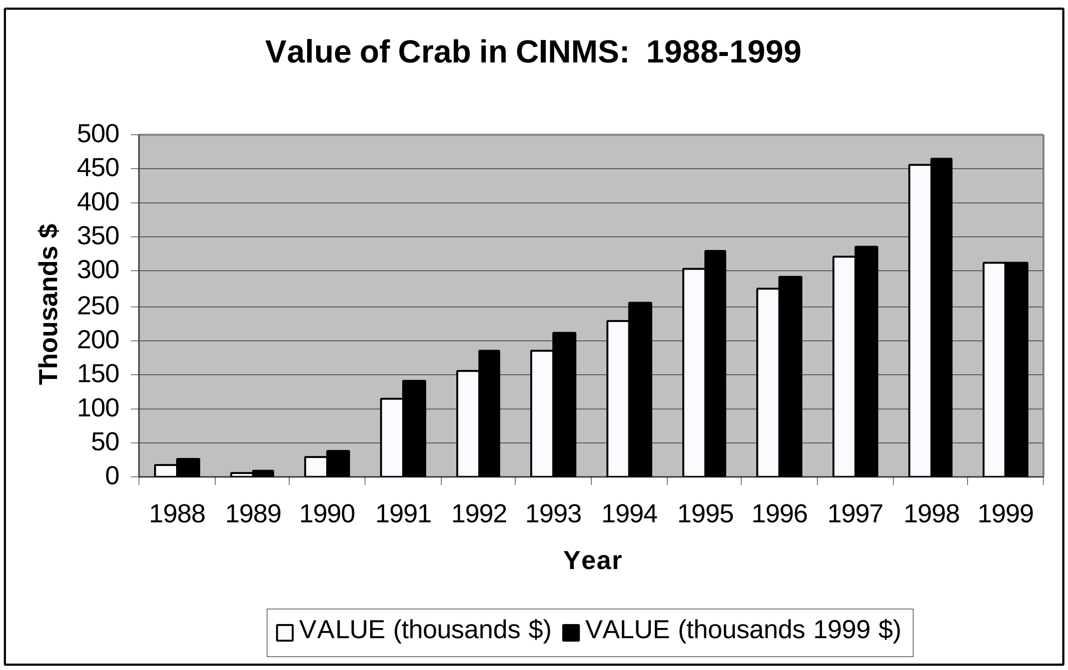


Value of Abalone in CA: 1988-1999
Millions $
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C

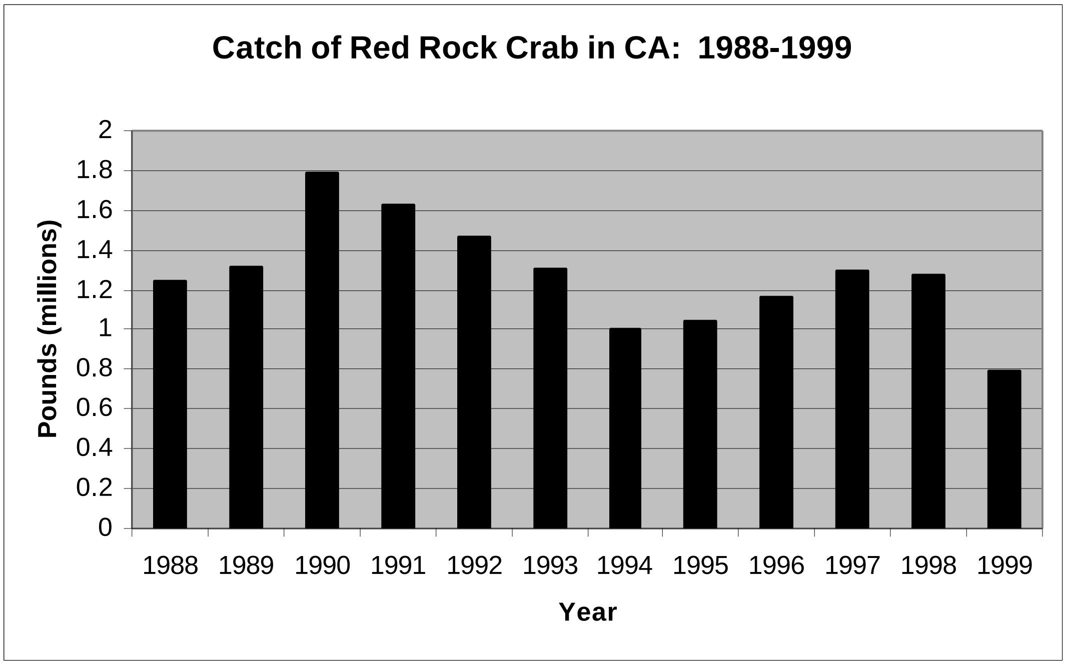


Crab Catch in CINMS: 1988-1999
Pounds (thousands)
450
400
350
300
250
200
150
100
50
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year

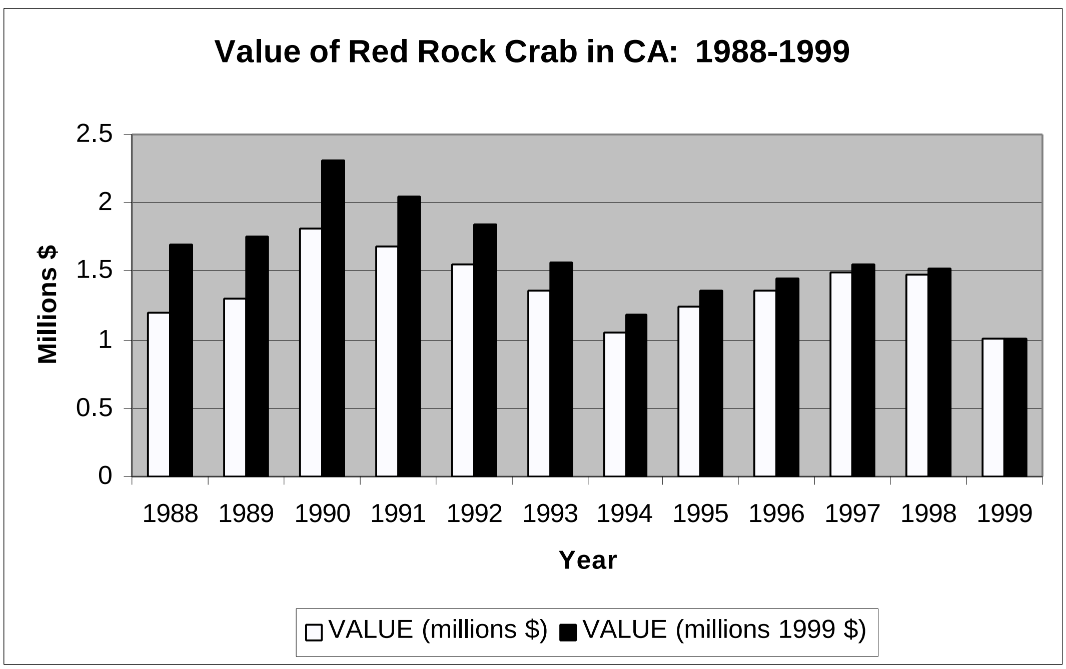


Value of Crab in CINMS: 1988-1999
Thousands $
500
450
400
350
300
250
200
150
100
50
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

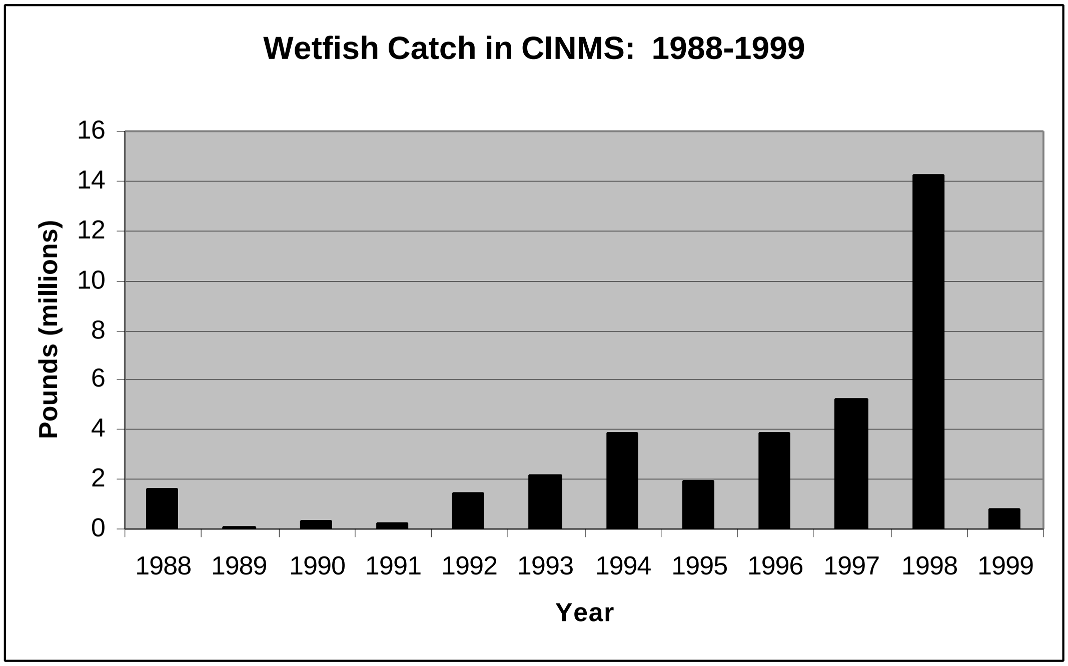


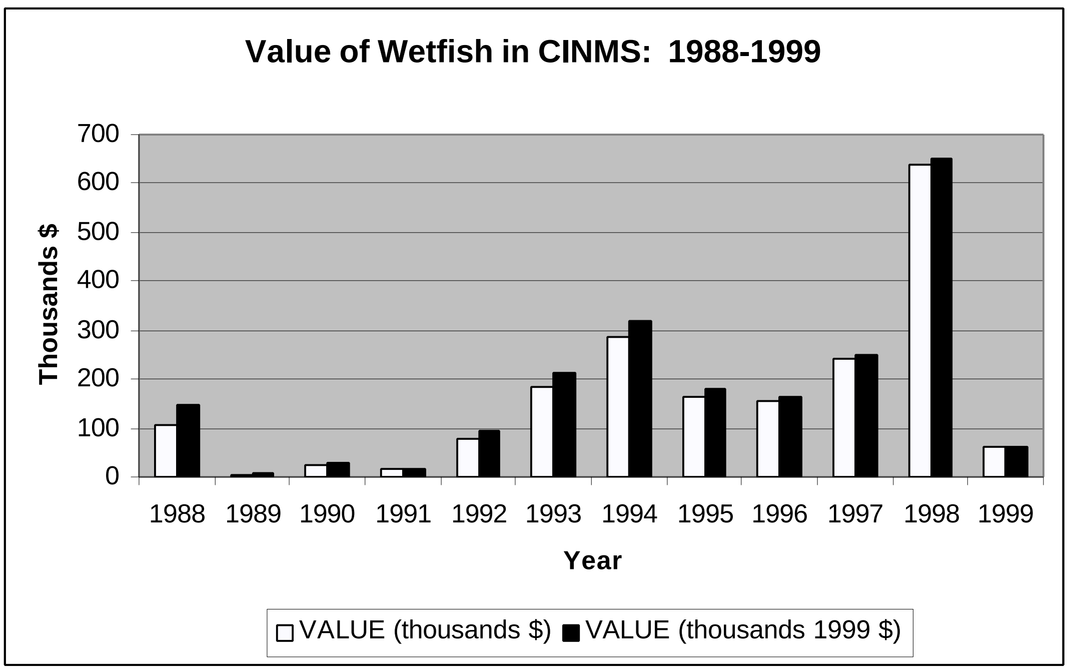
Catch of Red Rock Crab in CA: 1988-1999
Pounds (millions)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year



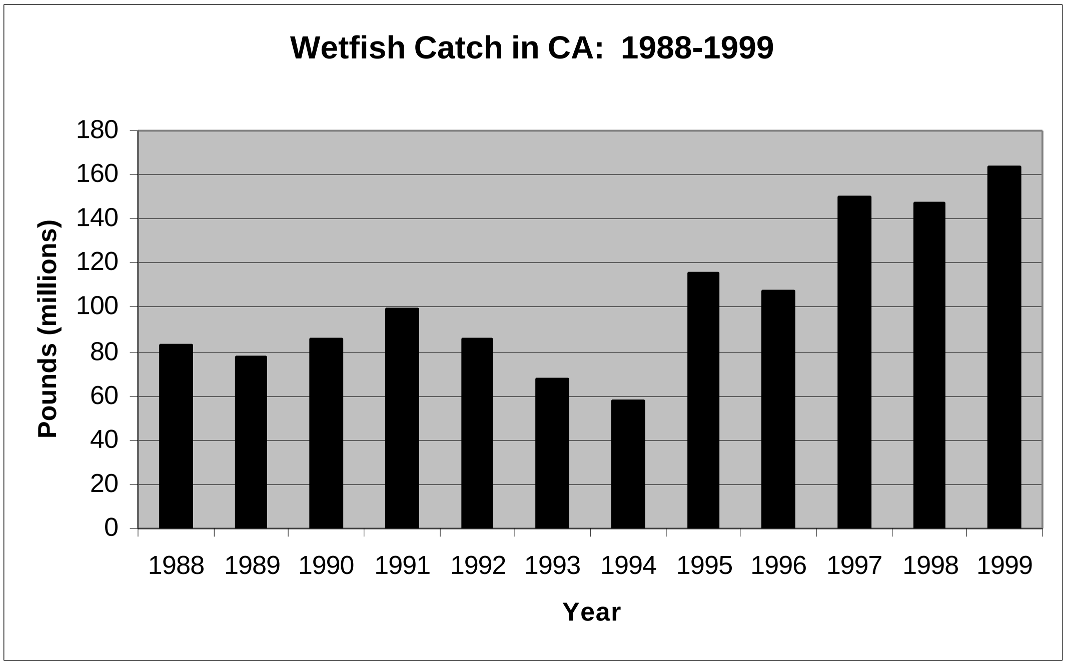
Value of Red Rock Crab in CA: 1988-1999
Millions $
2.5
2
1.5
1
0.5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

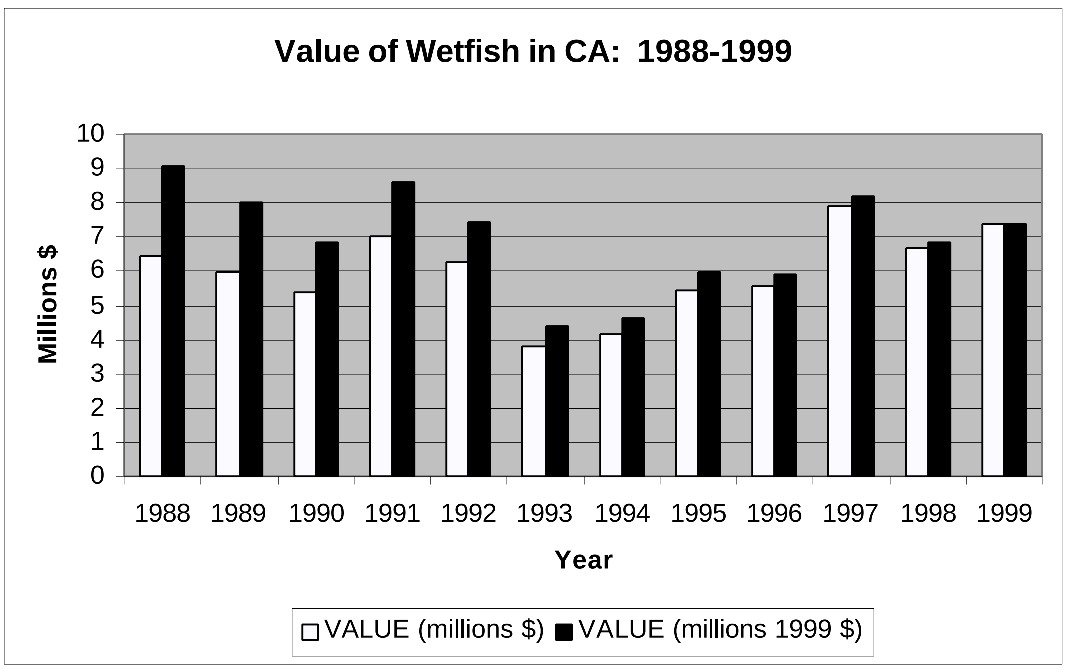
APPENDIX C


Wetfish Catch in CINMS: 1988-1999
16
14
12
10
8
6
4
2
0
Pounds (millions)
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year

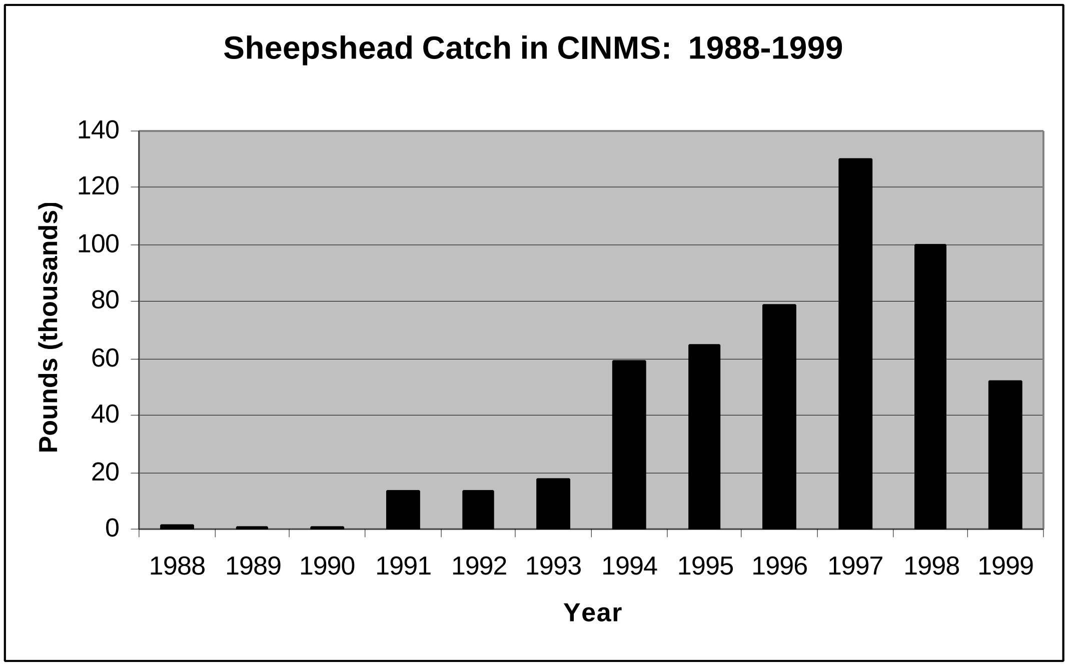

Value of Wetfish in CINMS: 1988-1999
700
600
500
400
300
200
100
0
Thousands $
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

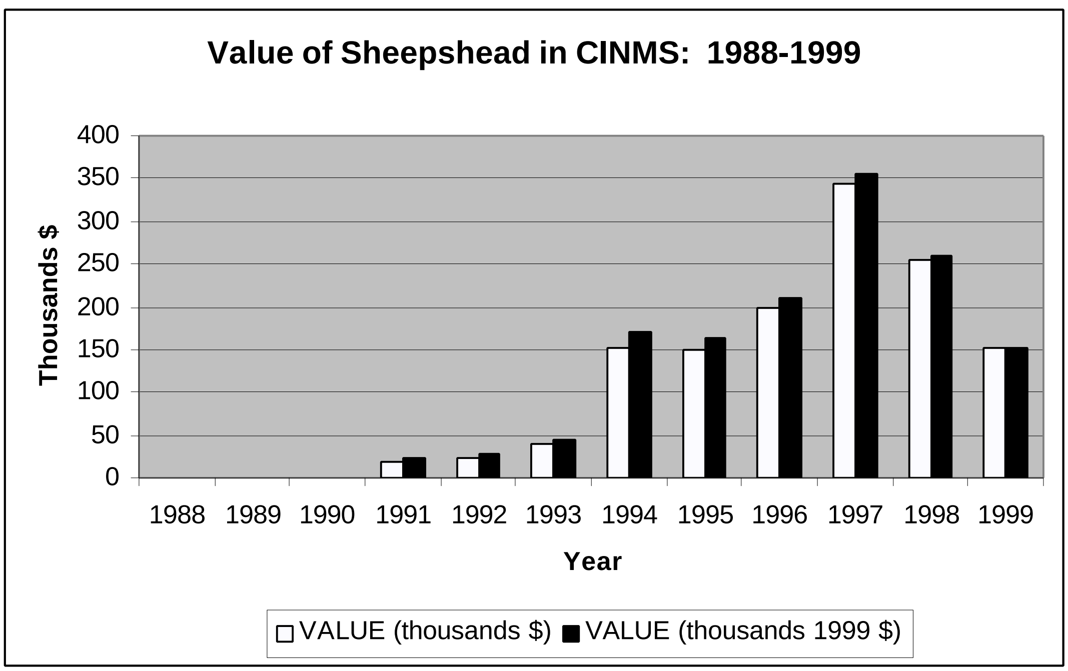

Wetfish Catch in CA: 1988-1999
Pounds (millions)
180
160
140
120
100
80
60
40
20
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year


Value of Wetfish in CA: 1988-1999
Millions $
10
9
8
7
6
5
4
3
2
1
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C

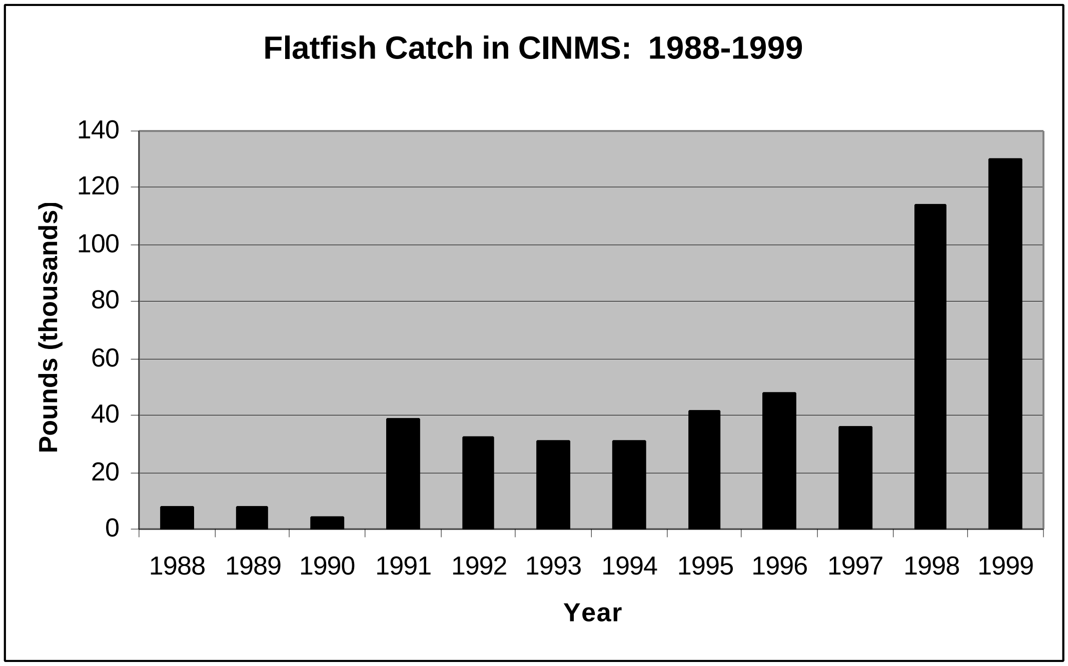


Sheepshead Catch in CINMS: 1988-1999
Pounds (thousands)
0
20
40
60
80
100
120
140
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year

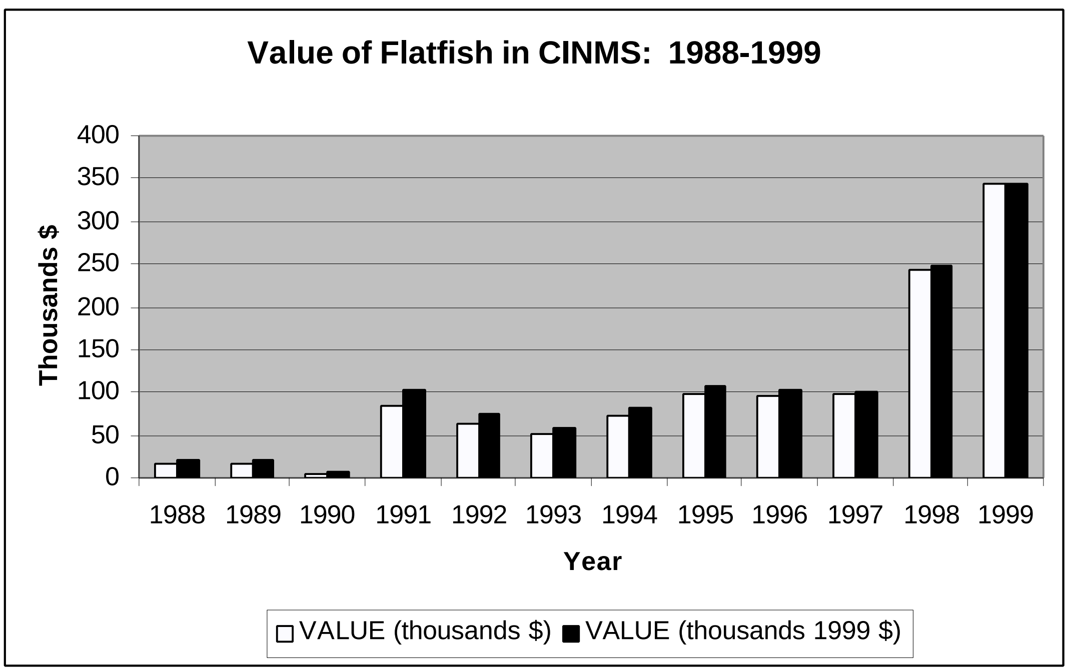


Value of Sheepshead in CINMS: 1988-1999
Thousands $
0
50
100
150
200
250
300
350
400
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

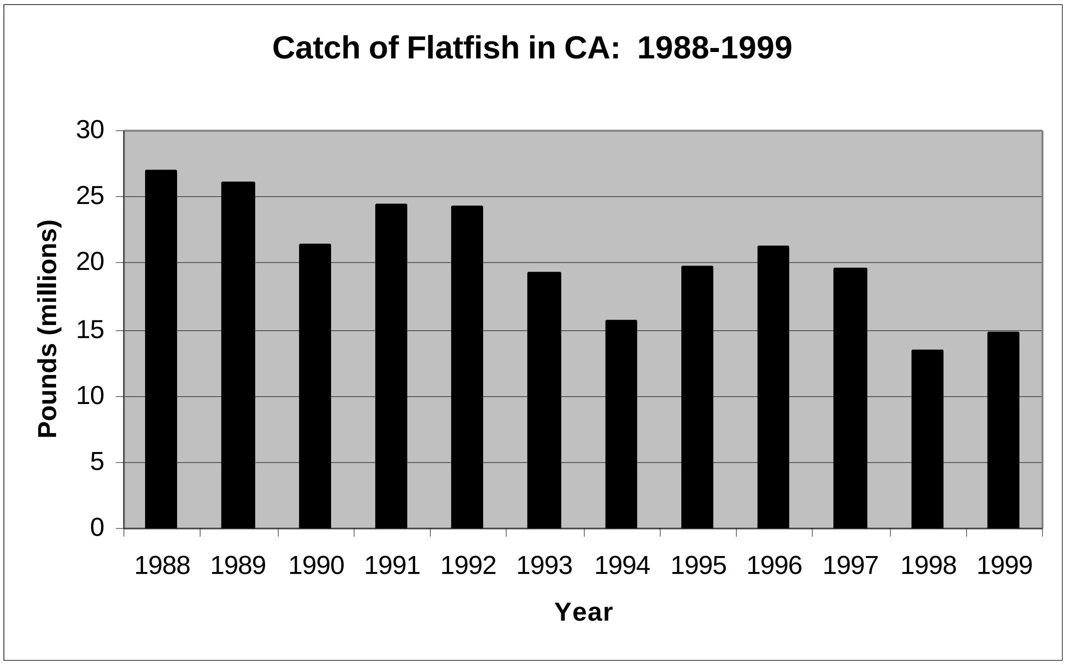


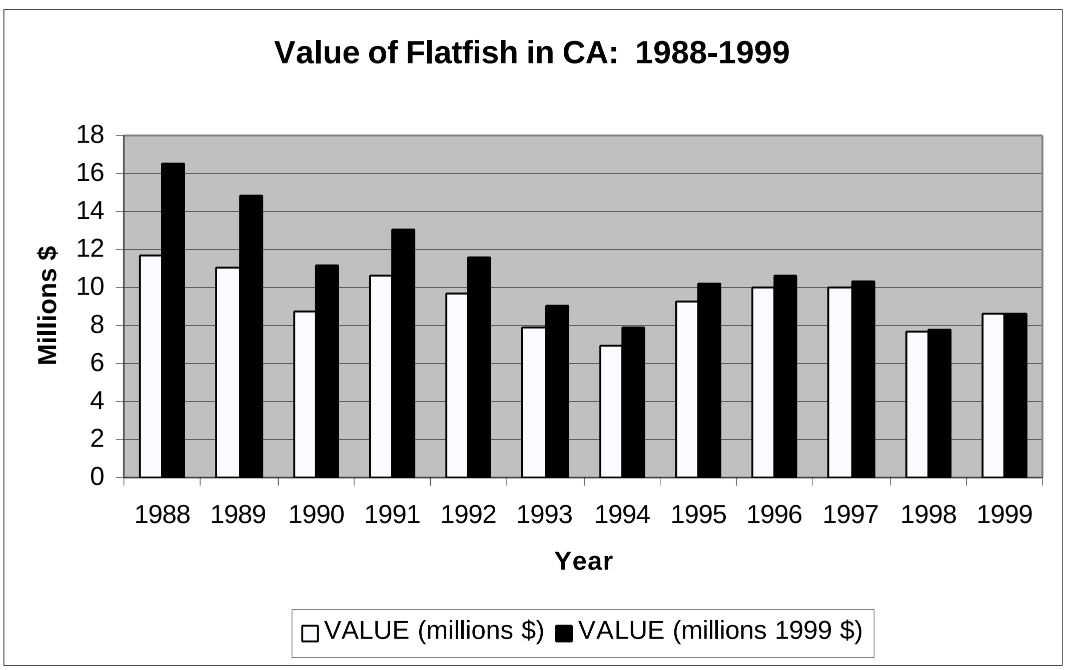
Flatfish Catch in CINMS: 1988-1999
Pounds (thousands)
0
20
40
60
80
100
120
140
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year



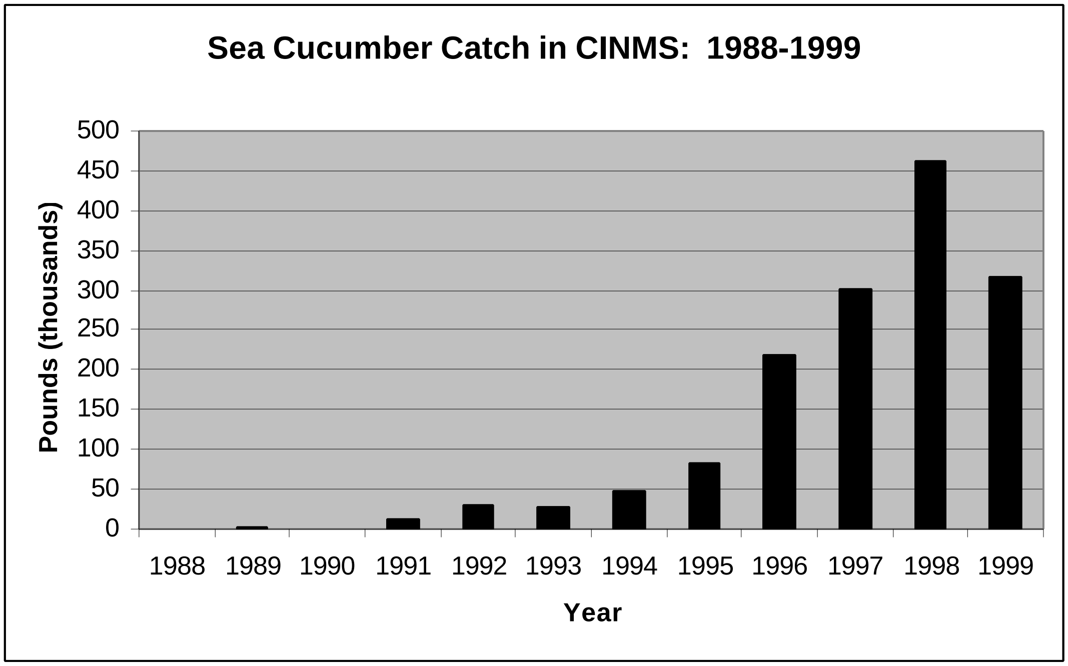
Value of Flatfish in CINMS: 1988-1999
Thousands $
0
50
100
150
200
250
300
350
400
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

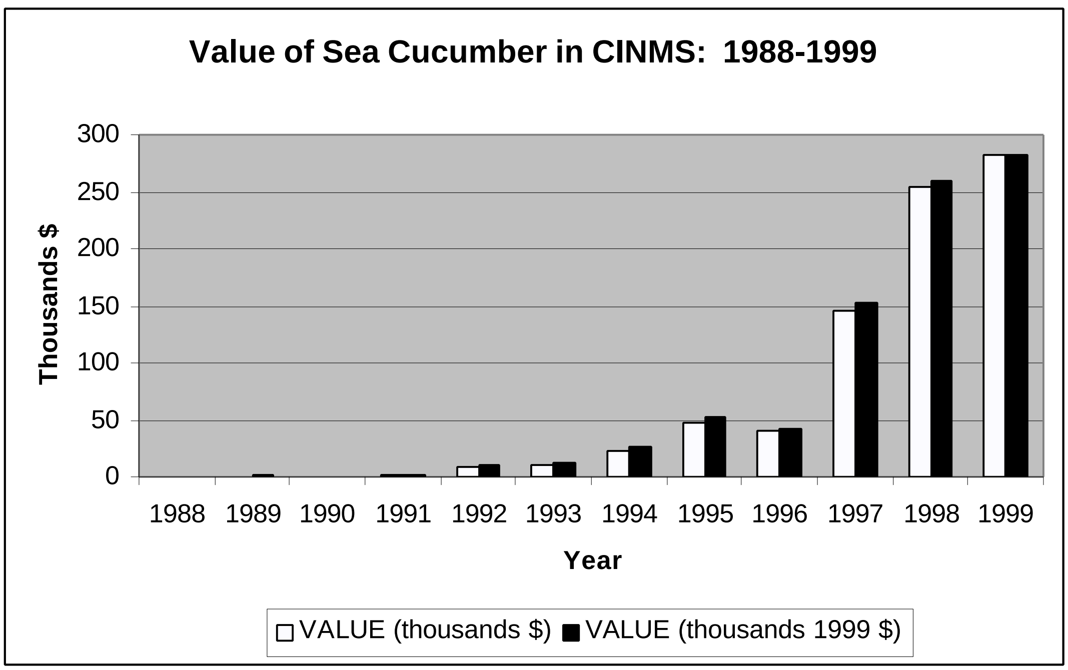

Catch of Flatfish in CA: 1988-1999
Pounds (millions)
30
25
20
15
10
5
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year


Value of Flatfish in CA: 1988-1999
Millions $
18
16
14
12
10
8
6
4
2
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C

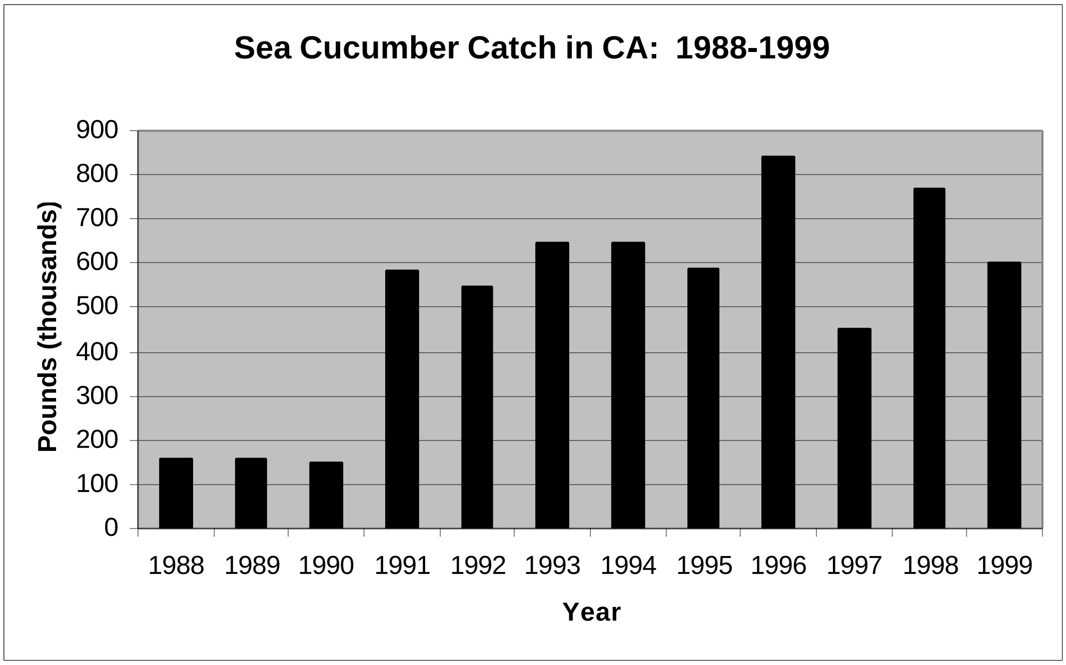


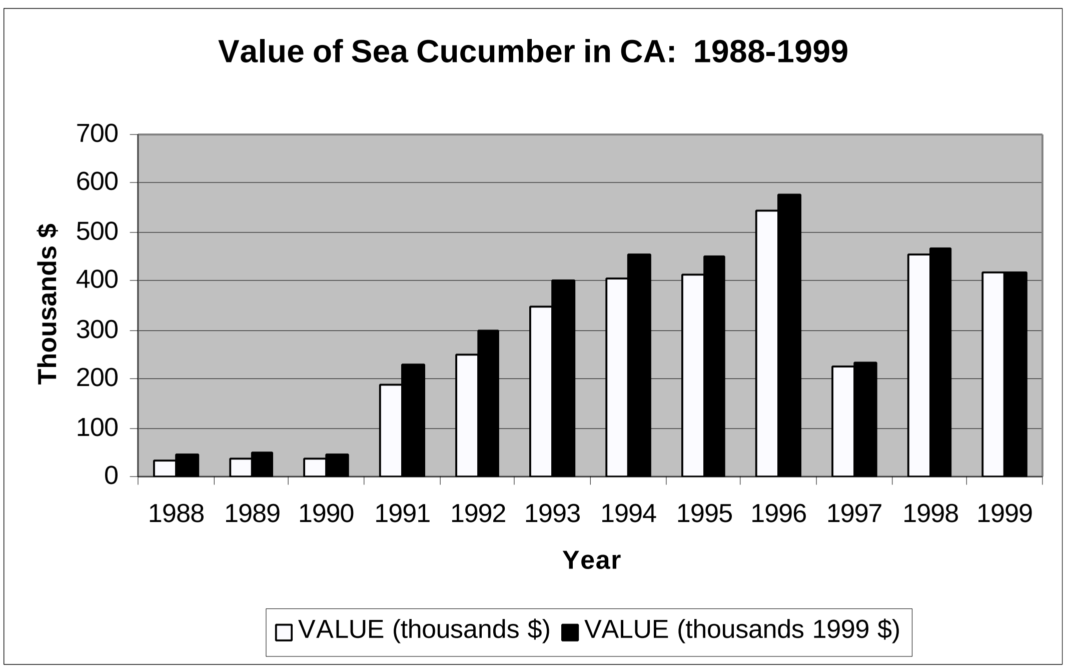
Sea Cucumber Catch in CINMS: 1988-1999
Pounds (thousands)
500
450
400
350
300
250
200
150
100
50
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year



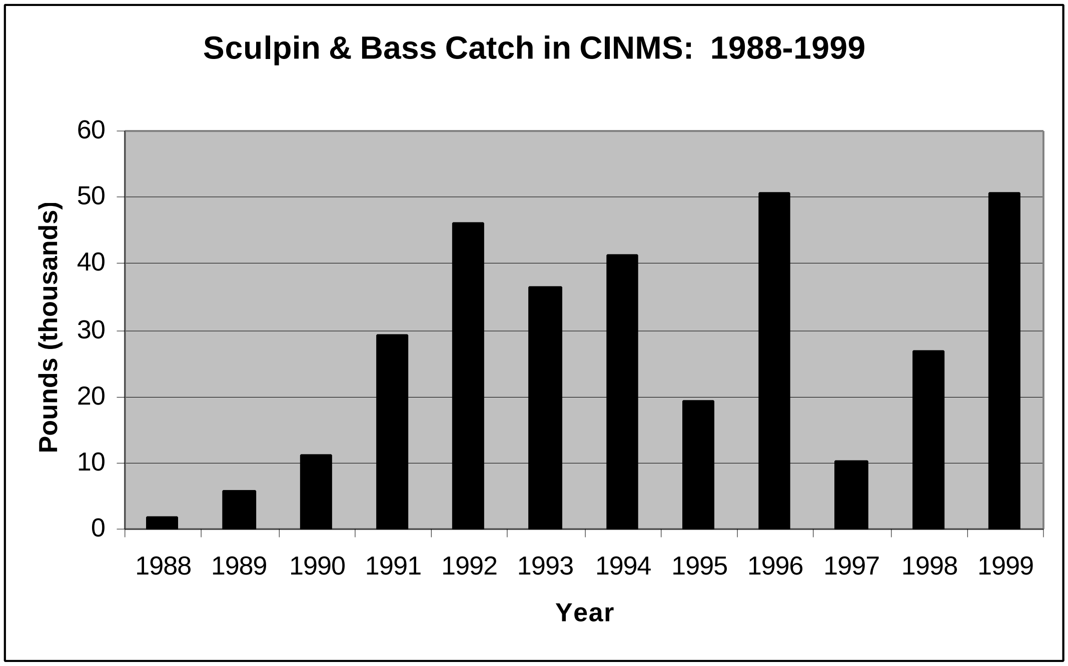
Value of Sea Cucumber in CINMS: 1988-1999
Thousands $
300
250
200
150
100
50
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

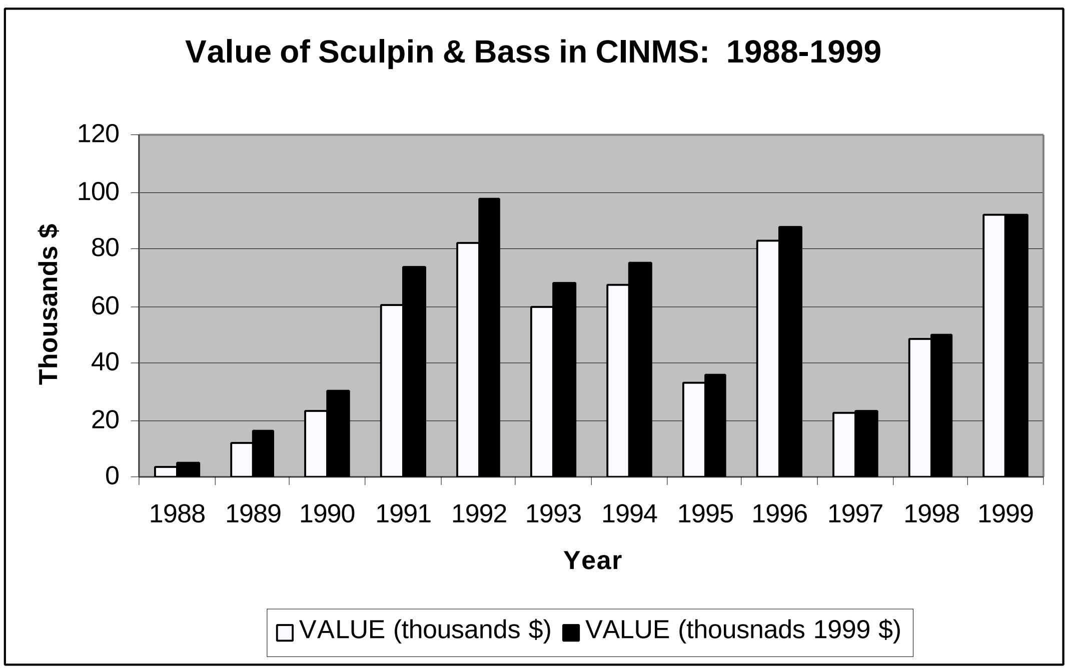

Sea Cucumber Catch in CA: 1988-1999
Pounds (thousands)
0
100
200
300
400
500
600
700
800
900
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year


Value of Sea Cucumber in CA: 1988-1999
Thousands $
0
100
200
300
400
500
600
700
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

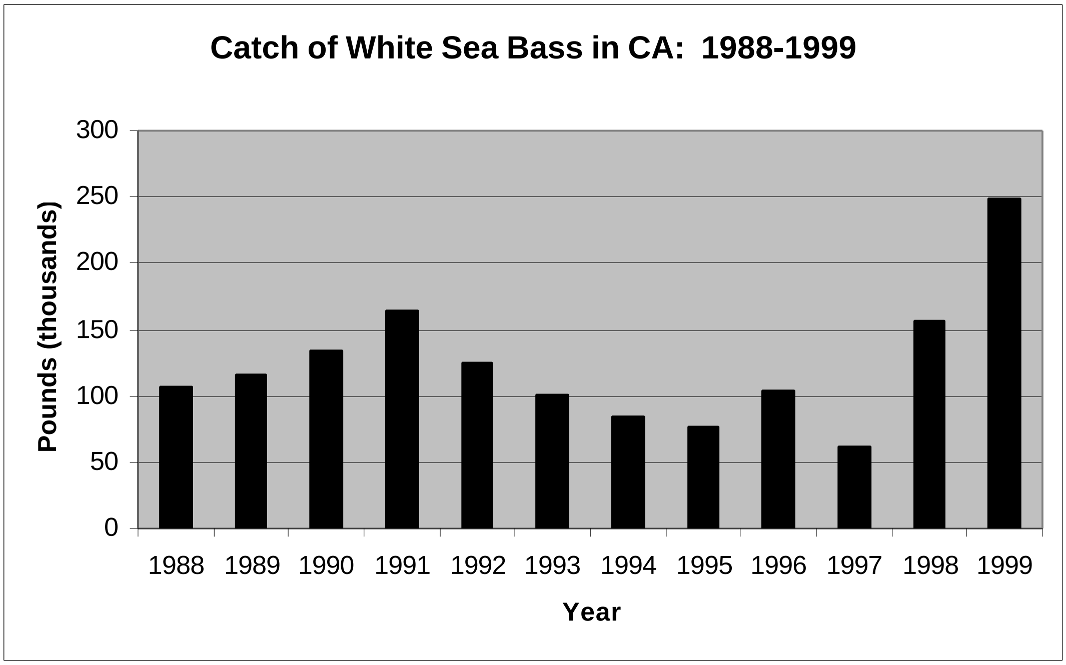


Sculpin & Bass Catch in CINMS: 1988-1999
Pounds (thousands)
60
50
40
30
20
10
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year

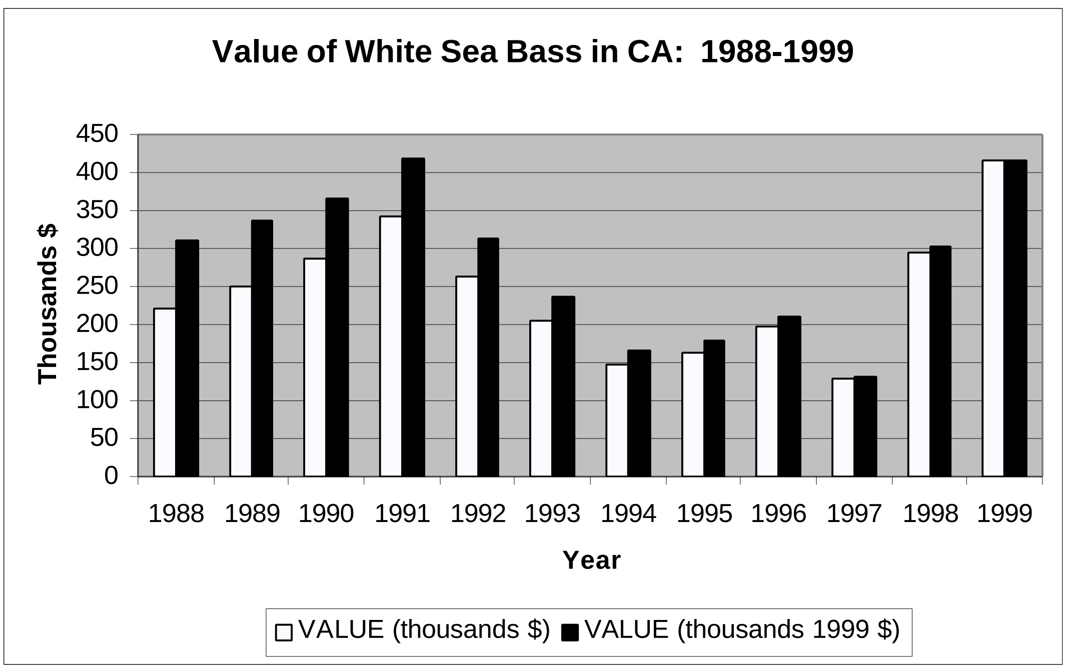


Value of Sculpin & Bass in CINMS: 1988-1999
Thousands $
120
100
80
60
40
20
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (thousands $)
VALUE (thousnads 1999 $)

APPENDIX C

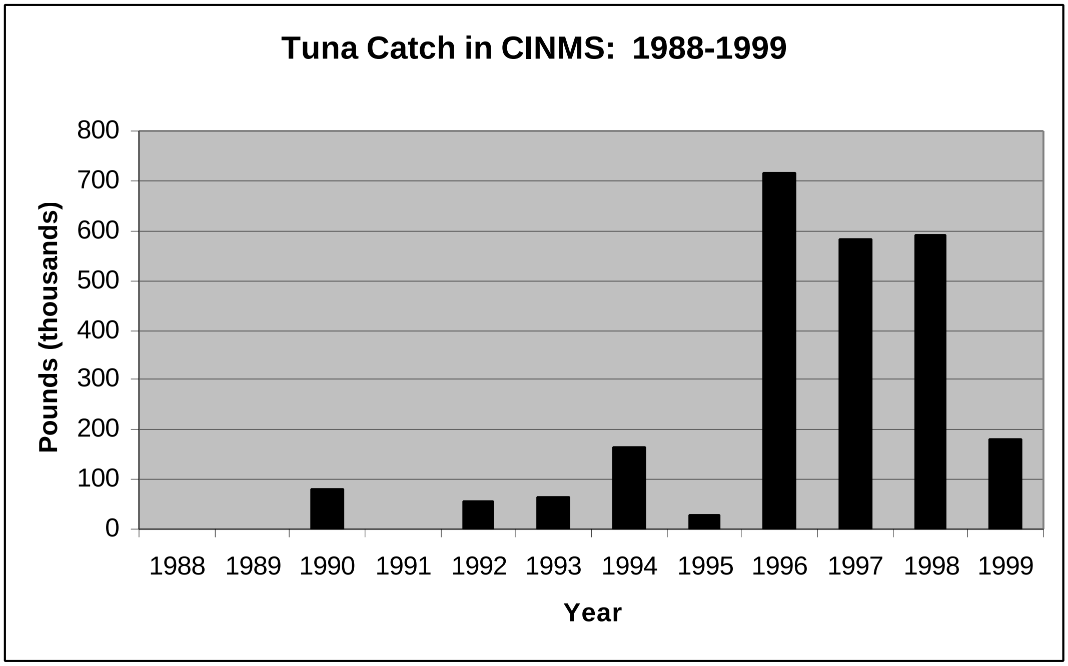


Catch of White Sea Bass in CA: 1988-1999
Pounds (thousands)
300
250
200
150
100
50
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year

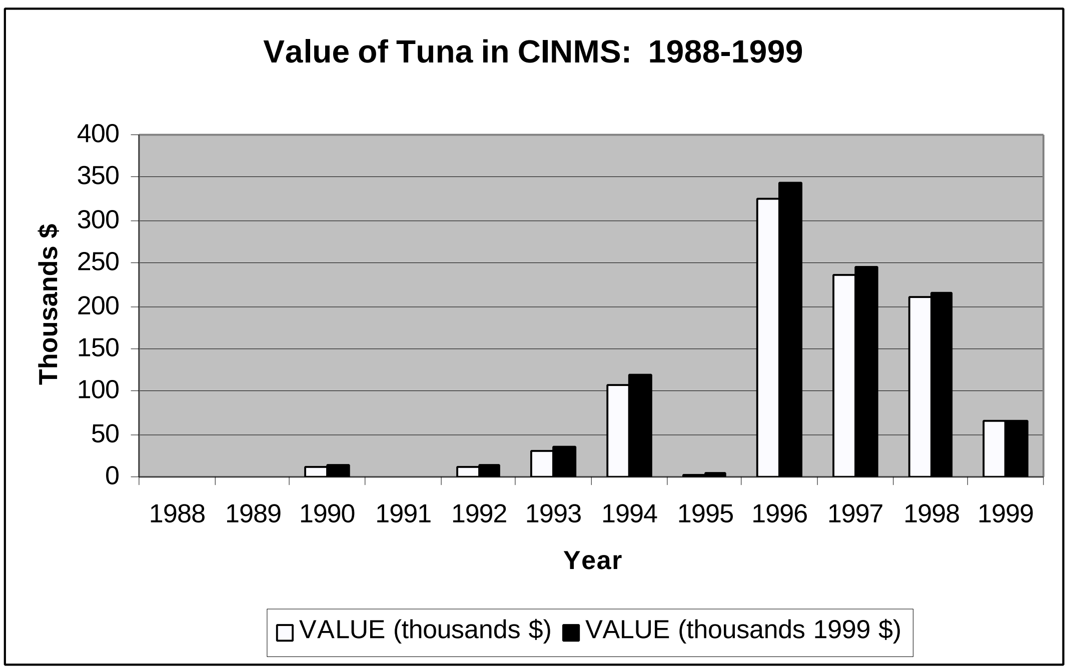


Value of White Sea Bass in CA: 1988-1999
Thousands $
450
400
350
300
250
200
150
100
50
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

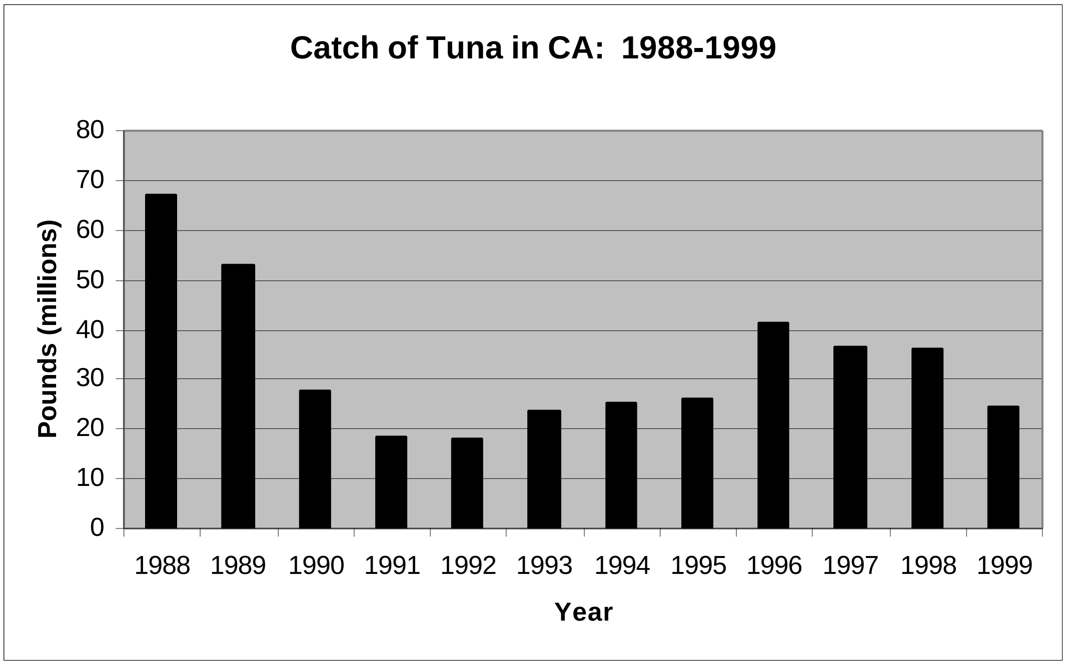


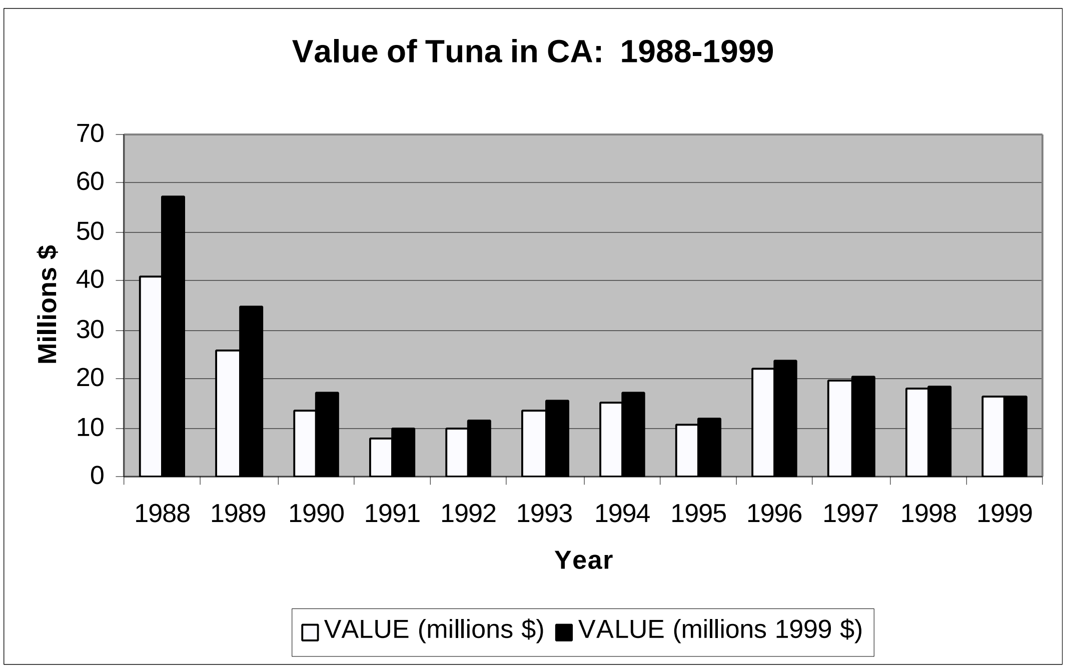
Tuna Catch in CINMS: 1988-1999
Pounds (thousands)
800
700
600
500
400
300
200
100
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year



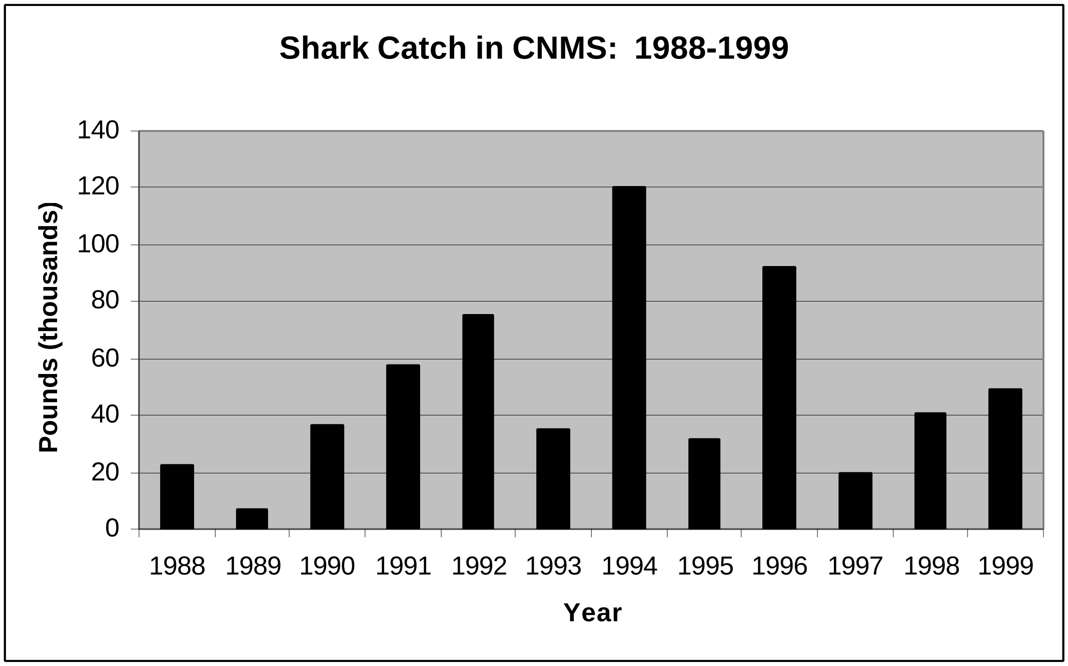
Value of Tuna in CINMS: 1988-1999
Thousands $
400
350
300
250
200
150
100
50
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

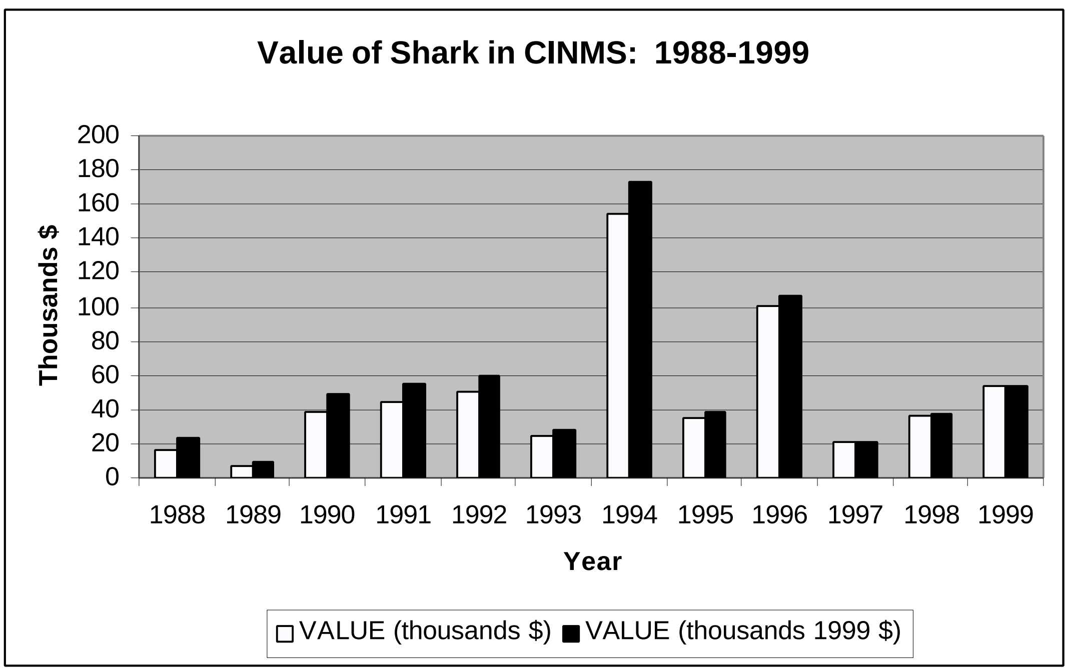

Catch of Tuna in CA: 1988-1999
Pounds (millions)
0
10
20
30
40
50
60
70
80
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year


Value of Tuna in CA: 1988-1999
Millions $
0
10
20
30
40
50
60
70
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C

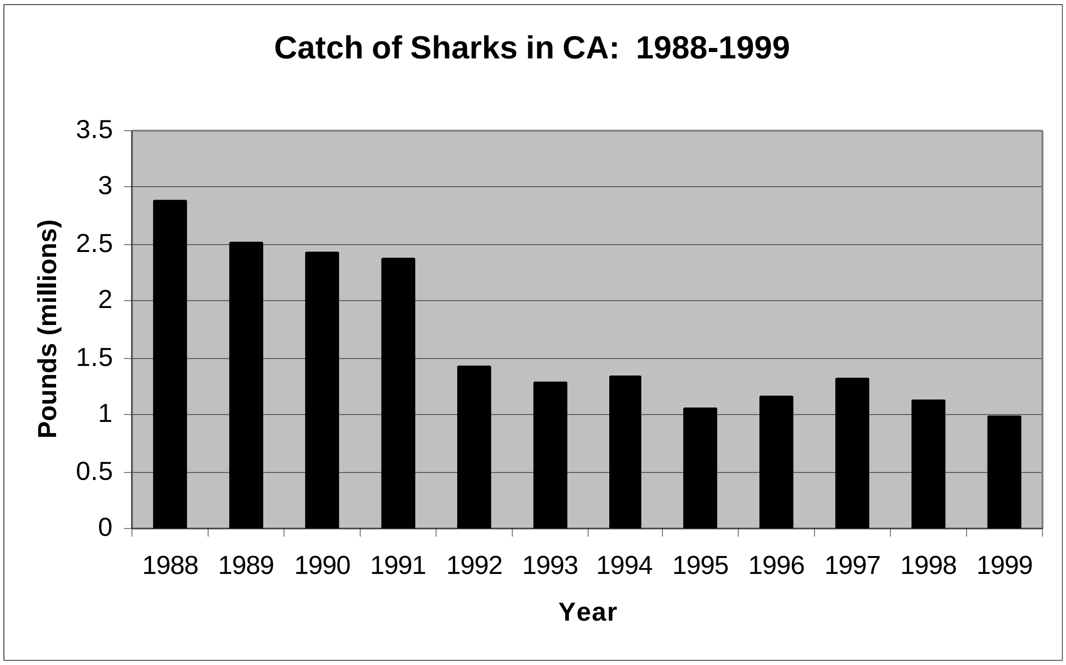


Shark Catch in CNMS: 1988-1999
Pounds (thousands)
0
20
40
60
80
100
120
140
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year

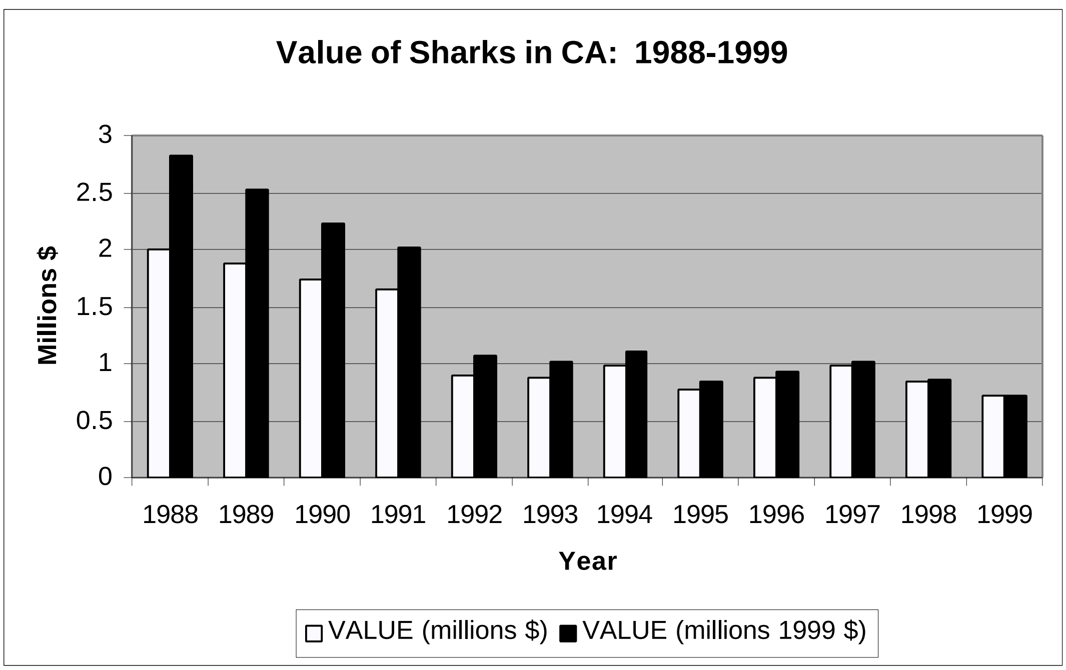


Value of Shark in CINMS: 1988-1999
Thousands $
0
20
40
60
80
100
120
140
160
180
200
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

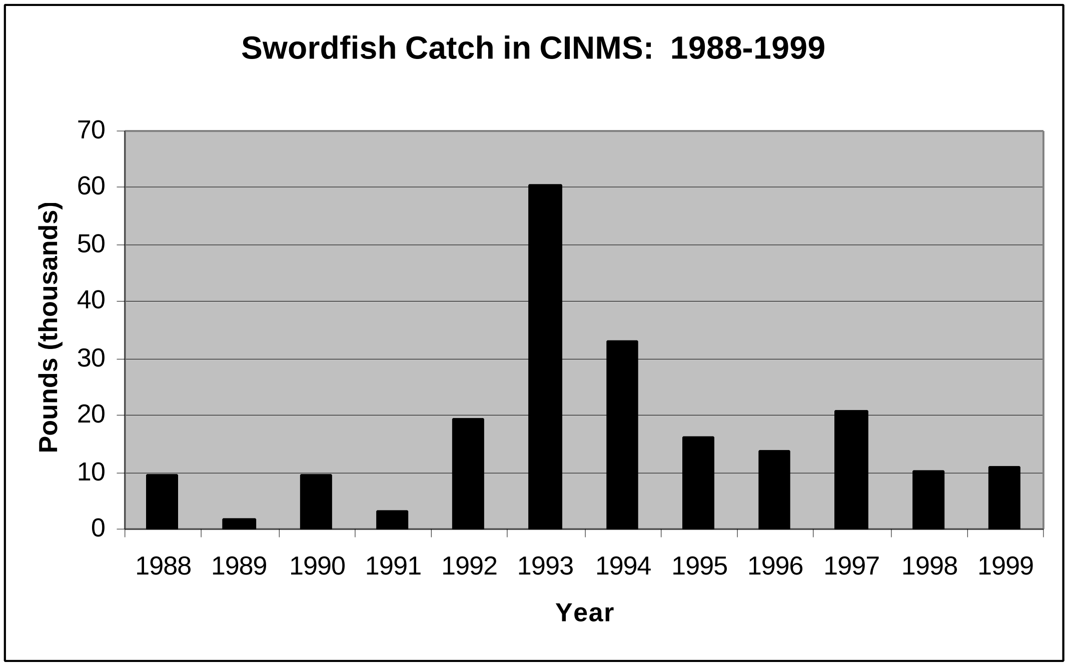


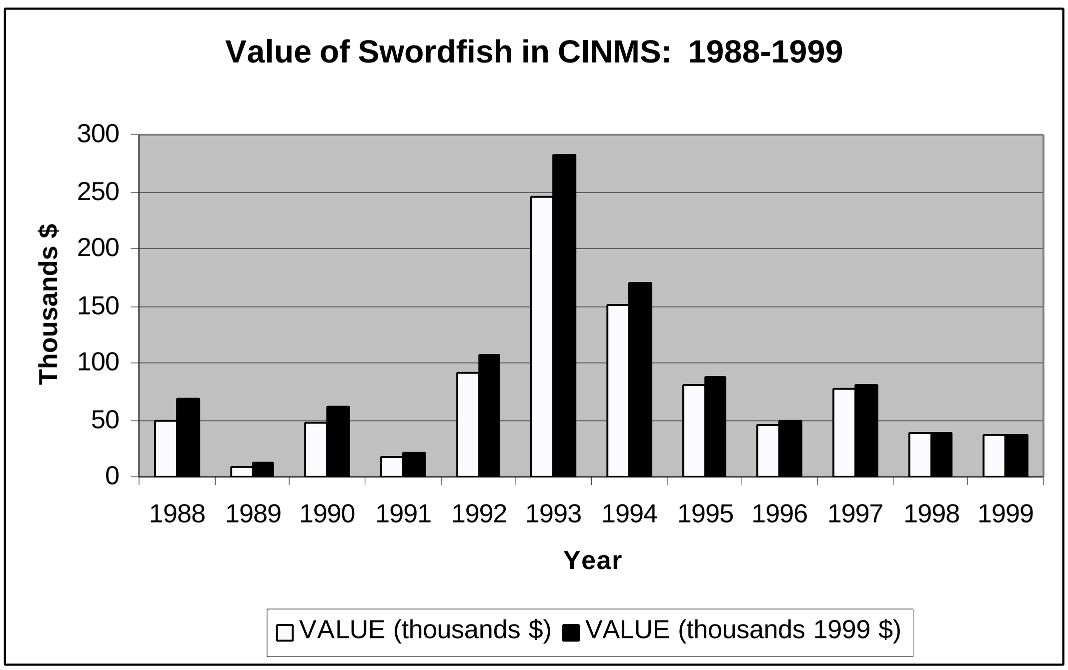
Catch of Sharks in CA: 1988-1999
Pounds (millions)
3.5
3
2.5
2
1.5
1
0.5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year



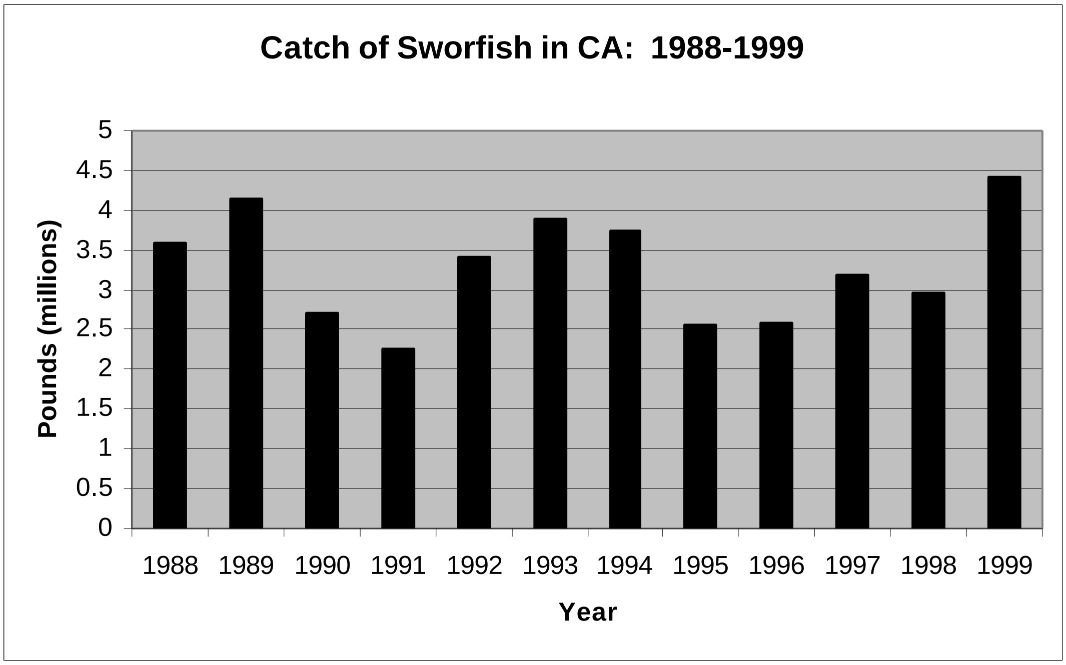
Value of Sharks in CA: 1988-1999
Millions $
3
2.5
2
1.5
1
0.5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C

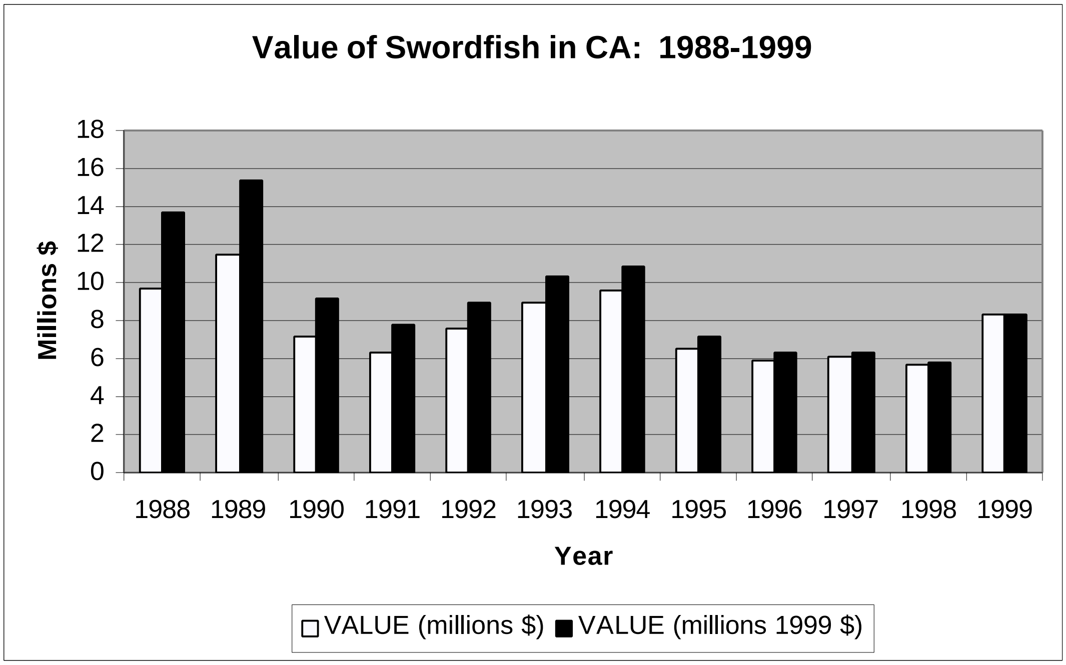

Swordfish Catch in CINMS: 1988-1999
Pounds (thousands)
0
10
20
30
40
50
60
70
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year


Value of Swordfish in CINMS: 1988-1999
Thousands $
0
50
100
150
200
250
300
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
VALUE (thousands $)
VALUE (thousands 1999 $)

APPENDIX C

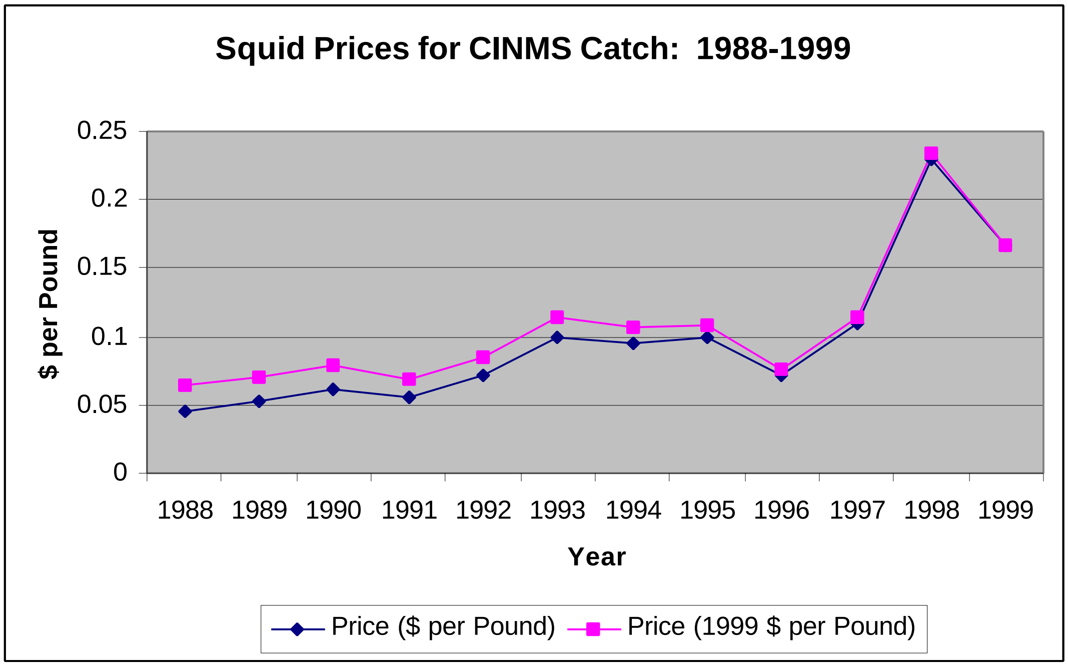


Catch of Sworfish in CA: 1988-1999
Pounds (millions)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year

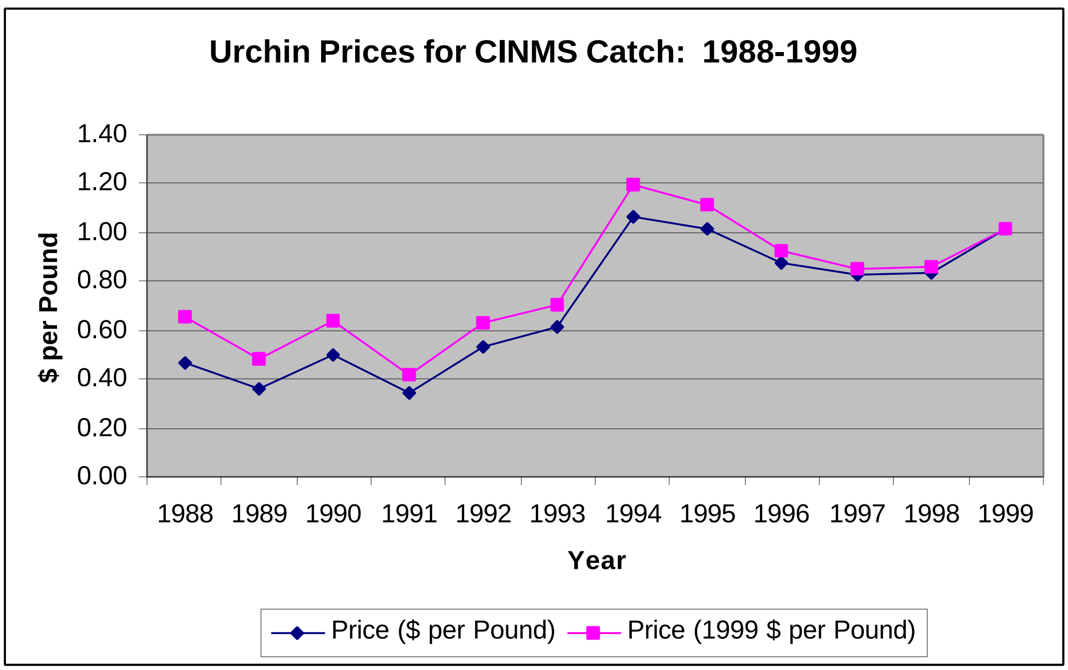


Value of Swordfish in CA: 1988-1999
Millions $
18
16
14
12
10
8
6
4
2
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
VALUE (millions $)
VALUE (millions 1999 $)

APPENDIX C

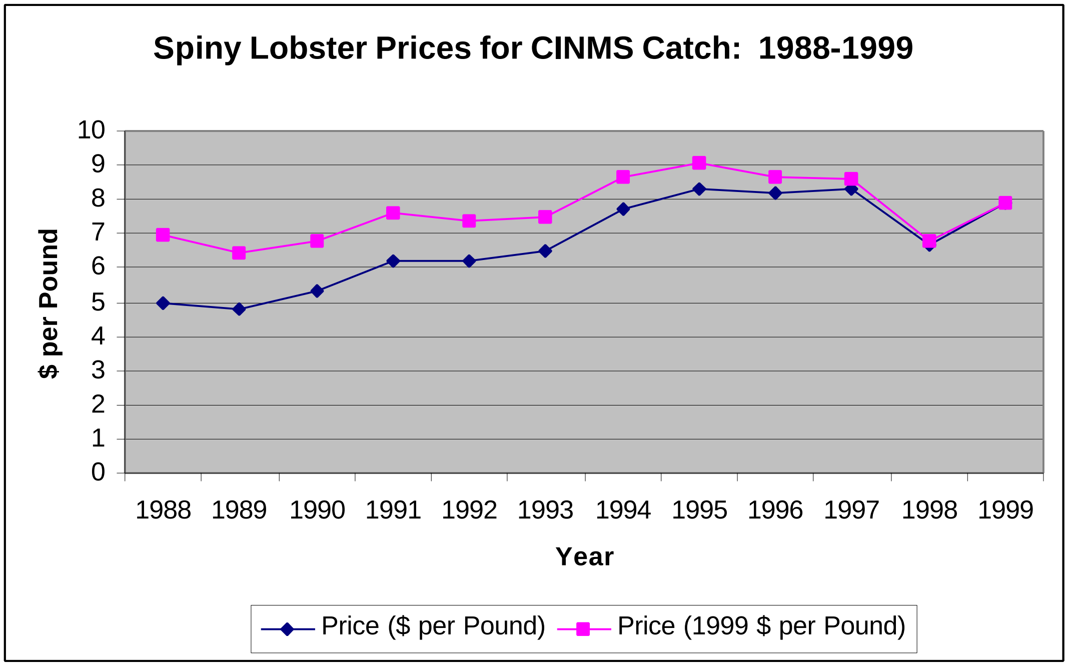


Squid Prices for CINMS Catch: 1988-1999
$ per Pound
0.25
0.2
0.15
0.1
0.05
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

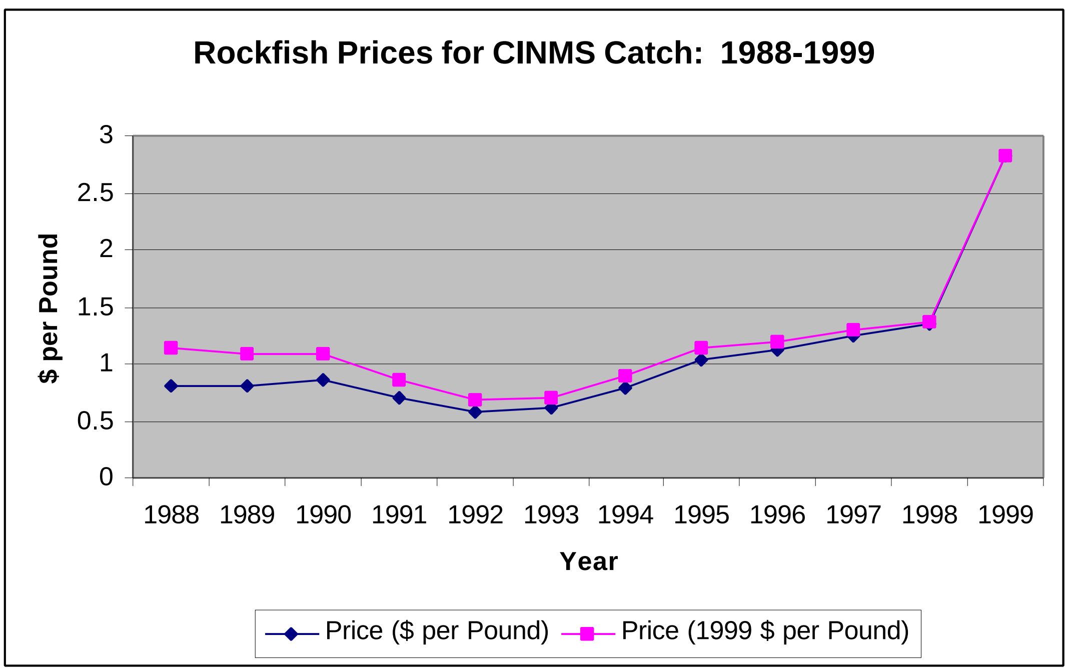


Urchin Prices for CINMS Catch: 1988-1999
$ per Pound
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

APPENDIX C

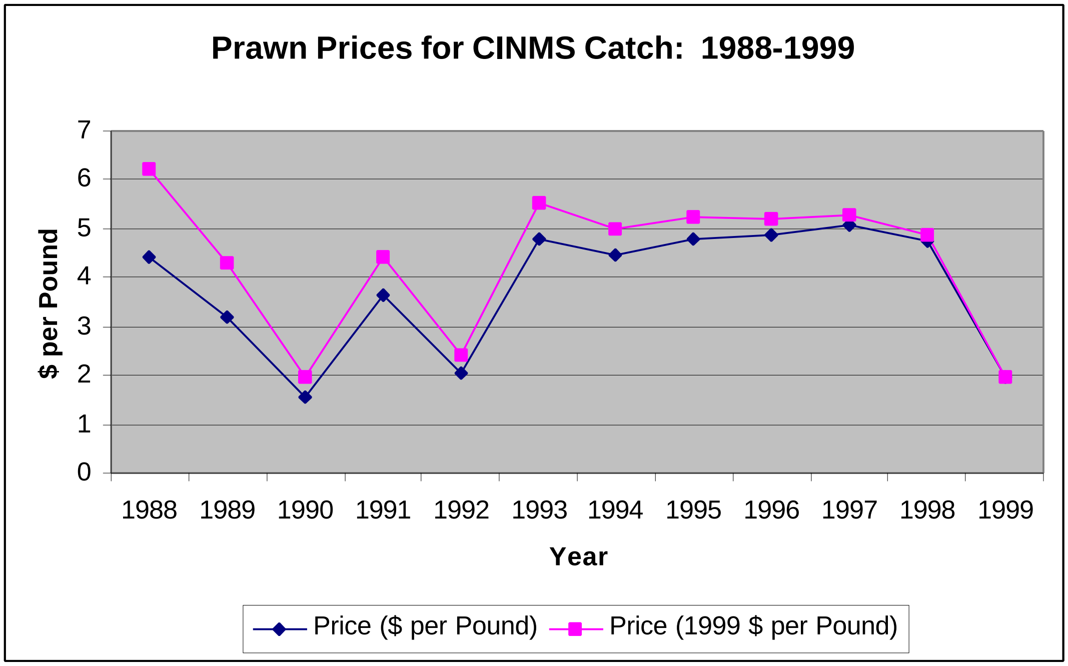


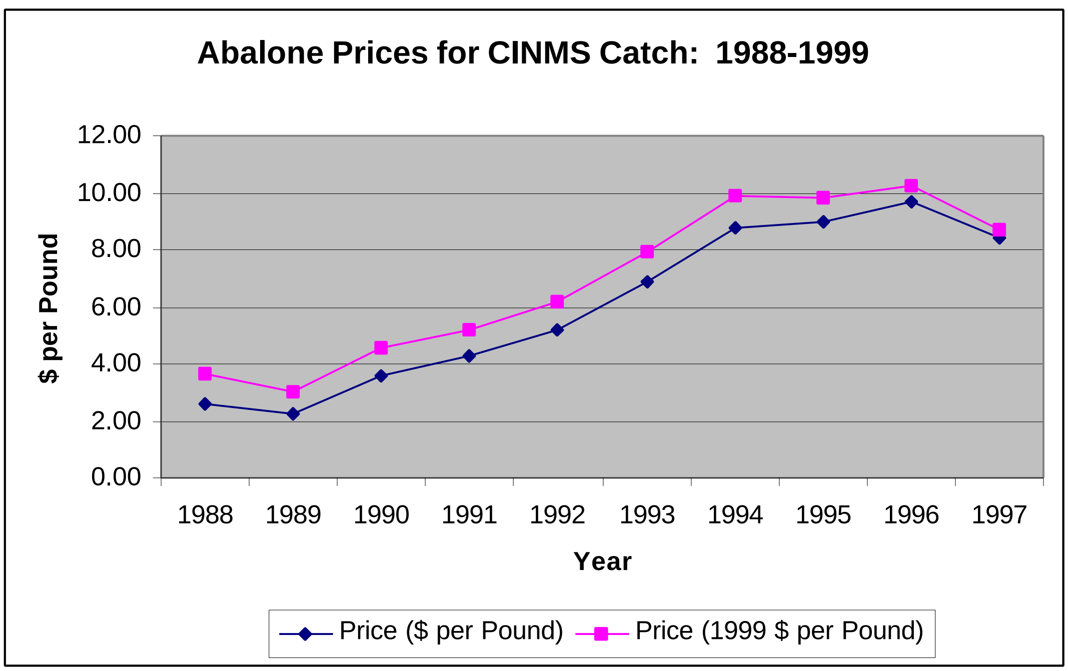
Spiny Lobster Prices for CINMS Catch: 1988-1999
$ per Pound
10
9
8
7
6
5
4
3
2
1
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)



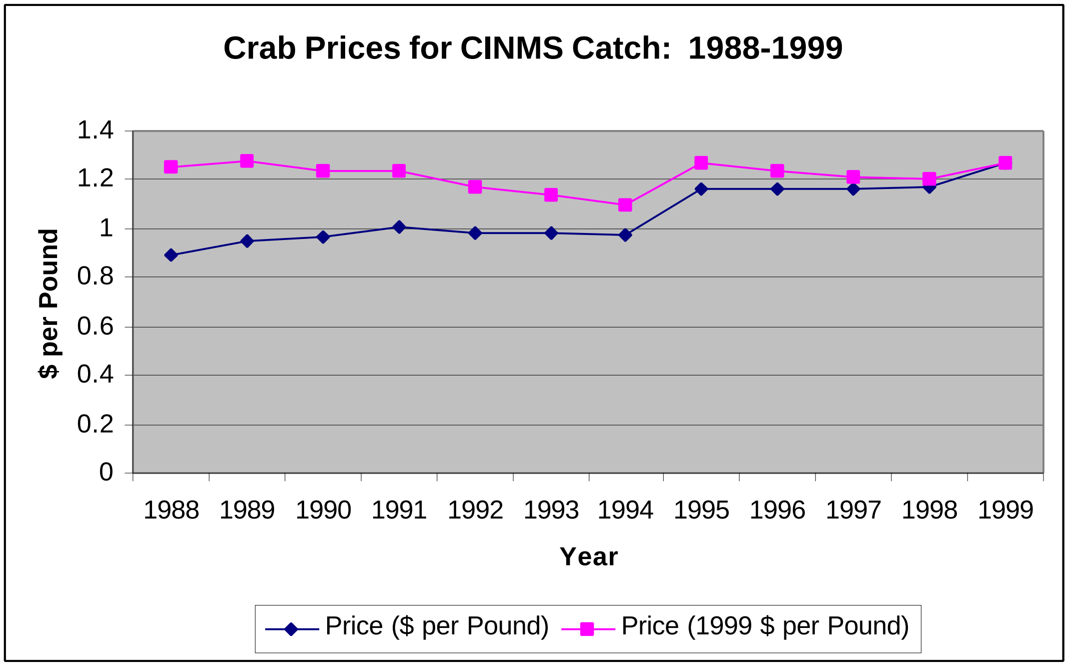
Rockfish Prices for CINMS Catch: 1988-1999
$ per Pound
3
2.5
2
1.5
1
0.5
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

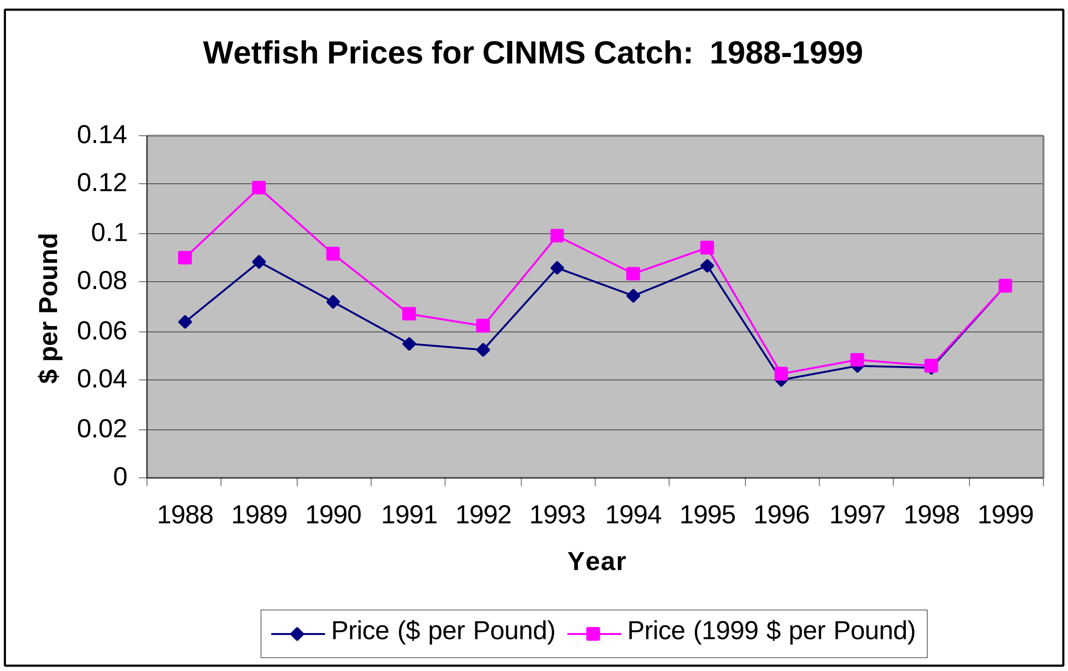
APPENDIX C


Prawn Prices for CINMS Catch: 1988-1999
$ per Pound
0
1
2
3
4
5
6
7
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

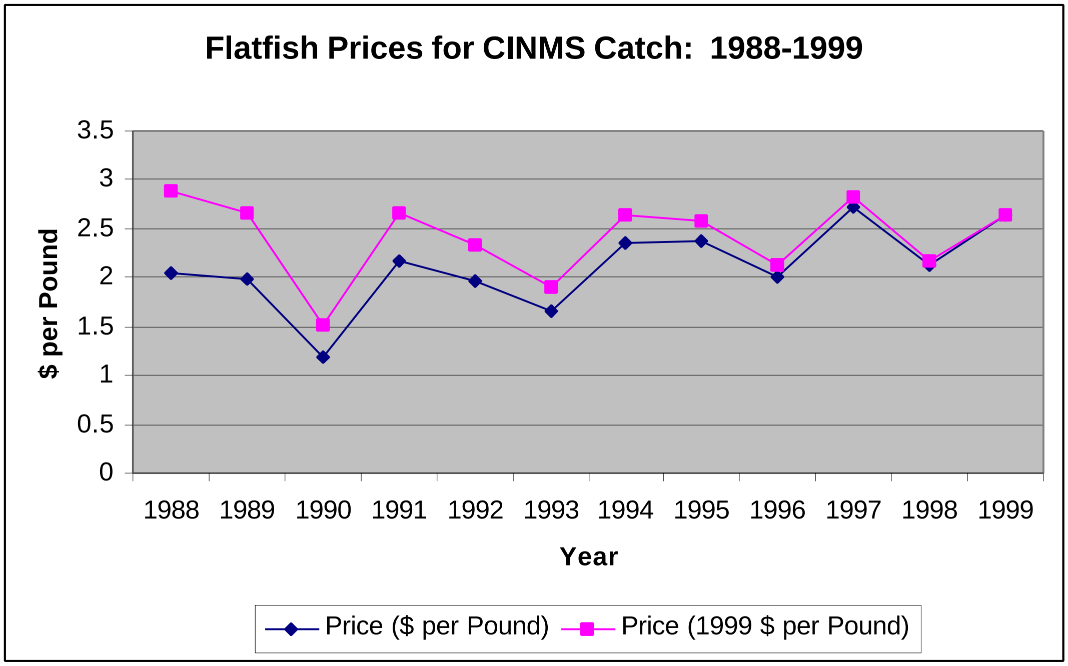

Abalone Prices for CINMS Catch: 1988-1999
$ per Pound
0.00
2.00
4.00
6.00
8.00
10.00
12.00
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Year
Price ($ per Pound)
Price (1999 $ per Pound)

APPENDIX C

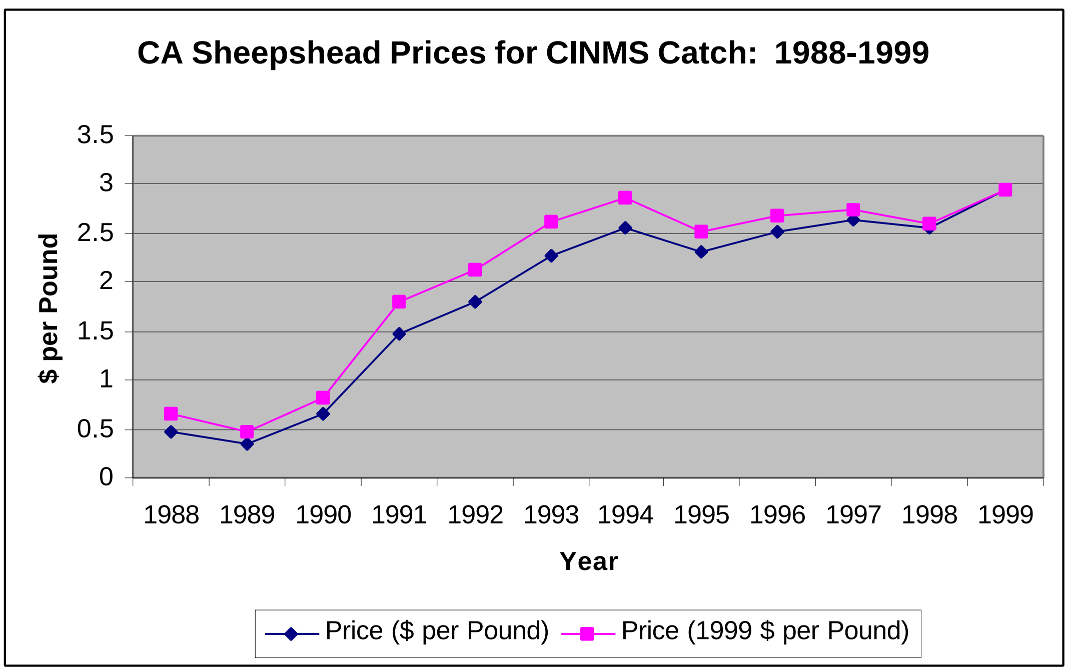

Crab Prices for CINMS Catch: 1988-1999
$ per Pound
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)


Wetfish Prices for CINMS Catch: 1988-1999
$ per Pound
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

APPENDIX C

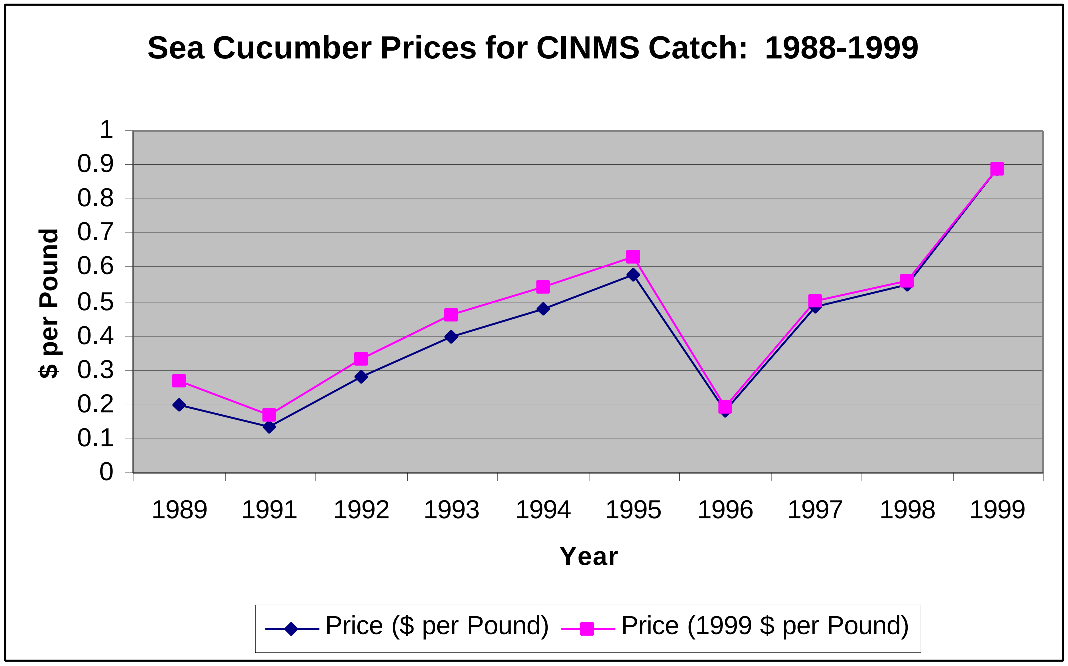


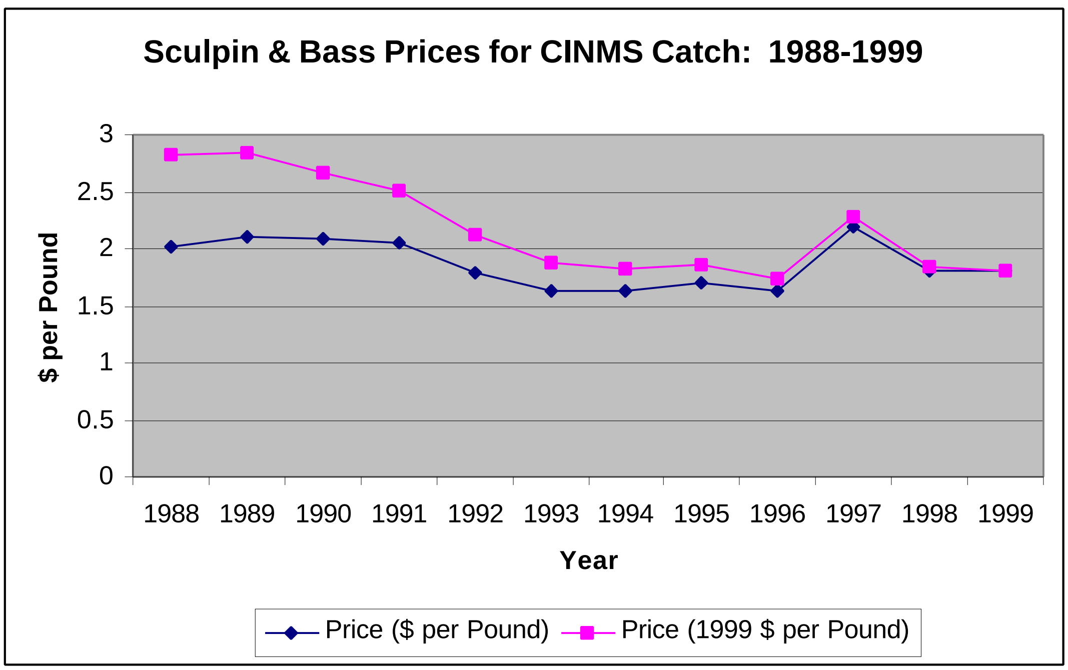
Flatfish Prices for CINMS Catch: 1988-1999
$ per Pound
3.5
3
2.5
2
1.5
1
0.5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)



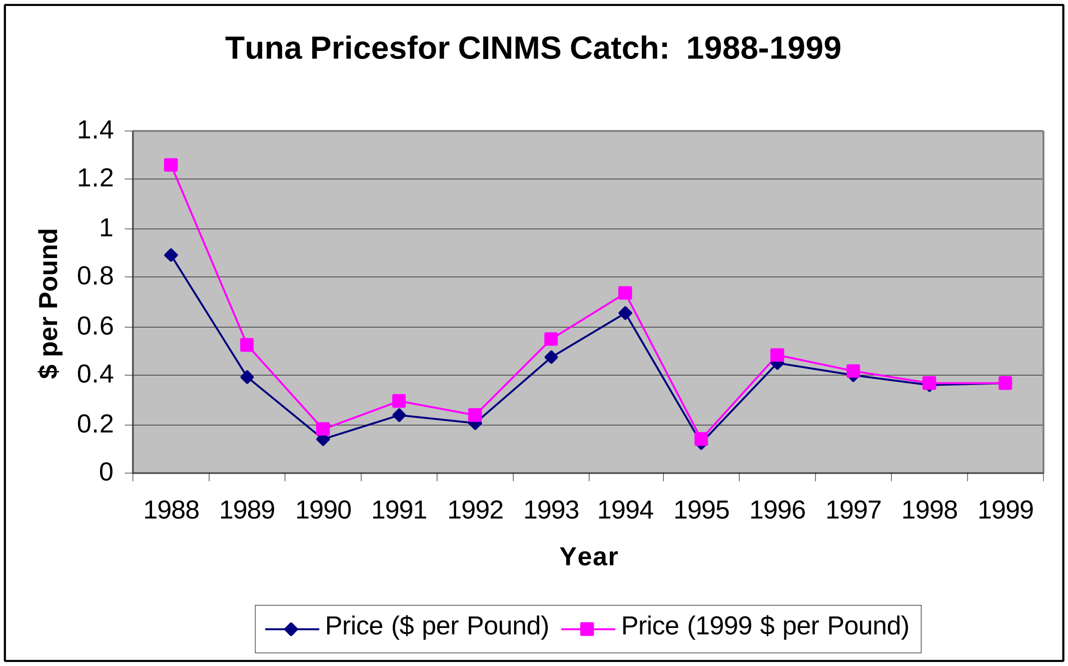
CA Sheepshead Prices for CINMS Catch: 1988-1999
$ per Pound
3.5
3
2.5
2
1.5
1
0.5
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

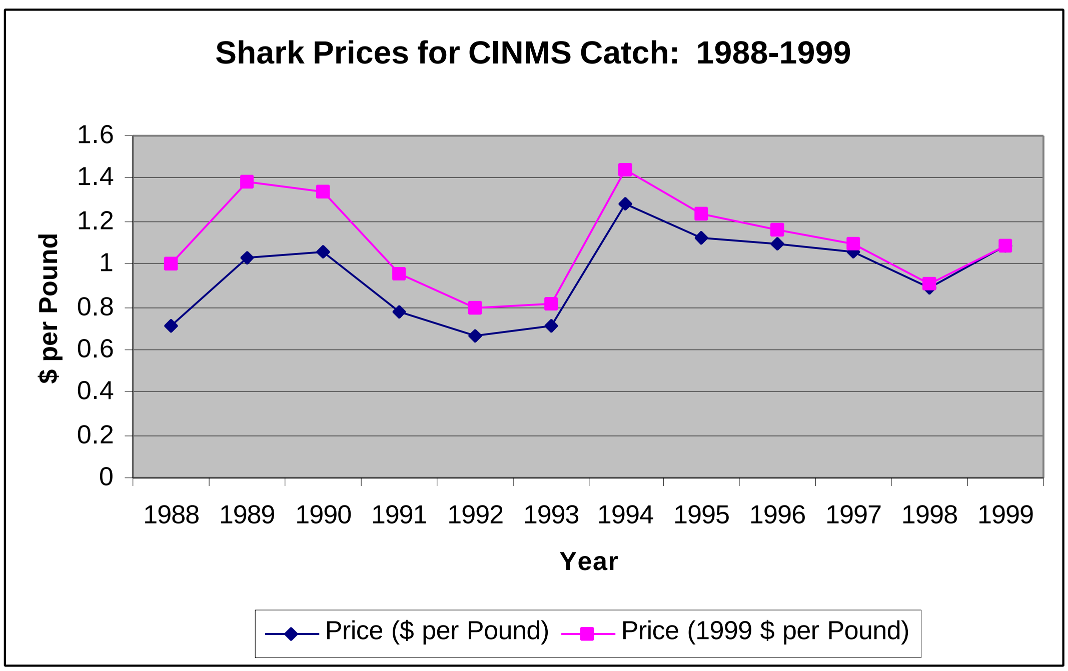
APPENDIX C


Sea Cucumber Prices for CINMS Catch: 1988-1999
$ per Pound
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

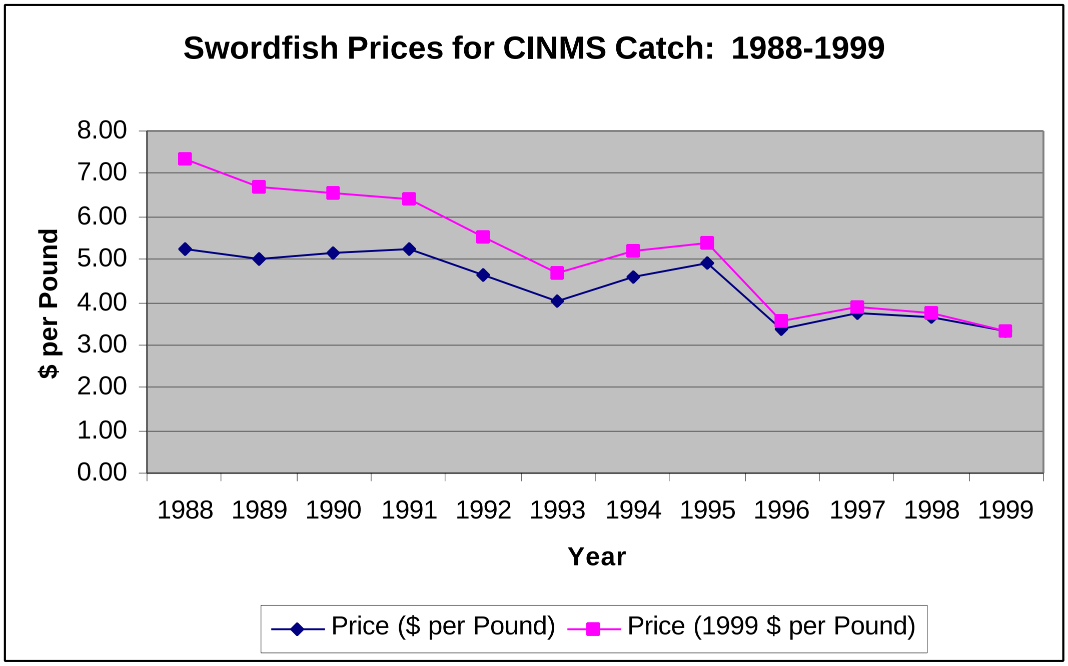

Sculpin & Bass Prices for CINMS Catch: 1988-1999
$ per Pound
3
2.5
2
1.5
1
0.5
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

APPENDIX C


Tuna Pricesfor CINMS Catch: 1988-1999
$ per Pound
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

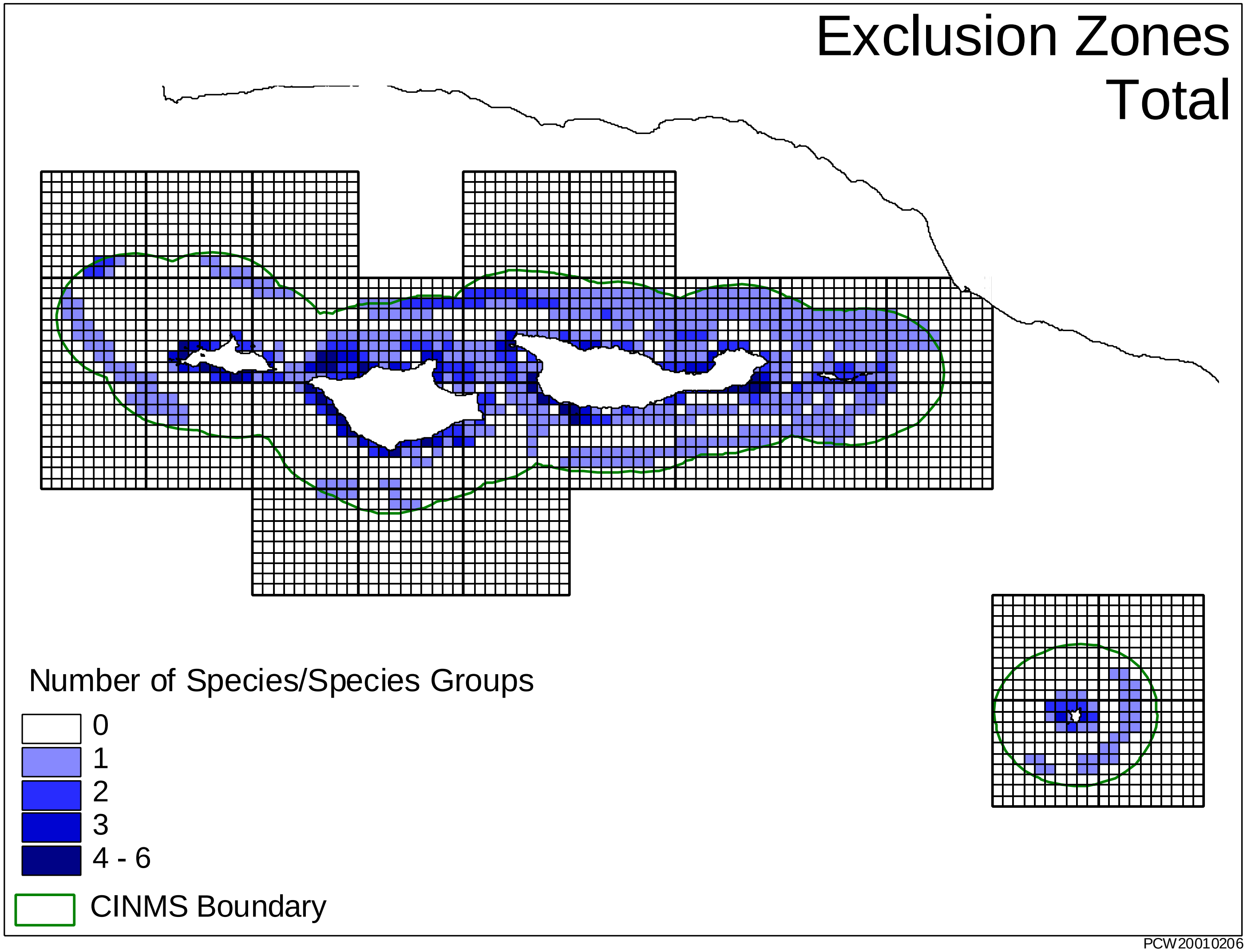

Shark Prices for CINMS Catch: 1988-1999
$ per Pound
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

APPENDIX C

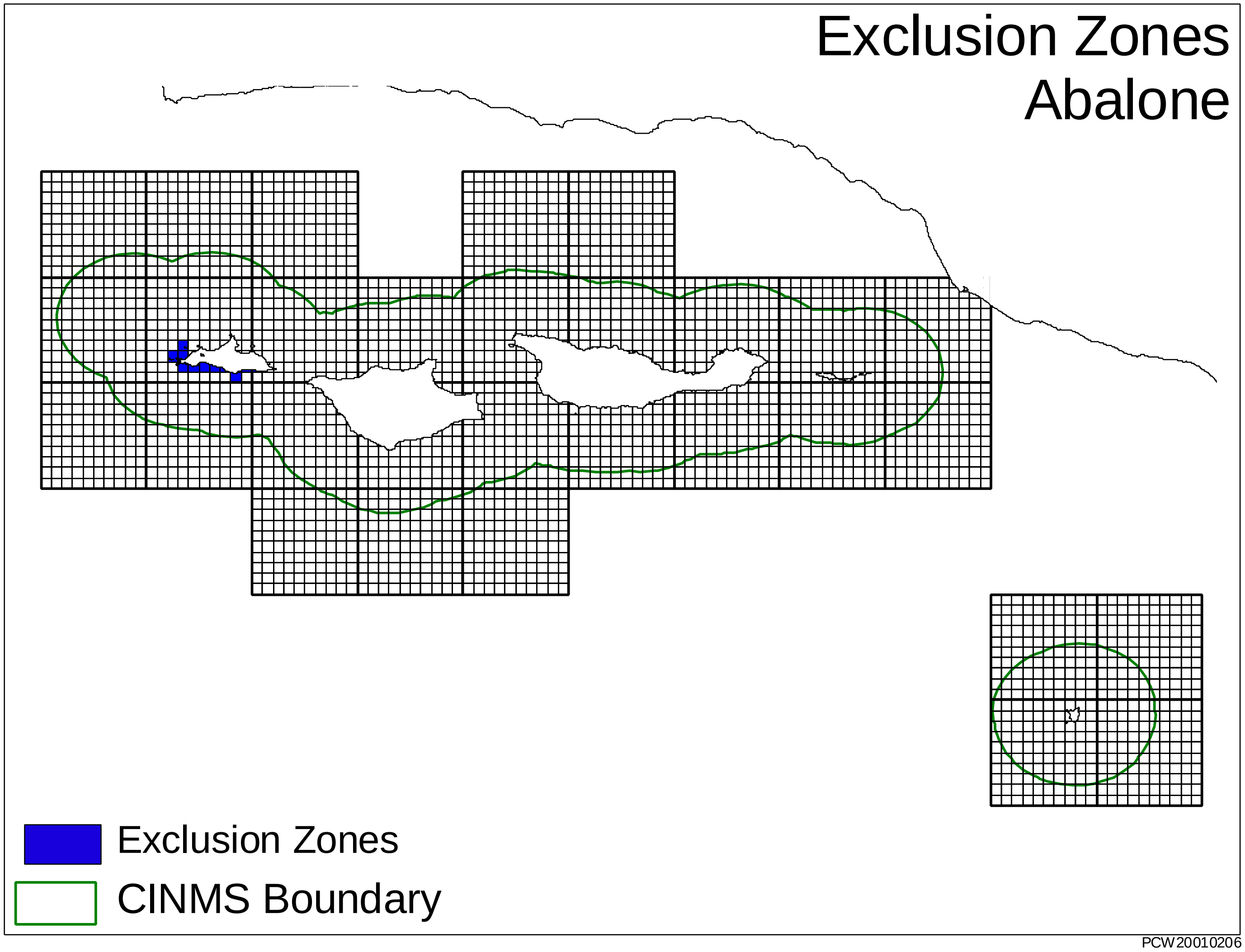


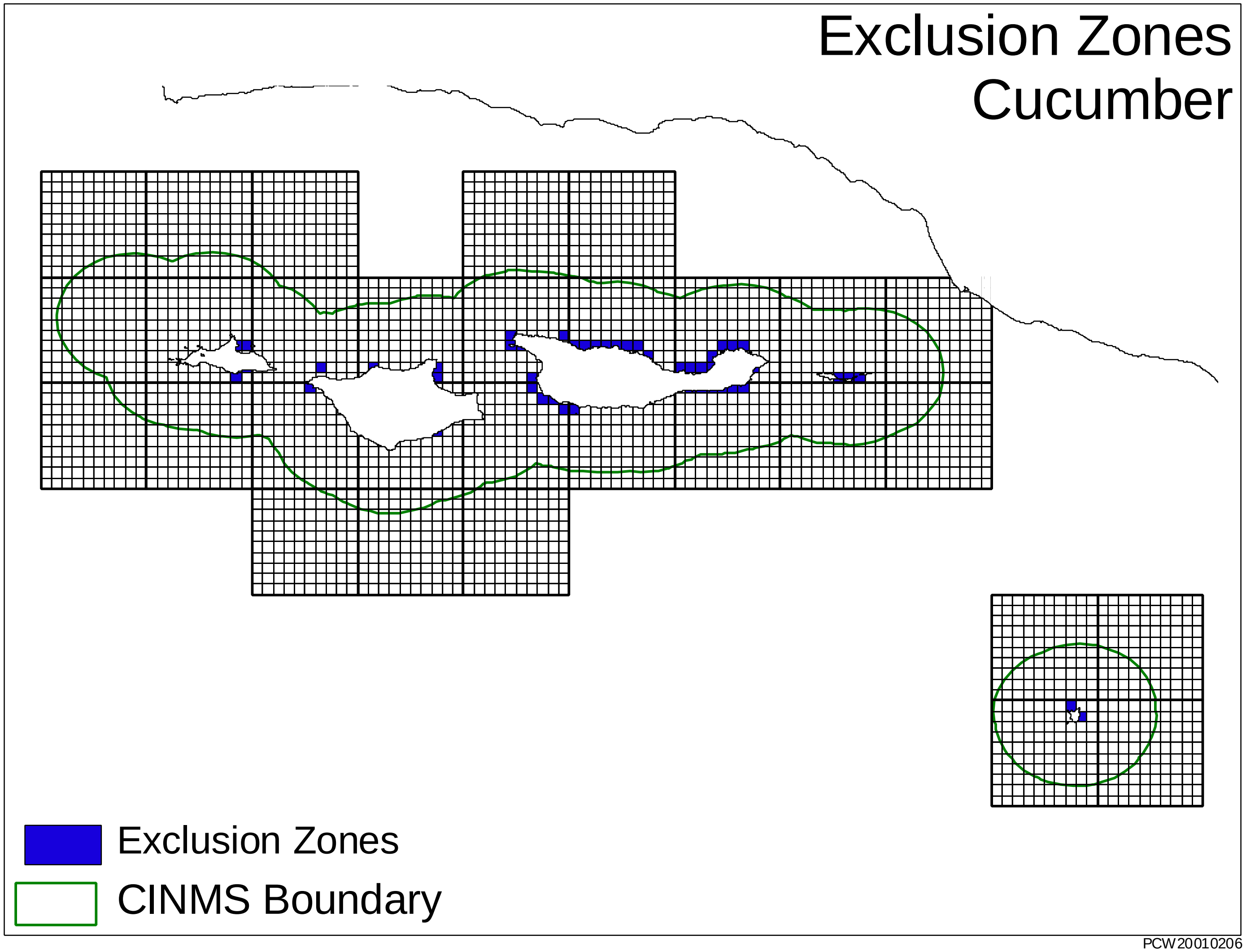
Swordfish Prices for CINMS Catch: 1988-1999
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
$ per Pound
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
Year
Price ($ per Pound)
Price (1999 $ per Pound)

APPENDIX C

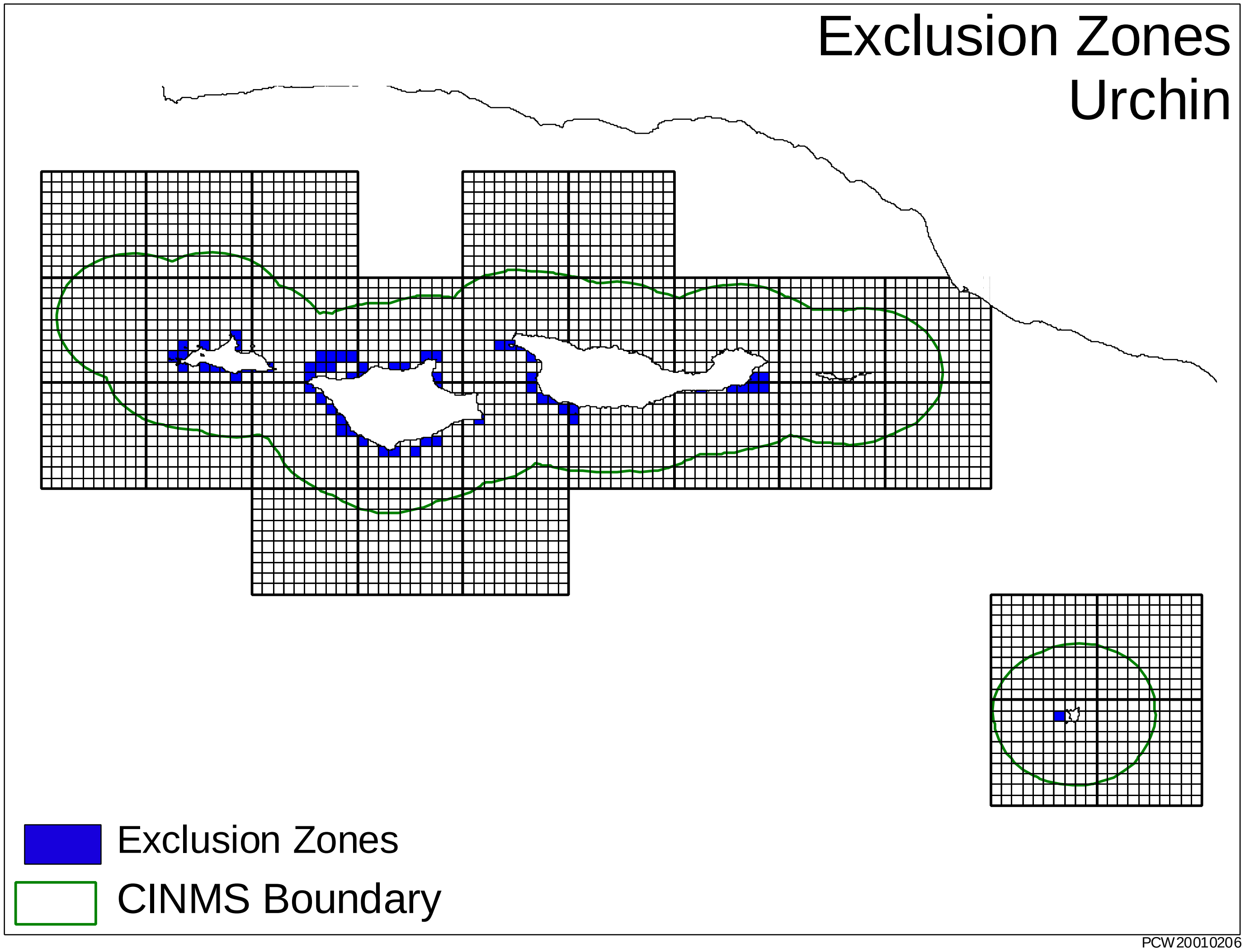

Exclusion Zones
Total
Number of Species/Species Groups
0
1
2
3
4 - 6
CINMS Boundary
PCW20010206

APPENDIX C


Exclusion Zones
Abalone
Exclusion Zones
CINMS Boundary
PCW20010206

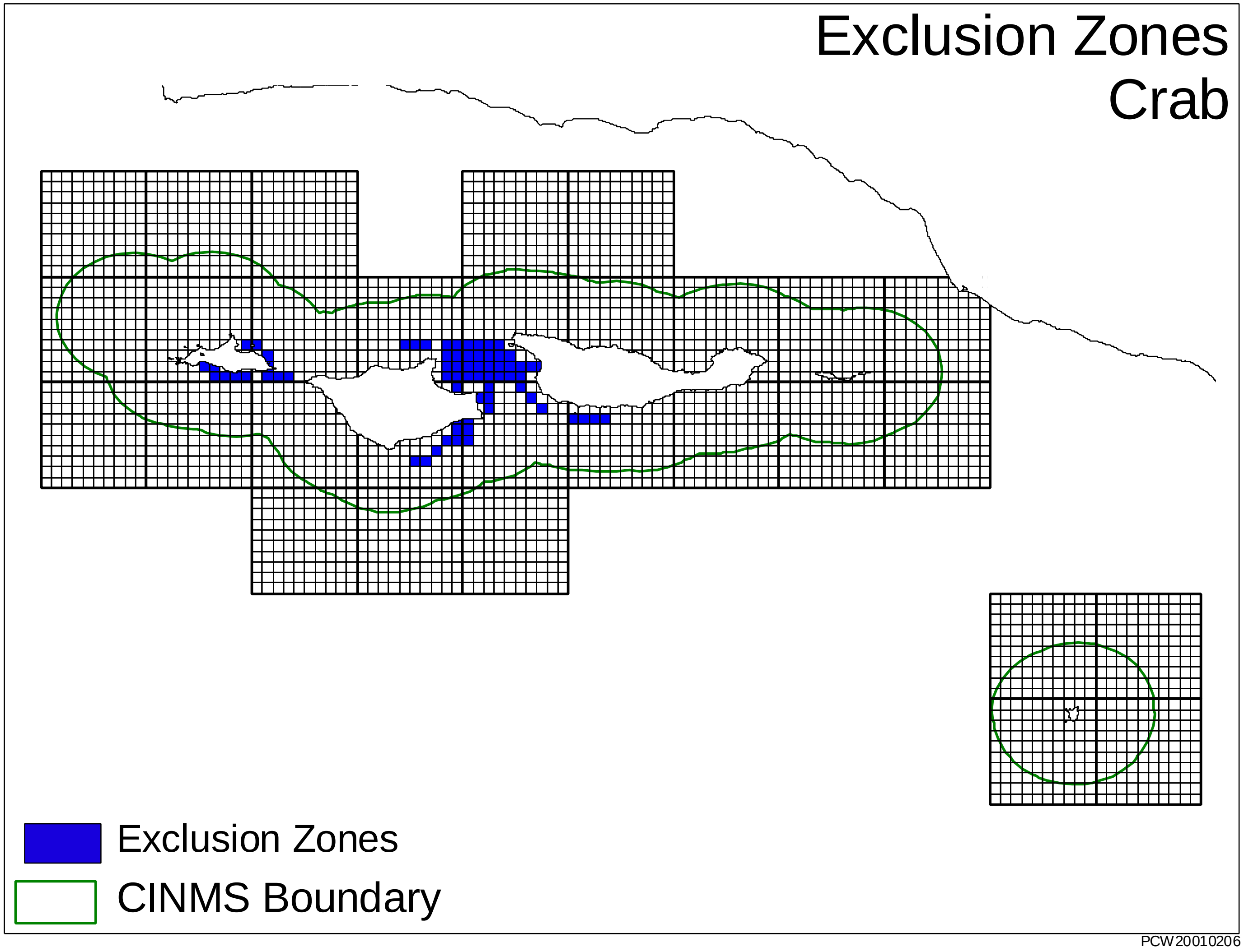

Exclusion Zones
Cucumber
Exclusion Zones
CINMS Boundary
PCW20010206

APPENDIX C



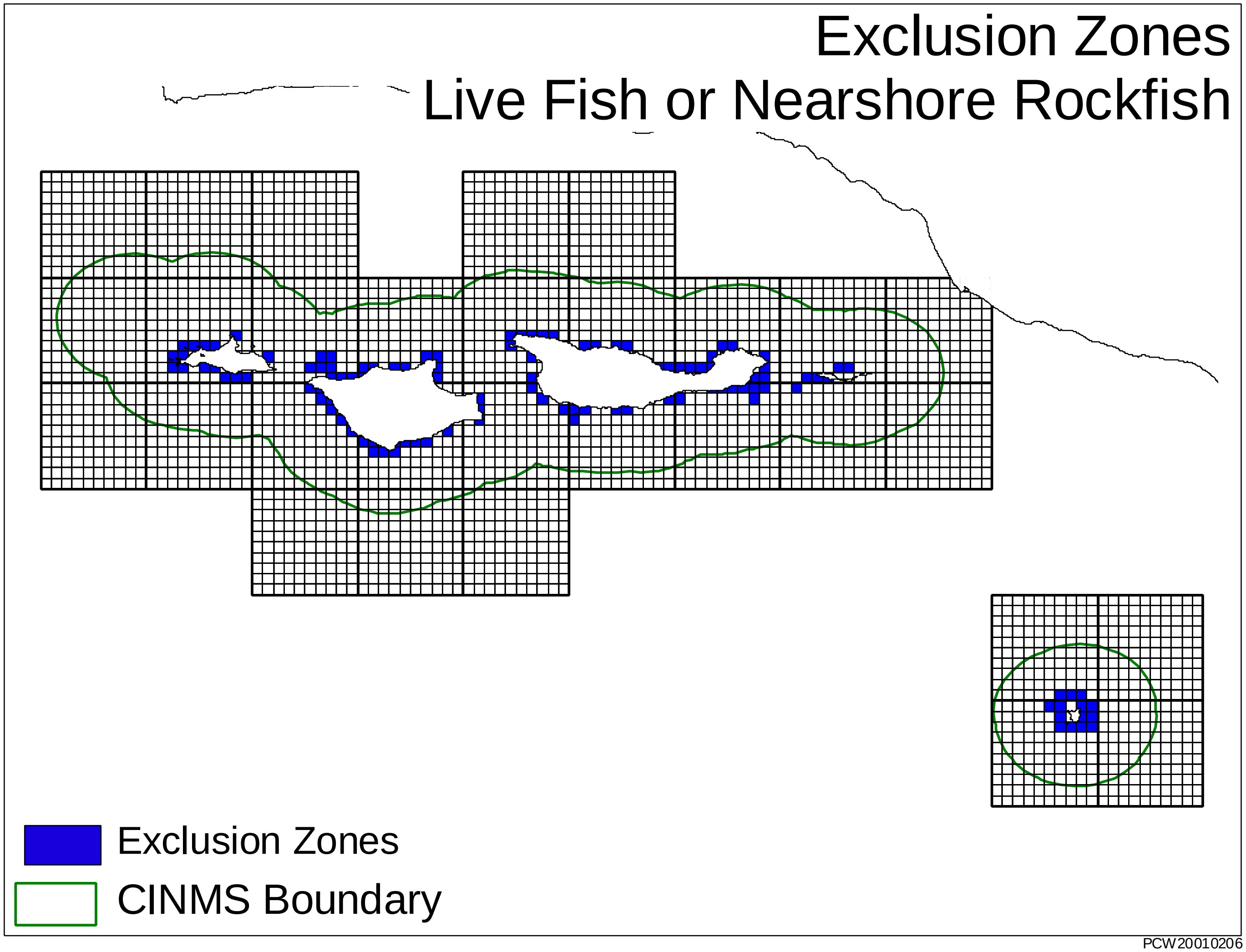
Exclusion Zones
Urchin
Exclusion Zones
CINMS Boundary
PCW20010206

APPENDIX C

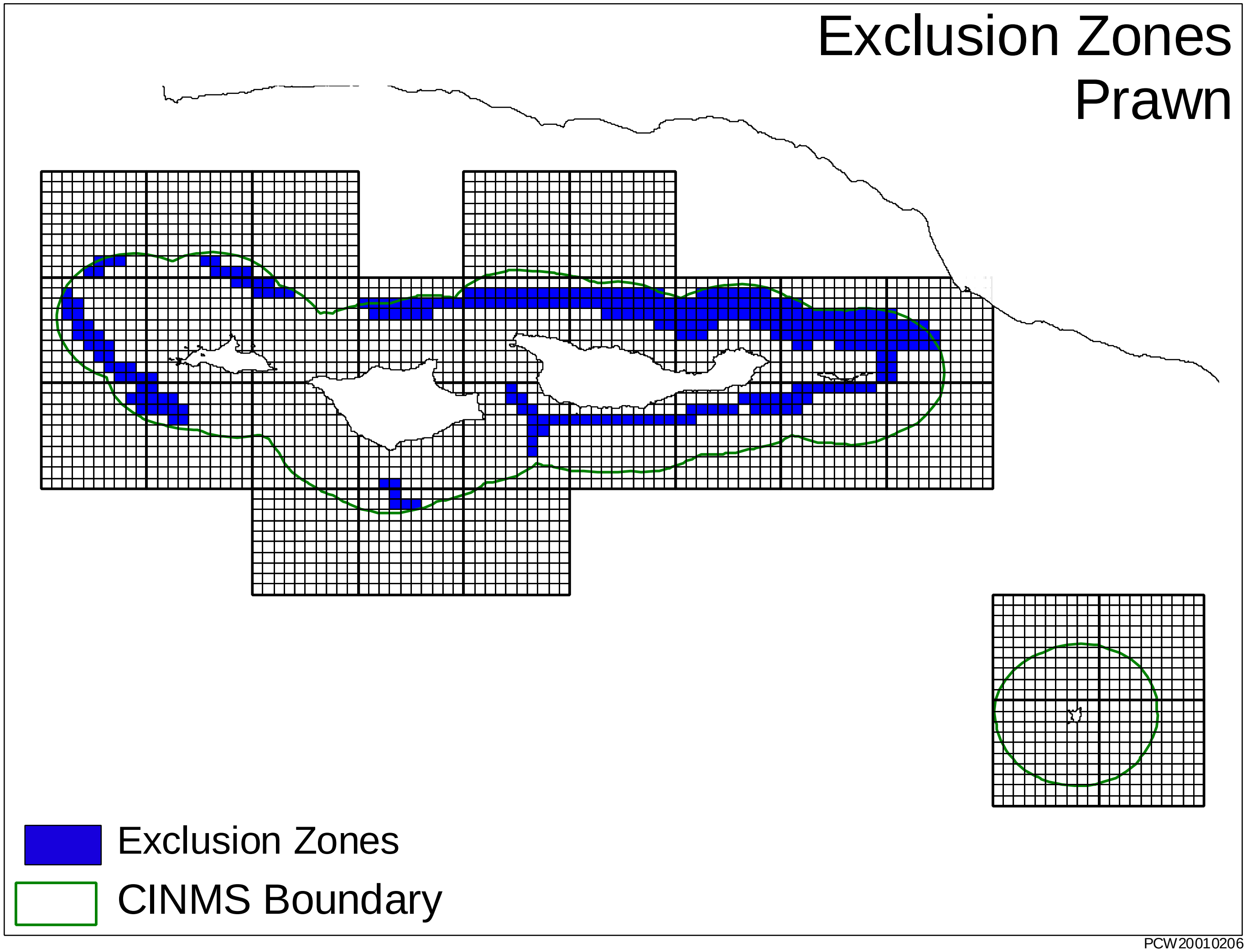


Exclusion Zones
Crab
Exclusion Zones
CINMS Boundary
PCW20010206

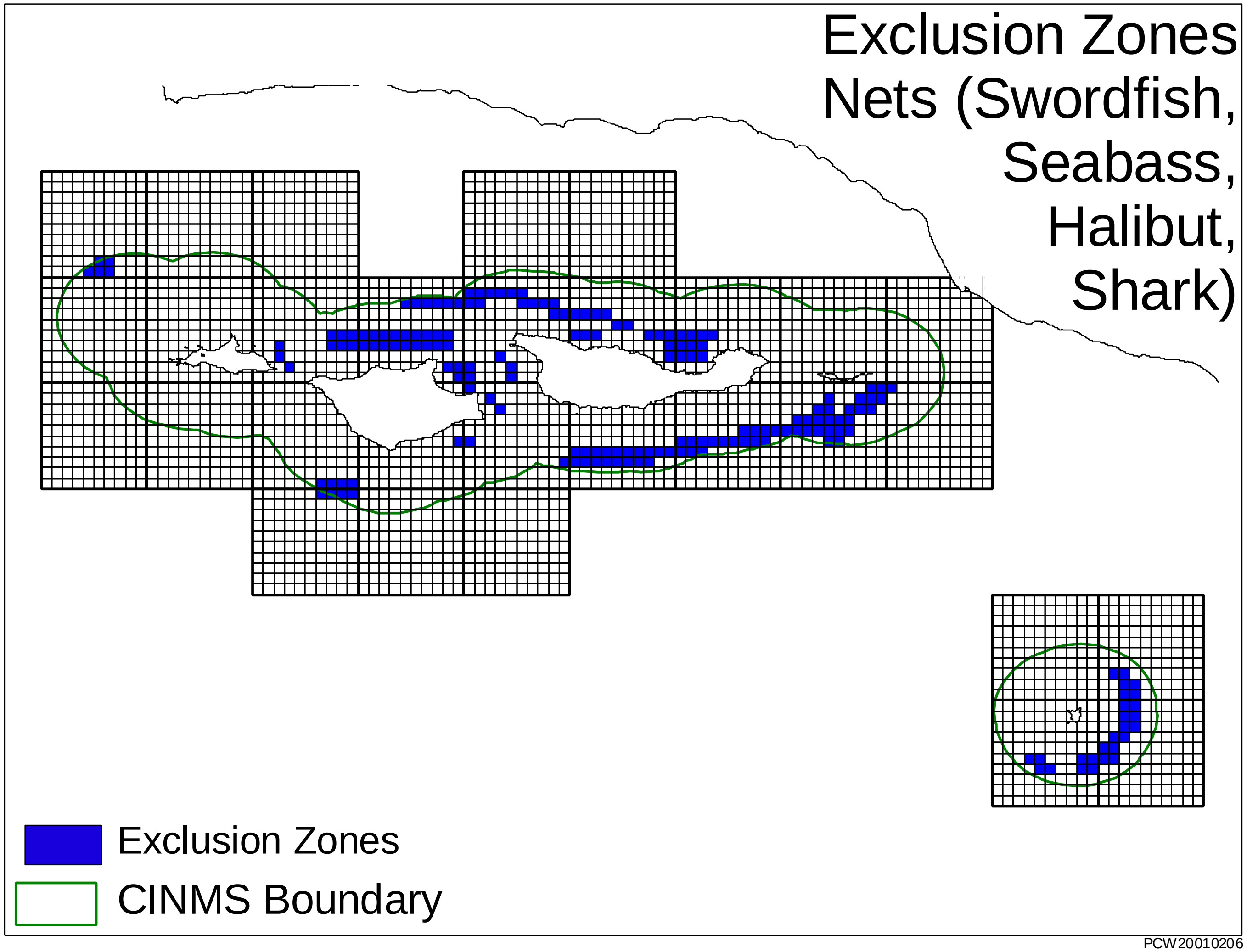
APPENDIX C

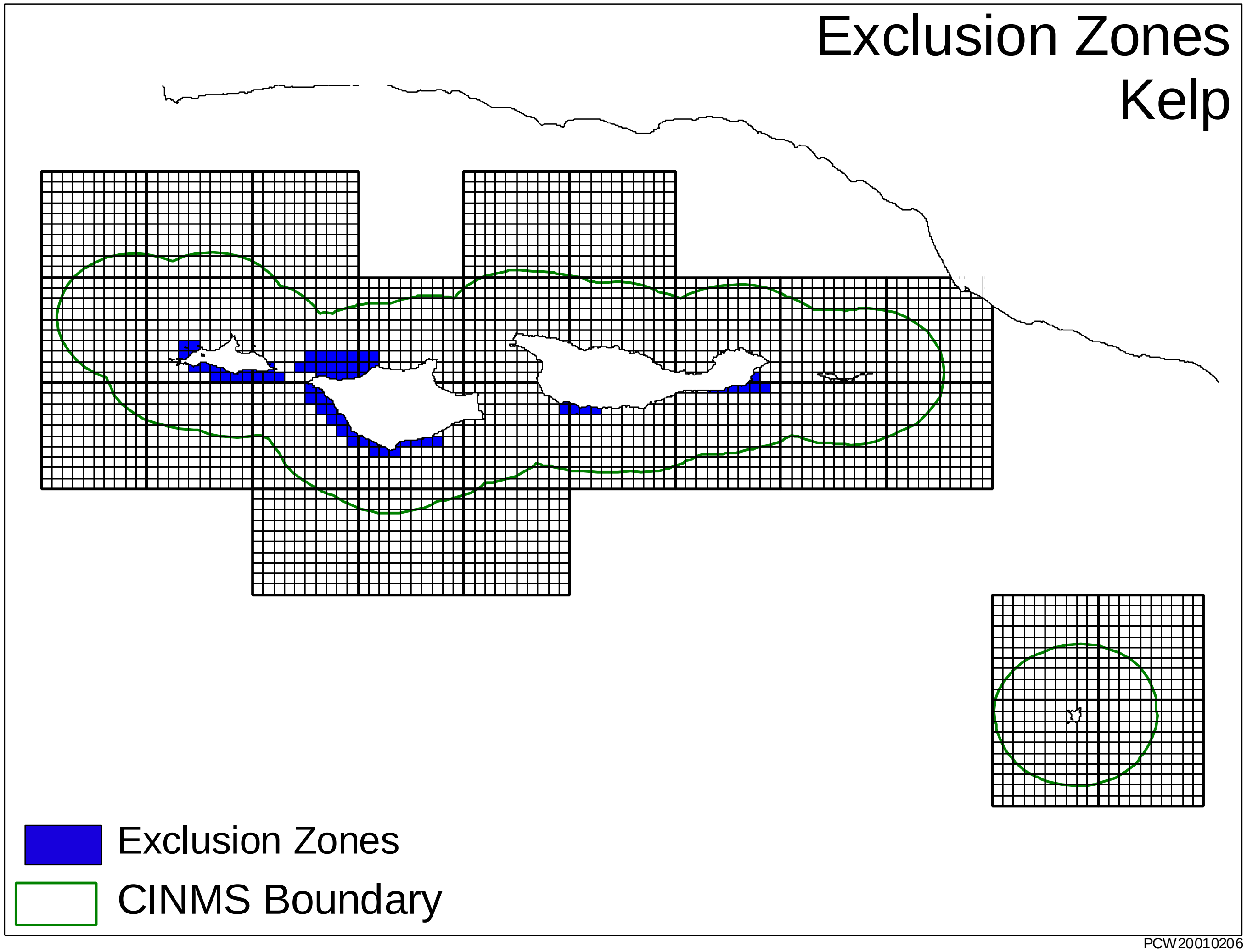


Exclusion Zones
Live Fish or Nearshore Rockfish
Exclusion Zones
CINMS Boundary
PCW20010206

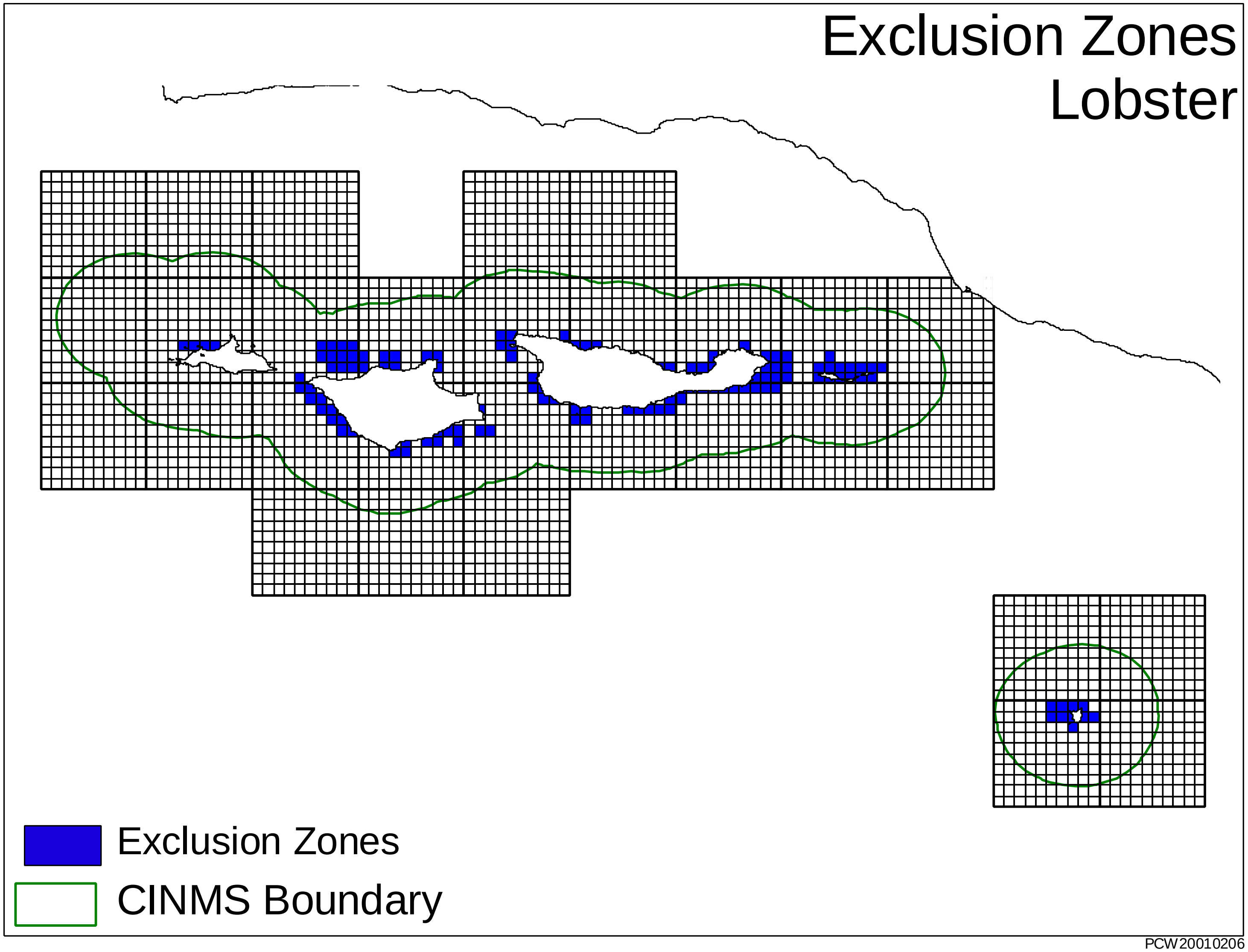

Exclusion Zones
Prawn
Exclusion Zones
CINMS Boundary
PCW20010206

APPENDIX C


Exclusion Zones
Nets (Swordfish,
Seabass,
Halibut,
Shark)
Exclusion Zones
CINMS Boundary
PCW20010206


Exclusion Zones
Kelp
Exclusion Zones
CINMS Boundary
PCW20010206

APPENDIX C



Exclusion Zones
Lobster
Exclusion Zones
CINMS Boundary
PCW20010206

APPENDIX C

Recreation

CONSUMPTIVE ACTIVITIES

The impact model for consumptive activities is ready for analysis. All of the parameters have been estimated and the model constructed.

Charter/party boat fishing

This data was collected under contract by Dr. Charles Kolstad of UC Santa Barbara. The charter/party operations in this survey are a *census* of operators, therefore this data represents the population, not a sample. The unit of observation in the survey was a firm, many of which operate multiple boats (the data was not collected by boat). Data was collected in one by one minute square grid cells within the study area. For charter/party boat fishing, 18 operators were surveyed for a total of 158,768 person-days of activity in the study area.

Charter/party boat consumptive diving

This data was also collected under contract by Dr. Kolstad. The charter/party operations in this survey are a *census* of operators, therefore this data is the population, not a sample. The unit of observation in the survey was a firm, many of which operate multiple boats (the data was not collected by boat). Data was collected in one by one minute square grid cells within the study area. For charter/party boat consumptive diving, 10 operators were surveyed for a total of 17,935 person-days of activity in the study area.

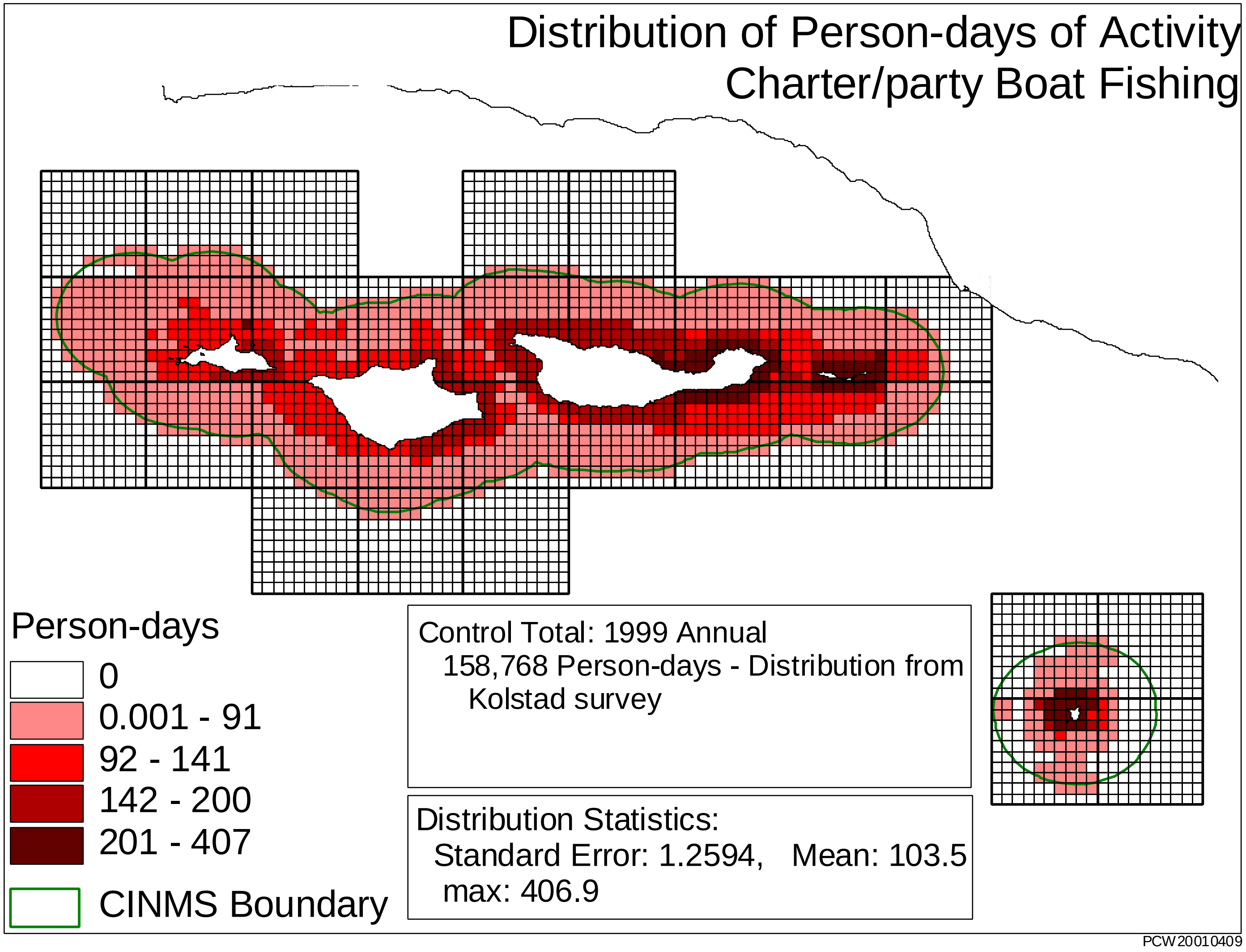
Private boat fishing

The distribution of private boat activities was pieced together using multiple sources of information/data with varying degrees of specificity and geographic coverage. In general, data was placed in the grid cells for which it was available, then using the assumption that the relative distribution was the same for private boat fishing and charter/party boat fishing, values for grid-cell containing no data were estimated based on the relationship between charter/party boat fishing grid-cell values. Data sources included the Channel Islands National Park, The Nature Conservancy, Yacht Clubs (two out of seven contacted), and a Marina. Based on the above methodology, it is estimated that there are 214,015 person-days of private boat fishing annually in the study area.

Private boat diving

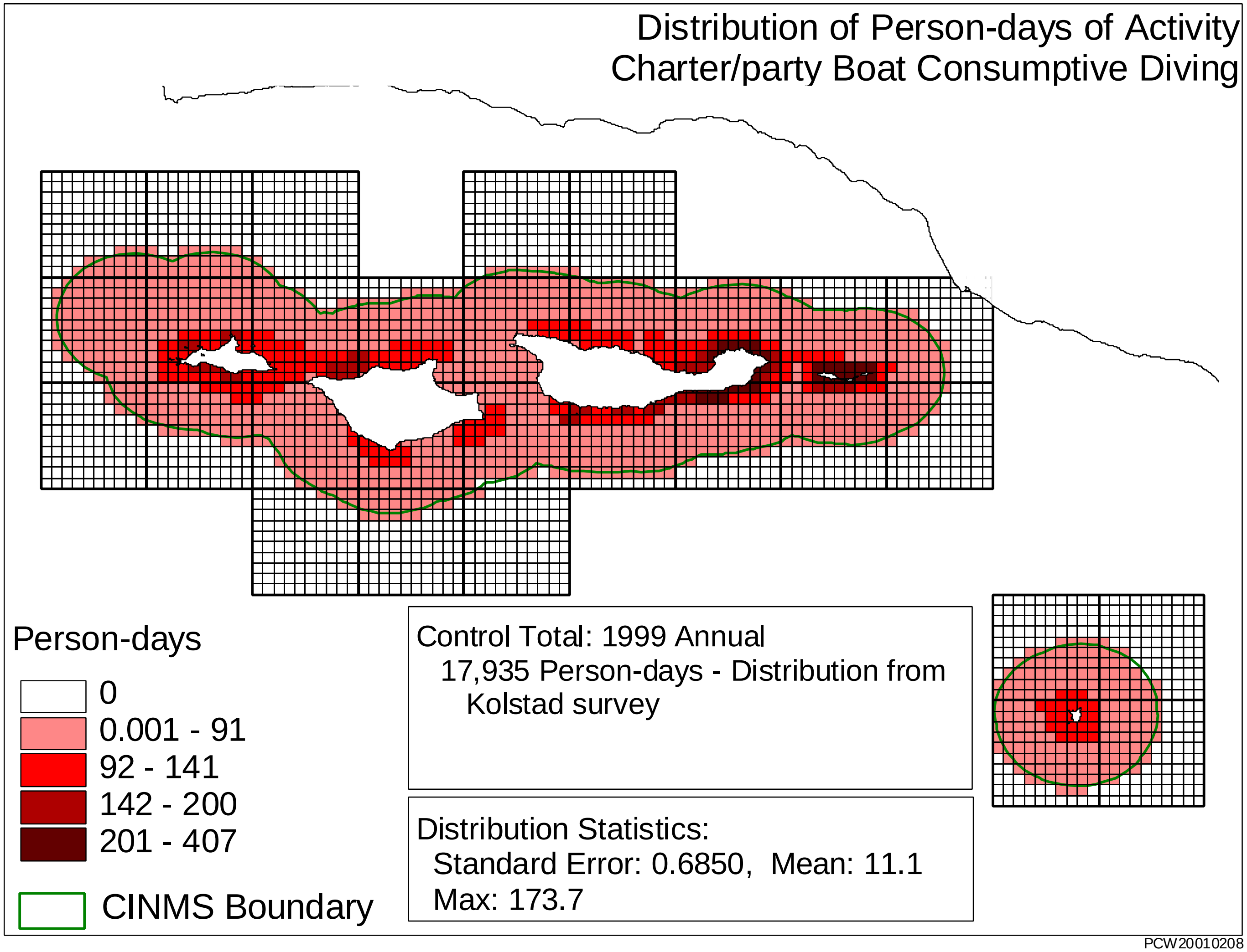
The distribution of private boat diving was derived in the same way as was private boat fishing. In general, data was placed in the grid cells for which it was available, then using the assumption that the relative distribution was the same for private boat fishing and charter/party boat fishing, values for grid-cell containing no data were estimated based on the relationship between charter/party boat fishing grid-cell values. Data sources included the Channel Islands National Park, The Nature Conservancy, Yacht Clubs, and a Marina. Based on the above methodology, it is estimated that there are 47,190 person-days of private boat fishing annually in the study area.

APPENDIX C



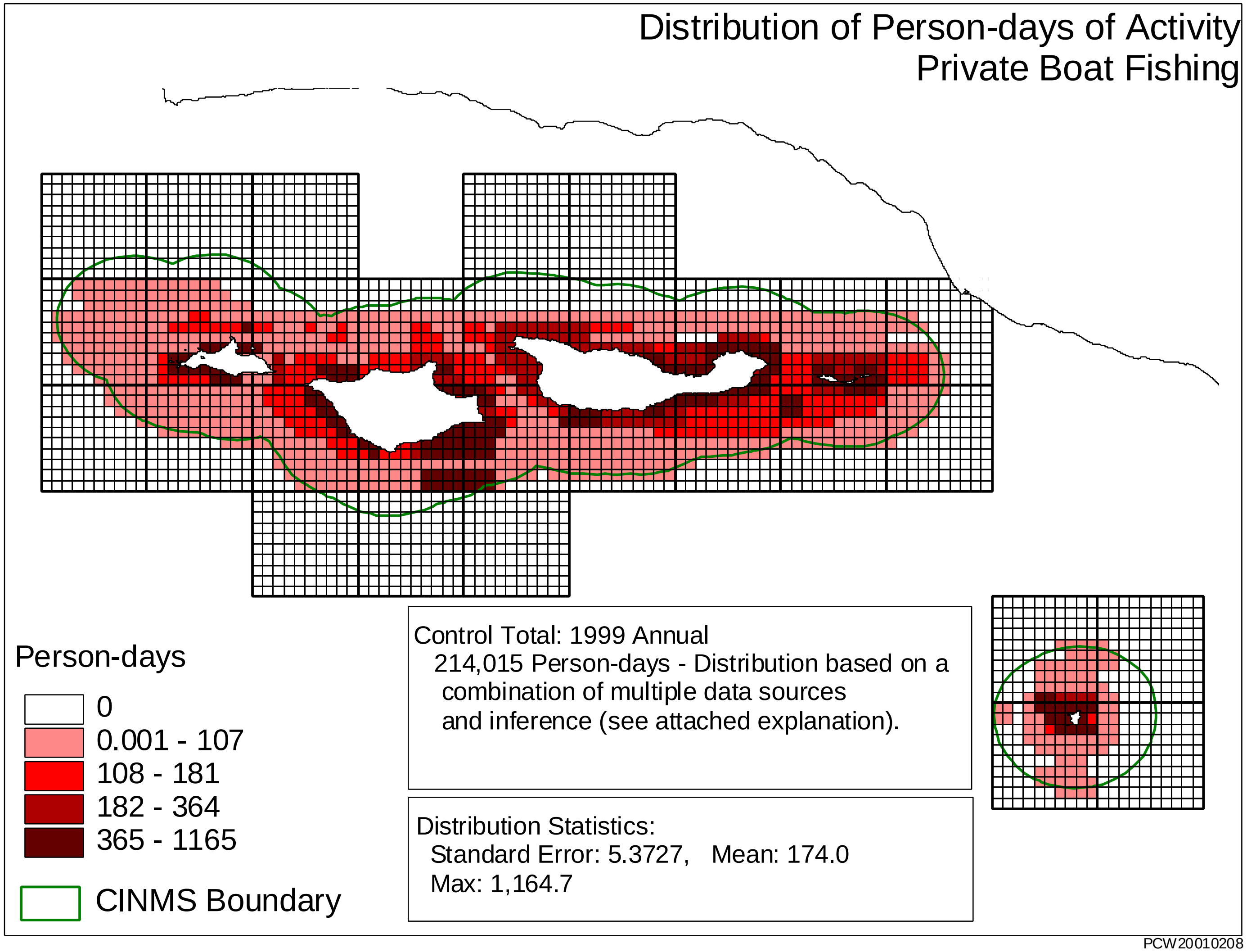
Distribution of Person-days of Activity
Charter/party Boat Fishing
Person-days
0
0.001 - 91
92 - 141
142 - 200
201 - 407
CINMS Boundary
Control Total: 1999 Annual
158,768 Person-days - Distribution from
Kolstad survey
Distribution Statistics:
Standard Error: 1.2594, Mean: 103.5
max: 406.9
PCW20010409

APPENDIX C



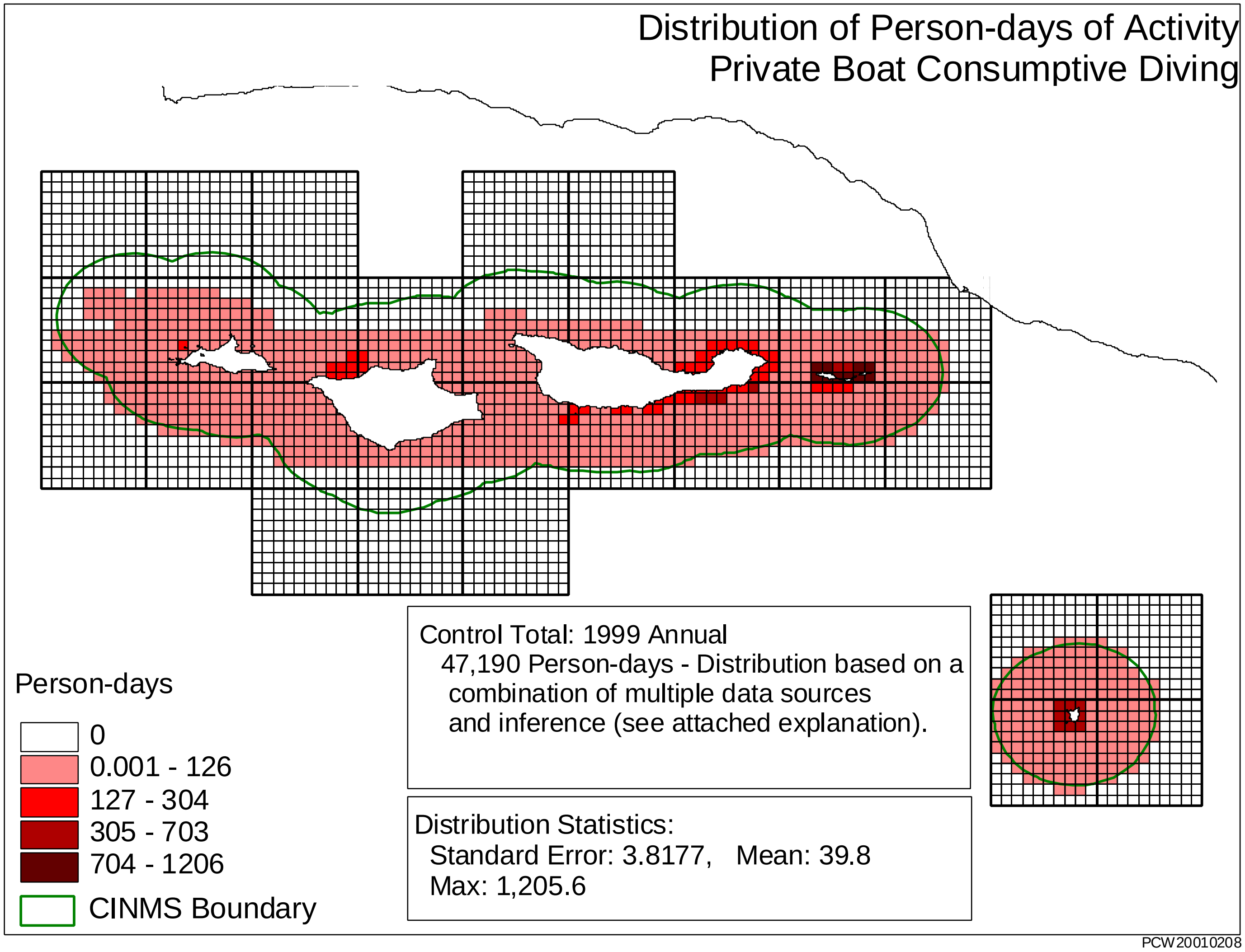
Distribution of Person-days of Activity
Charter/party Boat Consumptive Diving
Person-days
0
0.001 - 91
92 - 141
142 - 200
201 - 407
CINMS Boundary
Control Total: 1999 Annual
17,935 Person-days - Distribution from Kolstad survey
Distribution Statistics:
Standard Error: 0.6850, Mean: 11.1
Max: 173.7
PCW20010208

APPENDIX C



Distribution of Person-days of Activity
Private Boat Fishing
Person-days
0
0.001 - 107
108 - 181
182 - 364
365 - 1165
CINMS Boundary
Control Total: 1999 Annual
214,015 Person-days - Distribution based on a combination of multiple data sources and inference (see attached explanation).
Distribution Statistics:
Standard Error: 5.3727, Mean: 174.0
Max: 1,164.7
PCW20010208

APPENDIX C


Distribution of Person-days of Activity
Private Boat Consumptive Diving
Person-days
0
0.001 - 126
127 - 304
305 - 703
704 - 1206
CINMS Boundary
Control Total: 1999 Annual
47,190 Person-days - Distribution based on a combination of multiple data sources and inference (see attached explanation).
Distribution Statistics:
Standard Error: 3.8177, Mean: 39.8
Max: 1,205.6
PCW20010208

APPENDIX C

Recreation

NON-CONSUMPTIVE ACTIVITIES

The impact model for non-consumptive activities is under final review. Parameters will be finalized in the near future. Per-person-per-day consumer's surplus and the sources for the expenditure profile for non-consumptive activities are being examined and if necessary, revised.

Whale watching

This data was collected under contract by Dr. Charles Kolstad of UC Santa Barbara. The charter/party operations in this survey are a *census* of operators, therefore this data represents the population, not a sample. The unit of observation in the survey was a firm, many of which operate multiple boats (the data was not collected by boat). Data was collected in one by one minute square grid cells within the study area. For charter/party boat fishing, 8 operators were surveyed for a total of 25,984 person-days of activity in the study area. We were unable to locate any sources for private boat whale watching.

Non-consumptive diving

This data was also collected under contract by Dr. Kolstad. The charter/party operations in this survey are a *census* of operators, therefore this data is the population, not a sample. The unit of observation in the survey was a firm, many of which operate multiple boats (the data was not collected by boat). Data was collected in one by one minute square grid cells within the study area. For charter/party boat non-consumptive diving, 7 operators were surveyed for a total of 10,776 person-days of activity in the study area. In some cases operators engaged in both consumptive and non-consumptive diving. In these cases the person-days of each was provided separately.

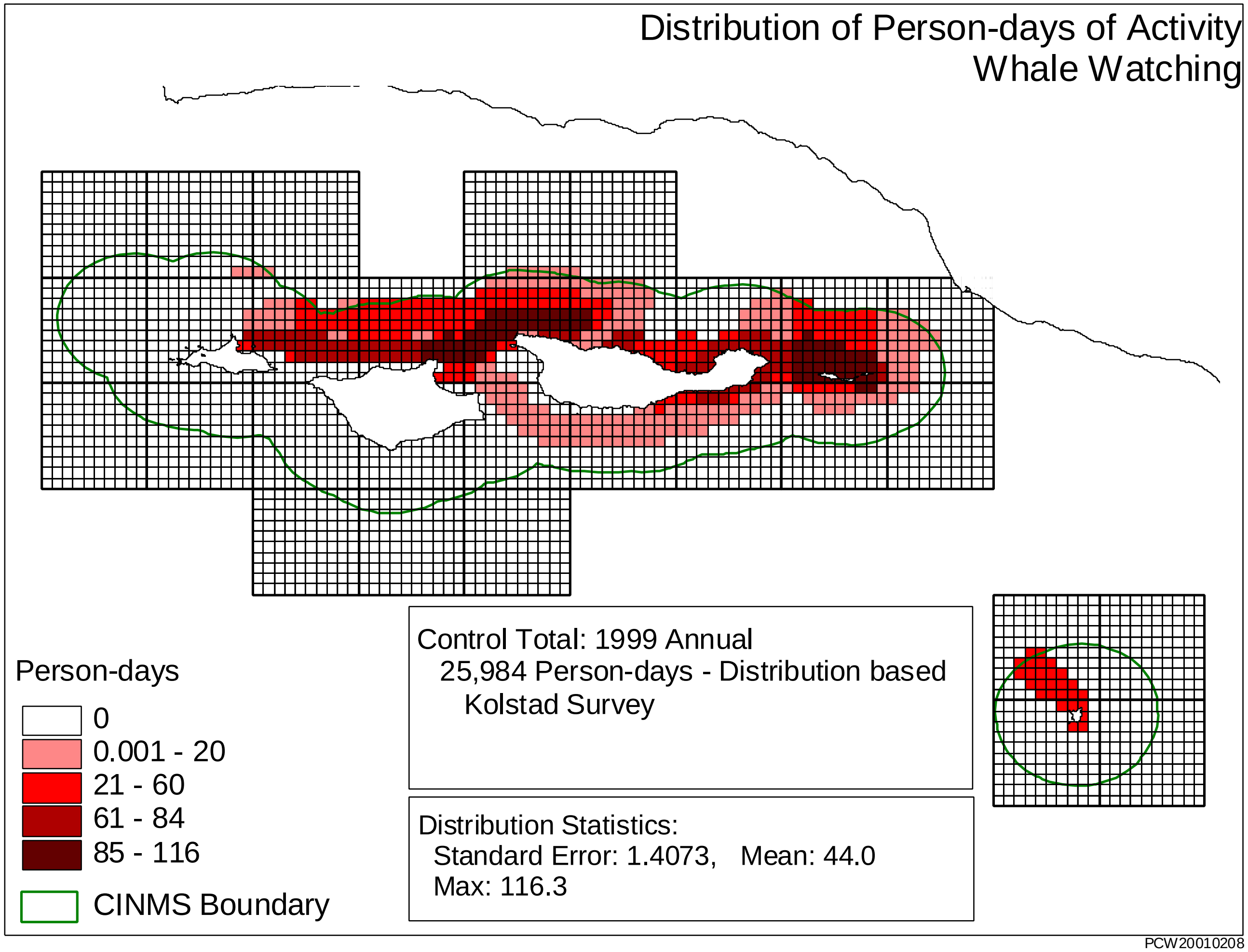
Sailing

This data was also collected as part of Dr. Kolstad's survey. 8 charter sailing operators were surveyed for a total of 4,015 person-days of activity in the study area.

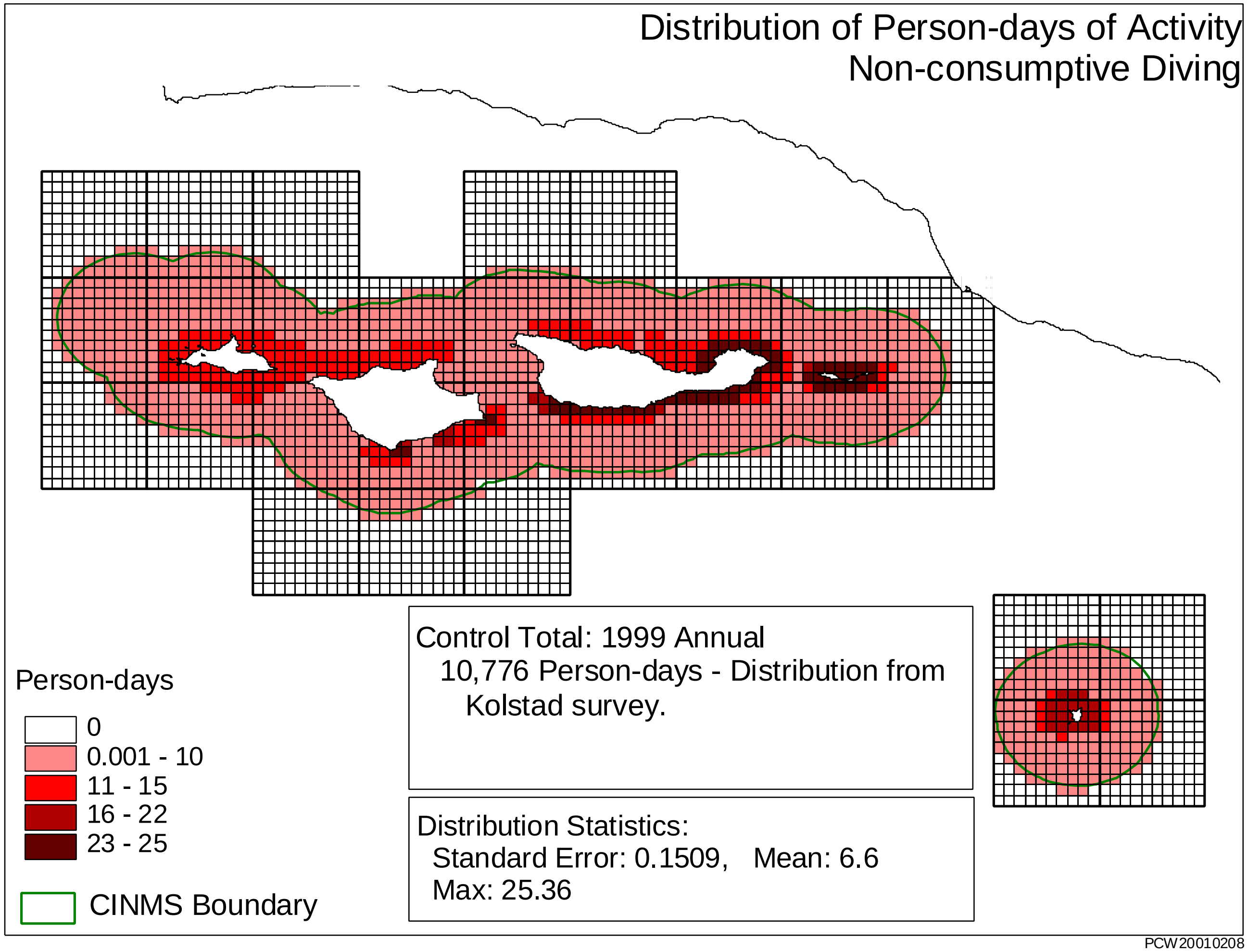
Kayaking/Island Sightseeing

This data was also collected as part of Dr. Kolstad's survey. 4 operators were surveyed for a total of 1,233 person-days of activity in the study area.

APPENDIX C


Distribution of Person-days of Activity
Whale Watching
Control Total: 1999 Annual
25,984 Person-days - Distribution based
Kolstad Survey
Distribution Statistics:
Standard Error: 1.4073, Mean: 44.0
Max: 116.3
Person-days
0
0.001 - 20
21 - 60
61 - 84
85 - 116
CINMS Boundary
PCW20010208

APPENDIX C



Distribution of Person-days of Activity
Non-consumptive Diving
Person-days
0
0.001 - 10
11 - 15
16 - 22
23 - 25
CINMS Boundary
Control Total: 1999 Annual
10,776 Person-days - Distribution from
Kolstad survey.
Distribution Statistics:
Standard Error: 0.1509, Mean: 6.6
Max: 25.36
PCW20010208

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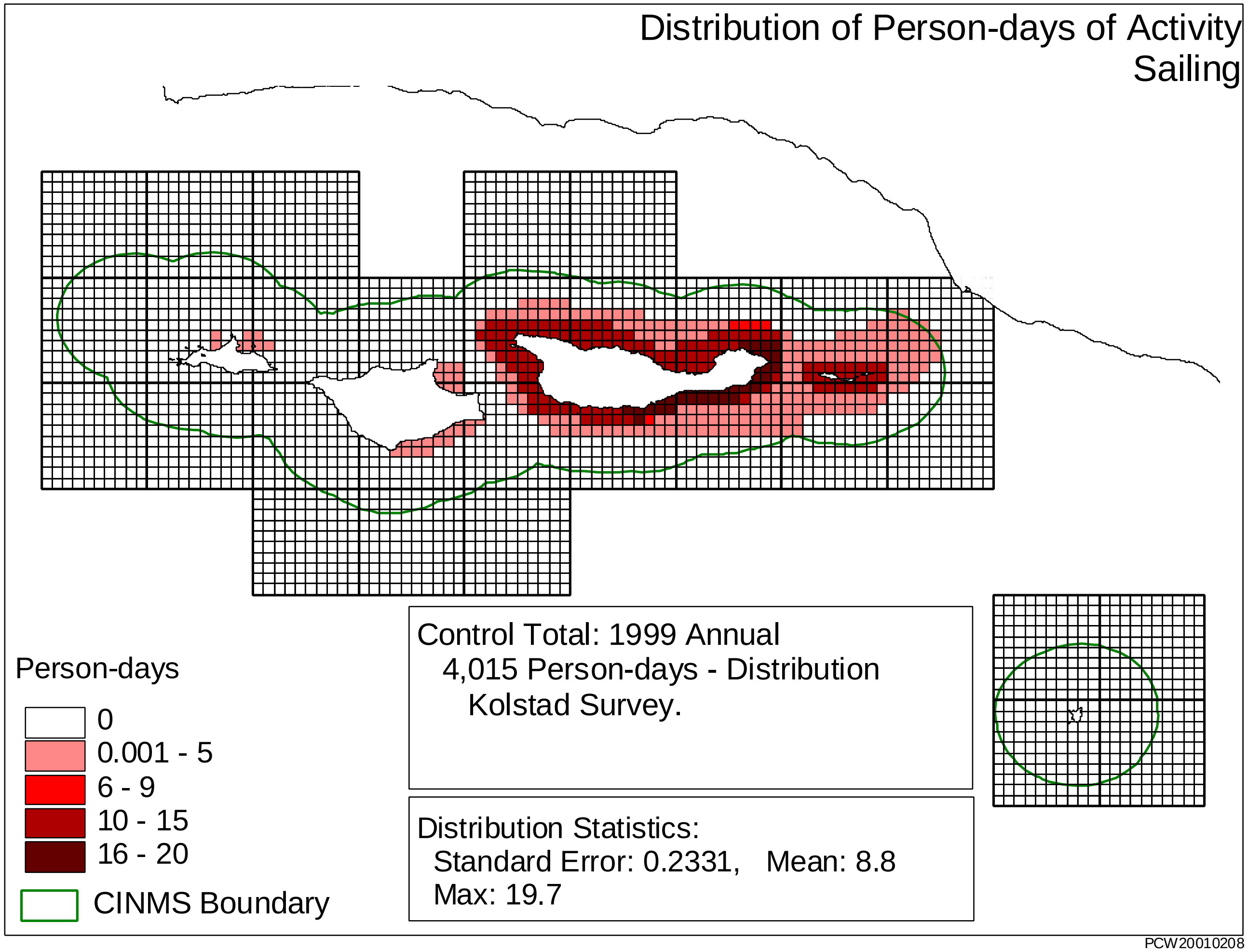

Distribution of Person-days of Activity
Sailing
Person-days
0
0.001 - 5
6 - 9
10 - 15
16 - 20
CINMS Boundary
Control Total: 1999 Annual
4,015 Person-days - Distribution
Kolstad Survey.
Distribution Statistics:
Standard Error: 0.2331, Mean: 8.8
Max: 19.7
PCW20010208

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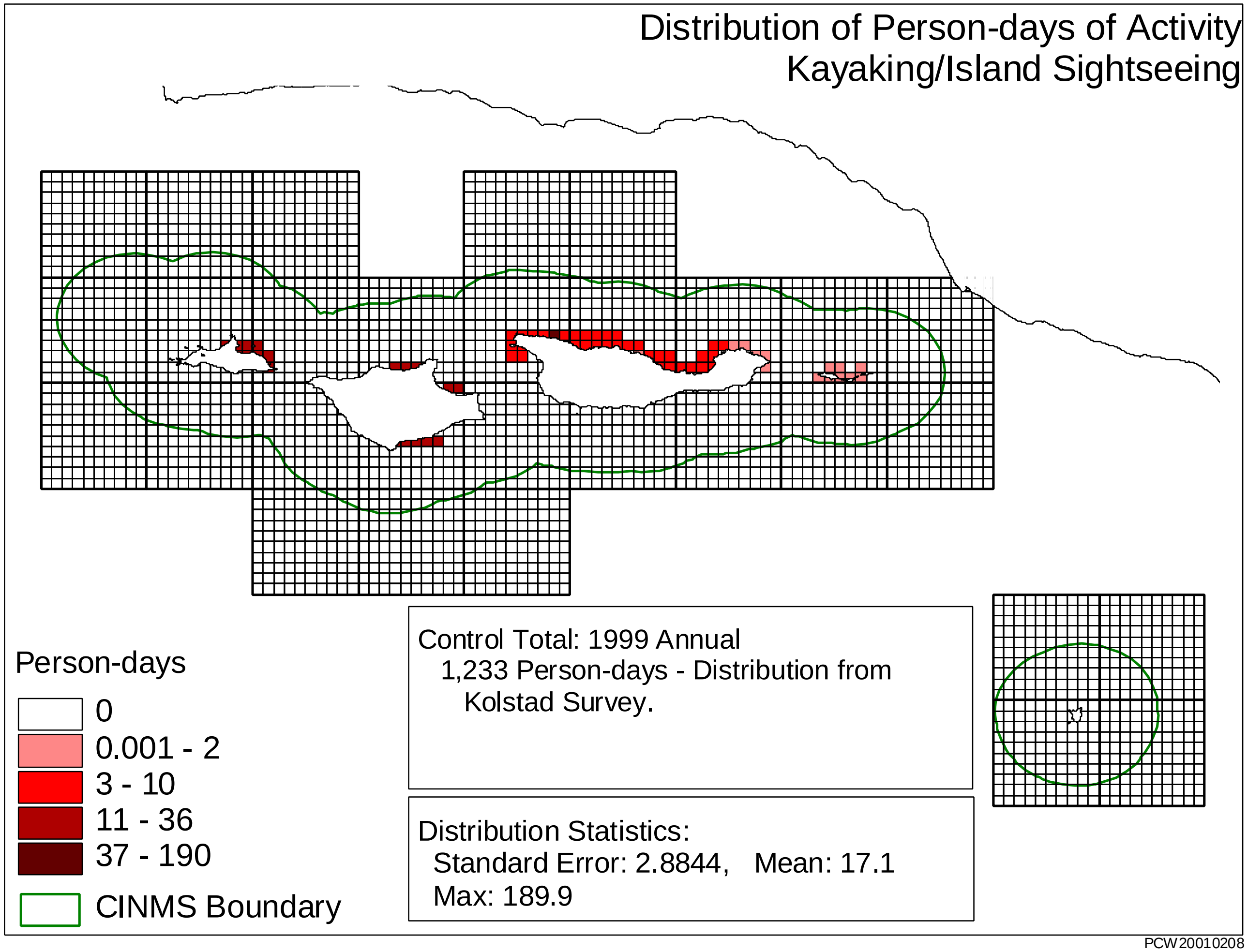

Distribution of Person-days of Activity
Kayaking/Island Sightseeing
Person-days
0
0.001 - 2
3 - 10
11 - 36
37 - 190
CINMS Boundary
Control Total: 1999 Annual
1,233 Person-days - Distribution from
Kolstad Survey.
Distribution Statistics:
Standard Error: 2.8844, Mean: 17.1
Max: 189.9
PCW20010208

APPENDIX C

Table A.10.1. Baseline Step 1 Analysis Charter Boat Fishing, Santa Barbara County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	135,471	0.185405925	25,117	11786.88293	2.1
Lodging	8.65	75,748	0.232375514	17,602	14245.93348	1.2
Private Transportation	16.64	145,716	0.170880464	24,900	21624.38212	1.2
Public Transportation	33.07	289,594	0.170880464	49,486	21624.38212	2.3
Boat Fuel	0.00	0	0.056686529	0	12788.05621	0.0
Access/Boat launch Fees	1.18	10,333	0.231621184	2,393	20200.13202	0.1
Equipment Rental	6.01	52,630	0.272281346	14,330	14929.50237	1.0
Bait and Ice	0.52	4,554	0.104264901	475	18232.86584	0.0
Charter Boat fee	60.74	531,939	0.239509323	127,404	12917.92929	9.9
Total	142.28	**1,245,985**		**261,708**		**17.8**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			584,877		22.4
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**877,315**	Lower	**28.0**
Upper 2.5			Upper	**1,023,534**	Upper	**33.6**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.014%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.008%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

APPENDIX C

Table A.10.2. Baseline Step 1 Analysis Charter Boat Diving, Santa Barbara County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	168,063	0.23237551	39,054	14,246	2.7
Eating & Drinking	29.00	91,959	0.17458227	16,054	11,194	1.4
Transportation	10.00	31,710	0.17088046	5,419	21,624	0.3
Charter Boat fee	40.21	127,500	0.23950932	30,537	12,918	2.4
Miscellaneous	15.00	47,565	0.23162118	11,017	20,200	0.5
Total	147.21	**466,797**		**102,081**		**7.3**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			228,136		9.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**342,204**	Lower	**11.4**
Upper 2.5			Upper	**399,238**	Upper	**13.7**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.005%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.003%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

APPENDIX C

Table A.10.3. Baseline Step 1 Analysis Private Boat Fishing, Santa Barbara County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	79,329	0.185405925	14,708	11786.88293	1.2
Lodging	1.20	12,526	0.232375514	2,911	14245.93348	0.2
Private Transportation	8.90	92,898	0.170880464	15,874	21624.38212	0.7
Public Transportation	1.89	19,728	0.170880464	3,371	21624.38212	0.2
Boat Fuel	12.74	132,980	0.056686529	7,538	12788.05621	0.6
Access/Boat launch Fees	1.52	15,866	0.231621184	3,675	20200.13202	0.2
Equipment Rental	0.91	9,499	0.272281346	2,586	14929.50237	0.2
Bait and Ice	6.77	70,665	0.104264901	7,368	18232.86584	0.4
Charter Boat fee	0.00	0	0.239509323	0	12917.92929	0.0
Total	41.53	**433,490**		**58,031**		**3.7**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			129,691		4.7
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**194,537**	Lower	**5.9**
Upper 2.5			Upper	**226,960**	Upper	**7.1**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.003%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.002%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

APPENDIX C

Table A.10.4. Baseline Step 1 Analysis Private Boat Diving, Santa Barbara County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	150,765	0.056686529	8,546	12,788	0.7
Air Refills	7.00	55,545	0.239509323	13,304	12,918	1.0
Ice	2.50	19,838	0.104264901	2,068	18,233	0.1
Boat Ramp Fee	1.50	11,903	0.239509323	2,851	12,918	0.2
Food & Drink	11.00	87,285	0.174582272	15,238	11,194	1.4
Auto Gas	9.00	71,415	0.056686529	4,048	12,788	0.3
Equipment Rental	5.00	39,675	0.272281346	10,803	14,930	0.7
Total	55.00	436,425		**56,858**		**4.4**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			127,070		5.4
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**190,605**	Lower	**6.8**
Upper 2.5			Upper	**222,372**	Upper	**8.2**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.003%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.002%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table A.10.5. Baseline Step 1 Analysis Charter/Party Boat Fishing, Ventura County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	2,299,428	0.171537003	394,437	11740.46679	33.6
Lodging	8.65	1,285,718	0.213109652	273,999	14138.05668	19.4
Private Transportation	16.64	2,473,334	0.166580417	412,009	21582.30187	19.1
Public Transportation	33.07	4,915,455	0.166580417	818,818	21582.30187	37.9
Boat Fuel	0.00	0	0.037661501	0	13082.33276	0.0
Access/Boat launch Fees	1.18	175,393	0.197079821	34,566	26686.02901	1.3
Equipment Rental	6.01	893,314	0.24102252	215,309	26205.88235	8.2
Bait and Ice	0.52	77,292	0.105851657	8,181	19902.47277	0.4
Charter Boat fee	47.62	7,078,154	0.229005998	1,620,940	24,860	65.2
Total	129.16	**19,198,086**		**3,778,260**		**185.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salaries	2.338143047			8,834,111		254.3
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**13,251,167**	Lower	**317.8**
Upper 2.5			Upper	**15,459,695**	Upper	**381.4**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.388%
to Employment	21027.31293			0.127%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.072%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table A.10.6. Baseline Step 1 Analysis Charter Boat Diving, Ventura County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	763,147	0.21310965	162,634	14,138	11.5
Eating & Drinking	29.00	417,571	0.16762701	69,996	11,507	6.1
Transportation	10.00	143,990	0.16658042	23,986	21,582	1.1
Charter Boat fee	64.50	928,739	0.229006	212,687	24,860	8.6
Miscellaneous	15.00	215,985	0.19707982	42,566	26,686	1.6
Total	171.50	**2,469,432**		**511,869**		**28.8**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			1,196,823		38.2
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**1,795,235**	Lower	**47.8**
Upper 2.5			Upper	**2,094,441**	Upper	**57.3**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.058%
to Employment	21027.31293			0.017%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.010%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table A.10.7. Baseline Step 1 Analysis Private Boat Fishing, Ventura County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	1,463,517	0.171537003	251,047	11740.46679	21.4
Lodging	1.20	231,082	0.213109652	49,246	14138.05668	3.5
Private Transportation	8.90	1,713,855	0.166580417	285,495	21582.30187	13.2
Public Transportation	1.89	363,954	0.166580417	60,628	21582.30187	2.8
Boat Fuel	12.74	2,453,316	0.037661501	92,396	13082.33276	7.1
Access/Boat launch Fees	1.52	292,703	0.197079821	57,686	26686.02901	2.2
Equipment Rental	0.91	175,237	0.24102252	42,236	26205.88235	1.6
Bait and Ice	6.77	1,303,685	0.105851657	137,997	19902.47277	6.9
Charter Boat fee	0.00	0	0.229005998	0	24,860	0.0
Total	41.53	**7,997,349**		**976,730**		**58.7**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			2,283,735		76.5
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**3,425,602**	Lower	**95.7**
Upper 2.5			Upper	**3,996,535**	Upper	**114.8**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.117%
to Employment	21027.31293			0.033%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.019%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table A.10.8. Baseline Step 1 Analysis Private Boat Diving, Ventura County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	646,969	0.037661501	24,366	13,082	1.9
Air Refills	7.00	238,357	0.229005998	54,585	24,860	2.2
Ice	2.50	85,128	0.105851657	9,011	19,902	0.5
Boat Ramp Fee	1.50	51,077	0.229005998	11,697	24,860	0.5
Food & Drink	11.00	374,561	0.167627006	62,787	11,507	5.5
Auto Gas	9.00	306,459	0.037661501	11,542	13,082	0.9
Equipment Rental	5.00	170,255	0.24102252	41,035	26,206	1.6
Total	55.00	**1,872,805**		**215,022**		**12.9**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			502,753		16.8
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**754,129**	Lower	**21.0**
Upper 2.5			Upper	**879,817**	Upper	**25.2**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.026%
to Employment	21027.31293			0.007%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.004%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu"$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta"$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
$\mu"$ = Regional income multipliers (upper and lower range).
$\delta"$ = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table A.10.9. Baseline Step 1 Analysis Charter Boat Fishing, Los Angeles County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	21,249	0.175118965	3,721	12848.82845	0.3
Lodging	8.65	11,881	0.20181569	2,398	16112.61061	0.1
Private Transportation	16.64	22,856	0.119408566	2,729	19952.00329	0.1
Public Transportation	33.07	45,423	0.119408566	5,424	19952.00329	0.3
Boat Fuel	0.00	0	0.039248605	0	13772.40377	0.0
Access/Boat launch Fees	1.18	1,621	0.268261264	435	29734.05276	0.0
Equipment Rental	6.01	8,255	0.243828383	2,013	19544.97354	0.1
Bait and Ice	0.52	714	0.103146649	74	19023.1563	0.0
Charter Boat fee	59.95	82,337	0.205539552	16,924	28,630	0.6
Total	141.49	**194,335**		**33,717**		**1.6**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			56,054		1.9
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**84,081**	Lower	**2.3**
Upper 2.5			Upper	**98,095**	Upper	**2.8**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000024%
to Employment	26601.36574			0.000048%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000037%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table A.10.10. Baseline Step 1 Analysis Charter Boat Diving, Los Angeles County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	19,269	0.20181569	3,889	16,113	0.2
Eating & Drinking	29.00	10,543	0.17046229	1,797	12,333	0.1
Transportation	10.00	3,636	0.11940857	434	19,952	0.0
Charter Boat fee	92.56	33,652	0.20553955	6,917	28,630	0.2
Miscellaneous	15.00	5,453	0.26826126	1,463	29,734	0.0
Total	199.56	**72,553**		**14,500**		**0.7**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			24,106		0.8
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**36,159**	Lower	**1.0**
Upper 2.5			Upper	**42,186**	Upper	**1.2**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000011%
to Employment	26601.36574			0.000020%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000016%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table A.10.11. Baseline Step 1 Analysis Private Boat Fishing, Los Angeles County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	83,668	0.175118965	14,652	12848.82845	1.1
Lodging	1.20	13,211	0.20181569	2,666	16112.61061	0.2
Private Transportation	8.90	97,980	0.119408566	11,700	19952.00329	0.6
Public Transportation	1.89	20,807	0.119408566	2,485	19952.00329	0.1
Boat Fuel	12.74	140,255	0.039248605	5,505	13772.40377	0.4
Access/Boat launch Fees	1.52	16,734	0.268261264	4,489	29734.05276	0.2
Equipment Rental	0.91	10,018	0.243828383	2,443	19544.97354	0.1
Bait and Ice	6.77	74,531	0.103146649	7,688	19023.1563	0.4
Charter Boat fee	0.00	0	0.205539552	0	28,630	0.0
Total	41.53	**457,204**		**51,626**		**3.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			85,829		3.6
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**128,744**	Lower	**4.5**
Upper 2.5			Upper	**150,201**	Upper	**5.3**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.0000005%
to Employment	26601.36574			0.00007%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.00006%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table A.10.12. Baseline Step 1 Analysis Private Boat Diving, Los Angeles County

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	98,876	0.039248605	3,881	13,772	0.3
Air Refills	7.00	36,428	0.205539552	7,487	28,630	0.3
Ice	2.50	13,010	0.103146649	1,342	19,023	0.1
Boat Ramp Fee	1.50	7,806	0.205539552	1,604	28,630	0.1
Food & Drink	11.00	57,244	0.170462286	9,758	12,333	0.8
Auto Gas	9.00	46,836	0.039248605	1,838	13,772	0.1
Equipment Rental	5.00	26,020	0.243828383	6,344	19,545	0.3
Total	55.00	**286,220**		**32,255**		**1.9**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			53,624		2.2
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**80,437**	Lower	**2.8**
Upper 2.5			Upper	**93,843**	Upper	**3.3**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000029%
to Employment	26601.36574			0.00005%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.00004%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

APPENDIX D

Appendix D. Commercial Fishing: Detailed Tables

Tables

APPENDIX D

Table D.1. Commercial Fishing: Impacts of Alternative 1 on Ex Vessel Value by Port and Species Group - Step 1 Analysis

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
1. Moss Landing						
Wetfish	3.03	N/A	1.46	N/A	4.49	N/A
Total	**3.03**	**N/A**	**1.46**	**N/A**	**4.49**	**N/A**
2. Morro Bay						
Squid	185.22	0.64	14.34	0.05	199.56	0.69
Rockfishes	8,685.16	0.56	0.00	0.00	8,685.16	0.56
CA Sheepshead	39.16	0.76	0.00	0.00	39.16	0.76
Total	8,909.55	0.20	14.34	0.00	8,923.89	0.20
3. Avila/Port San Luis						
Flatfish	15.28	0.00	0.96	0.00	16.24	0.00
Sharks	2.19	0.01	0.10	0.00	2.29	0.01
Total	**17.47**	**0.00**	**1.06**	**0.00**	**18.53**	**0.00**
4. Santa Barbara						
Squid	6,048.01	2.70	468.21	0.21	6,516.22	2.91
Urchins	666,062.58	16.67	0.00	0.00	666,062.58	16.67
Spiny Lobsters	77,752.87	6.51	0.00	0.00	77,752.87	6.51
Rockfishes	61,235.02	19.76	0.00	0.00	61,235.02	19.76
Prawn	5,398.90	0.52	4,591.96	0.44	9,990.87	0.96
Crab	25,054.15	3.77	0.00	0.00	25,054.15	3.77
CA Sheepshead	5,881.82	7.32	0.00	0.00	5,881.82	7.32
Flatfish	430.58	0.21	27.02	0.01	457.59	0.22
Sea Cucumbers	4,526.99	8.37	0.00	0.00	4,526.99	8.37
Tuna	15.57	0.21	29.18	0.39	44.75	0.61
Total	**852,406.49**	**9.92**	**5,116.37**	**0.06**	**857,522.86**	**9.98**
5. Ventura Harbor						
Squid	42,683.80	1.52	3,304.37	0.12	45,988.17	1.63
Urchins	1,200.37	0.77	0.00	0.00	1,200.37	0.77
Spiny Lobsters	3,383.36	0.99	0.00	0.00	3,383.36	0.99
Rockfishes	375.63	0.14	0.00	0.00	375.63	0.14
Prawn	7,756.84	1.58	6,597.47	1.35	14,354.31	2.93
Crab	119.04	0.18	0.00	0.00	119.04	0.18
Wetfish	3.29	0.04	1.58	0.02	4.88	0.05
CA Sheepshead	9,914.10	20.67	0.00	0.00	9,914.10	20.67
Flatfish	3,359.59	1.21	210.81	0.08	3,570.40	1.29
Sculpin & Bass	960.52	4.78	135.14	0.67	1,095.66	5.45
Tuna	3.76	0.00	7.04	0.01	10.79	0.01
Sharks	648.65	1.04	30.54	0.05	679.20	1.09
Total	**70,408.95**	**1.31**	**10,286.96**	**0.19**	**80,695.91**	**1.50**
6. Channel Islands/Oxnard						
Squid	71.33	0.49	5.52	0.04	76.86	0.52
Urchins	60,606.83	2.03	0.00	0.00	60,606.83	2.03
Spiny Lobsters	316.15	0.14	0.00	0.00	316.15	0.14
Rockfishes	2,668.21	1.06	0.00	0.00	2,668.21	1.06
Prawn	76,600.96	12.93	65,151.89	10.99	141,752.85	23.92
Crab	1,157.82	2.06	0.00	0.00	1,157.82	2.06
Wetfish	39.09	0.26	18.78	0.13	57.87	0.39
CA Sheepshead	4,957.87	2.61	0.00	0.00	4,957.87	2.61
Flatfish	3,359.59	1.54	210.81	0.10	3,570.40	1.64
Sea Cucumbers	16,575.43	10.74	0.00	0.00	16,575.43	10.74
Sculpin & Bass	2,315.96	12.47	325.85	1.75	2,641.82	14.22
Tuna	42.03	0.47	78.75	0.89	120.77	1.36
Sharks	1,515.54	5.19	71.37	0.24	1,586.91	5.43
Total	**170,226.80**	**3.48**	**65,862.97**	**1.35**	**236,089.77**	**4.83**

APPENDIX D

Table D.1. (continued)

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
7. Port Hueneme						
Squid	540,845.58	4.16	41,869.65	0.32	582,715.23	4.48
Prawn	4,413.30	2.37	3,753.67	2.02	8,166.98	4.39
Wetfish	8,402.51	2.40	4,035.63	1.15	12,438.14	3.56
Tuna	157.63	0.40	295.37	0.76	452.99	1.16
Total	**553,819.02**	**4.06**	**49,954.32**	**0.37**	**603,773.34**	**4.43**
8. San Pedro						
Squid	57,562.06	1.45	4,456.18	0.11	62,018.24	1.56
Urchins	2,753.52	0.95	0.00	0.00	2,753.52	0.95
Spiny Lobsters	152.01	0.03	0.00	0.00	152.01	0.03
Wetfish	977.44	0.03	469.45	0.01	1,446.89	0.04
CA Sheepshead	3,231.05	7.91	0.00	0.00	3,231.05	7.91
Flatfish	1.81	0.00	0.11	0.00	1.93	0.00
Sea Cucumbers	303.58	7.52	0.00	0.00	303.58	7.52
Sculpin & Bass	1,157.89	1.33	162.91	0.19	1,320.81	1.52
Tuna	450.79	0.01	844.71	0.02	1,295.51	0.04
Sharks	90.57	0.06	4.26	0.00	94.84	0.06
Total	**66,680.74**	**0.48**	**5,937.64**	**0.04**	**72,618.37**	**0.52**
9. Terminal Island						
Squid	14,241.51	1.67	1,102.51	0.13	15,344.02	1.80
Urchins	624.15	0.02	0.00	0.00	624.15	0.02
Wetfish	568.27	0.05	272.93	0.02	841.21	0.07
Tuna	4,305.66	0.04	8,068.10	0.07	12,373.76	0.11
Sharks	794.83	3.26	37.43	0.15	832.26	3.41
Total	**20,534.43**	**0.11**	**9,480.97**	**0.05**	**30,015.39**	**0.17**
10. Avalon & Other LA						
Squid	83.71	1.60	6.48	0.12	90.19	1.72
Spiny Lobsters	22.61	0.00	0.00	0.00	22.61	0.00
Wetfish	0.36	0.00	0.17	0.00	0.53	0.01
Total	**106.68**	**0.01**	**6.65**	**0.00**	**113.33**	**0.01**
11. Newport Beach						
Squid	1.06	0.43	0.08	0.03	1.14	0.46
Tuna	3.68	0.38	6.89	0.70	10.57	1.08
Total	**4.74**	**0.00**	**6.98**	**0.00**	**11.71**	**0.00**
12. San Diego						
Urchins	3,966.55	11.05	0.00	0.00	3,966.55	11.05
Tuna	27.83	0.01	52.16	0.01	79.99	0.02
Sharks	6.21	0.00	0.29	0.00	6.50	0.00
Total	**4,000.60**	**0.12**	**52.45**	**0.00**	**4,053.04**	**0.12**

1. Percents are amount of loss as a percent of total ex vessel value of Port landings (1996-1999 annual average).

APPENDIX D

Table D.2. Commercial Fishing: Impacts of Alternative 2 on Ex Vessel Value by Port and Species Group - Step 1 Analysis

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
1. Moss Landing						
Wetfish	3.82	N/A	1.88	N/A	5.70	N/A
Total	**3.82**	**N/A**	**1.88**	**N/A**	**5.70**	**N/A**
2. Morro Bay						
Squid	199.56	0.69	3.58	0.01	203.15	0.70
Rockfishes	7,229.03	0.47	1,006.79	0.07	8,235.81	0.54
CA Sheepshead	72.16	1.41	0.00	0.00	72.16	1.41
Total	7,500.74	0.17	1,010.37	0.02	8,511.12	0.19
3. Avila/Port San Luis						
Flatfish	32.21	0.01	4.44	0.00	36.65	0.01
Sharks	1.27	0.01	0.32	0.00	1.59	0.01
Total	**33.48**	**0.00**	**4.76**	**0.00**	**38.23**	**0.00**
4. Santa Barbara						
Squid	6,516.25	2.91	117.05	0.05	6,633.30	2.96
Urchins	638,473.87	15.98	0.00	0.00	638,473.87	15.98
Spiny Lobsters	79,465.53	6.65	0.00	0.00	79,465.53	6.65
Rockfishes	50,968.48	16.44	7,098.37	2.29	58,066.85	18.73
Prawn	3,627.42	0.35	4,199.41	0.40	7,826.83	0.75
Crab	25,636.47	3.86	0.00	0.00	25,636.47	3.86
CA Sheepshead	10,836.70	13.48	0.00	0.00	10,836.70	13.48
Flatfish	907.44	0.44	124.96	0.06	1,032.40	0.50
Sea Cucumbers	6,062.56	11.22	0.00	0.00	6,062.56	11.22
Tuna	17.00	0.23	33.93	0.46	50.93	0.69
Total	**822,511.74**	**9.57**	**11,573.73**	**0.13**	**834,085.47**	**9.71**
5. Ventura Harbor						
Squid	45,988.40	1.63	826.09	0.03	46,814.49	1.66
Urchins	1,150.65	0.74	0.00	0.00	1,150.65	0.74
Spiny Lobsters	3,457.89	1.01	0.00	0.00	3,457.89	1.01
Rockfishes	312.65	0.11	43.54	0.02	356.20	0.13
Prawn	5,211.67	1.06	6,033.48	1.23	11,245.15	2.29
Crab	121.80	0.18	0.00	0.00	121.80	0.18
Wetfish	4.14	0.05	2.04	0.02	6.18	0.07
CA Sheepshead	18,265.82	38.08	0.00	0.00	18,265.82	38.08
Flatfish	7,080.37	2.55	974.99	0.35	8,055.36	2.91
Sculpin & Bass	1,300.33	6.47	625.04	3.11	1,925.37	9.58
Tuna	4.10	0.00	8.18	0.01	12.28	0.01
Sharks	376.08	0.60	95.45	0.15	471.54	0.75
Total	**83,273.91**	**1.54**	**8,608.82**	**0.16**	**91,882.73**	**1.70**
6. Channel Islands/Oxnard						
Squid	76.86	0.52	1.38	0.01	78.24	0.53
Urchins	58,096.46	1.94	0.00	0.00	58,096.46	1.94
Spiny Lobsters	323.11	0.14	0.00	0.00	323.11	0.14
Rockfishes	2,220.86	0.88	309.30	0.12	2,530.16	1.01
Prawn	51,466.70	8.68	59,582.32	10.05	111,049.02	18.74
Crab	1,184.73	2.11	0.00	0.00	1,184.73	2.11
Wetfish	49.18	0.33	24.20	0.16	73.38	0.49
CA Sheepshead	9,134.41	4.81	0.00	0.00	9,134.41	4.81
Flatfish	7,080.37	3.24	974.99	0.45	8,055.36	3.69
Sea Cucumbers	22,197.88	14.38	0.00	0.00	22,197.88	14.38
Sculpin & Bass	3,135.30	16.88	1,507.07	8.11	4,642.37	24.99
Tuna	45.88	0.52	91.57	1.03	137.45	1.55
Sharks	878.70	3.01	223.02	0.76	1,101.72	3.77
Total	**155,890.43**	**3.19**	**62,713.85**	**1.28**	**218,604.28**	**4.47**

APPENDIX D

Table D.2. (continued)

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
7. Port Hueneme						
Squid	582,718.09	4.48	10,467.41	0.08	593,185.50	4.56
Prawn	2,965.21	1.60	3,432.79	1.85	6,398.00	3.44
Wetfish	10,570.82	3.02	5,200.91	1.49	15,771.73	4.51
Tuna	172.10	0.44	343.46	0.88	515.56	1.32
Total	**596,426.22**	**4.37**	**19,444.57**	**0.14**	**615,870.79**	**4.52**
8. San Pedro						
Squid	62,018.54	1.56	1,114.04	0.03	63,132.59	1.59
Urchins	2,639.47	0.91	0.00	0.00	2,639.47	0.91
Spiny Lobsters	155.36	0.03	0.00	0.00	155.36	0.03
Wetfish	1,229.67	0.04	605.01	0.02	1,834.68	0.05
CA Sheepshead	5,952.91	14.58	0.00	0.00	5,952.91	14.58
Flatfish	3.82	0.00	0.53	0.00	4.35	0.00
Sea Cucumbers	406.56	10.08	0.00	0.00	406.56	10.08
Sculpin & Bass	1,567.53	1.80	753.48	0.87	2,321.01	2.67
Tuna	492.19	0.01	982.25	0.03	1,474.44	0.04
Sharks	52.51	0.03	13.33	0.01	65.84	0.04
Total	**74,518.56**	**0.53**	**3,468.63**	**0.02**	**77,987.20**	**0.56**
9. Terminal Island						
Squid	15,344.09	1.80	275.63	0.03	15,619.72	1.83
Urchins	598.29	0.02	0.00	0.00	598.29	0.02
Wetfish	714.92	0.06	351.74	0.03	1,066.66	0.08
Tuna	4,701.03	0.04	9,381.75	0.08	14,082.78	0.12
Sharks	460.84	1.89	116.96	0.48	577.80	2.37
Total	**21,819.17**	**0.12**	**10,126.08**	**0.06**	**31,945.25**	**0.18**
10. Avalon & Other LA						
Squid	90.19	1.72	1.62	0.03	91.81	1.75
Spiny Lobsters	23.11	0.00	0.00	0.00	23.11	0.00
Wetfish	0.45	0.01	0.22	0.00	0.67	0.01
Total	**113.75**	**0.01**	**1.84**	**0.00**	**115.59**	**0.01**
11. Newport Beach						
Squid	1.14	0.46	0.02	0.01	1.16	0.47
Tuna	4.02	0.41	8.02	0.82	12.03	1.23
Total	**5.16**	**0.00**	**8.04**	**0.00**	**13.19**	**0.00**
12. San Diego						
Urchins	3,802.25	10.59	0.00	0.00	3,802.25	10.59
Tuna	30.39	0.01	60.65	0.01	91.04	0.02
Sharks	3.60	0.00	0.91	0.00	4.52	0.00
Total	**3,836.25**	**0.11**	**61.56**	**0.00**	**3,897.81**	**0.12**

1. Percents are amount of loss as a percent of total ex vessel value of Port landings (1996-1999 annual average).

APPENDIX D

Table D.3. Commercial Fishing: Impacts of Alternative 3 on Ex Vessel Value by Port and Species Group - Step 1 Analysis

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
1. Moss Landing						
Wetfish	3.06	N/A	1.46	N/A	4.52	N/A
Total	**3.06**	**N/A**	**1.46**	**N/A**	**4.52**	**N/A**
2. Morro Bay						
Squid	194.78	0.68	11.95	0.04	206.73	0.72
Rockfishes	10,501.38	0.68	5,301.99	0.34	15,803.37	1.03
CA Sheepshead	42.67	0.83	0.00	0.00	42.67	0.83
Total	10,738.83	0.24	5,313.94	0.12	16,052.77	0.35
3. Avila/Port San Luis						
Flatfish	15.28	0.00	5.87	0.00	21.16	0.00
Sharks	2.08	0.01	0.63	0.00	2.71	0.01
Total	**17.36**	**0.00**	**6.50**	**0.00**	**23.87**	**0.00**
4. Santa Barbara						
Squid	6,360.17	2.84	390.17	0.17	6,750.35	3.02
Urchins	683,041.78	17.09	0.00	0.00	683,041.78	17.09
Spiny Lobsters	92,780.12	7.77	0.00	0.00	92,780.12	7.77
Rockfishes	74,040.29	23.89	37,381.86	12.06	111,422.16	35.95
Prawn	5,398.90	0.52	6,474.27	0.62	11,873.17	1.14
Crab	25,003.72	3.77	0.00	0.00	25,003.72	3.77
CA Sheepshead	6,408.20	7.97	0.00	0.00	6,408.20	7.97
Flatfish	430.58	0.21	165.49	0.08	596.06	0.29
Sea Cucumbers	4,940.44	9.14	0.00	0.00	4,940.44	9.14
Tuna	18.08	0.24	59.73	0.81	77.81	1.05
Total	**898,422.28**	**10.46**	**44,471.52**	**0.52**	**942,893.80**	**10.97**
5. Ventura Harbor						
Squid	44,886.87	1.59	2,753.64	0.10	47,640.51	1.69
Urchins	1,230.97	0.79	0.00	0.00	1,230.97	0.79
Spiny Lobsters	4,037.26	1.18	0.00	0.00	4,037.26	1.18
Rockfishes	454.18	0.16	229.31	0.08	683.49	0.25
Prawn	7,756.84	1.58	9,301.86	1.90	17,058.70	3.48
Crab	118.80	0.18	0.00	0.00	118.80	0.18
Wetfish	3.32	0.04	1.58	0.02	4.90	0.05
CA Sheepshead	10,801.35	22.52	0.00	0.00	10,801.35	22.52
Flatfish	3,359.59	1.21	1,291.20	0.47	4,650.80	1.68
Sculpin & Bass	989.97	4.93	827.76	4.12	1,817.73	9.05
Tuna	4.36	0.00	14.41	0.01	18.77	0.02
Sharks	616.41	0.99	187.09	0.30	803.50	1.29
Total	**74,259.93**	**1.38**	**14,606.85**	**0.27**	**88,866.78**	**1.65**
6. Channel Islands/Oxnard						
Squid	75.02	0.51	4.60	0.03	79.62	0.54
Urchins	62,151.81	2.08	0.00	0.00	62,151.81	2.08
Spiny Lobsters	377.25	0.16	0.00	0.00	377.25	0.16
Rockfishes	3,226.17	1.29	1,628.85	0.65	4,855.02	1.93
Prawn	76,600.96	12.93	91,858.51	15.50	168,459.47	28.43
Crab	1,155.49	2.06	0.00	0.00	1,155.49	2.06
Wetfish	39.42	0.26	18.78	0.13	58.20	0.39
CA Sheepshead	5,401.57	2.85	0.00	0.00	5,401.57	2.85
Flatfish	3,359.59	1.54	1,291.20	0.59	4,650.80	2.13
Sea Cucumbers	18,089.25	11.72	0.00	0.00	18,089.25	11.72
Sculpin & Bass	2,386.98	12.85	1,995.85	10.74	4,382.83	23.60
Tuna	48.78	0.55	161.21	1.82	209.99	2.37
Sharks	1,440.21	4.93	437.12	1.50	1,877.33	6.43
Total	**174,352.50**	**3.56**	**97,396.12**	**1.99**	**271,748.63**	**5.55**

APPENDIX D

Table D.3. (continued)

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
7. Port Hueneme						
Squid	568,760.58	4.37	34,891.37	0.27	603,651.95	4.64
Prawn	4,413.30	2.37	5,292.36	2.85	9,705.66	5.22
Wetfish	8,473.13	2.42	4,035.63	1.15	12,508.76	3.58
Tuna	182.98	0.47	604.65	1.55	787.63	2.02
Total	**581,829.99**	**4.27**	**44,824.00**	**0.33**	**626,654.00**	**4.59**
8. San Pedro						
Squid	60,533.05	1.52	3,713.48	0.09	64,246.53	1.62
Urchins	2,823.72	0.97	0.00	0.00	2,823.72	0.97
Spiny Lobsters	181.39	0.04	0.00	0.00	181.39	0.04
Wetfish	985.65	0.03	469.45	0.01	1,455.11	0.04
CA Sheepshead	3,520.21	8.62	0.00	0.00	3,520.21	8.62
Flatfish	1.81	0.00	0.70	0.00	2.51	0.00
Sea Cucumbers	331.31	8.21	0.00	0.00	331.31	8.21
Sculpin & Bass	1,193.40	1.37	997.85	1.15	2,191.25	2.52
Tuna	523.30	0.02	1,729.22	0.05	2,252.52	0.07
Sharks	86.07	0.05	26.12	0.02	112.19	0.07
Total	**70,179.91**	**0.50**	**6,936.82**	**0.05**	**77,116.73**	**0.55**
9. Terminal Island						
Squid	14,976.57	1.76	918.76	0.11	15,895.32	1.87
Urchins	640.06	0.02	0.00	0.00	640.06	0.02
Wetfish	573.05	0.05	272.93	0.02	845.98	0.07
Tuna	4,998.19	0.04	16,516.26	0.14	21,514.45	0.18
Sharks	755.33	3.10	229.25	0.94	984.58	4.03
Total	**21,943.19**	**0.12**	**17,937.20**	**0.10**	**39,880.39**	**0.22**
10. Avalon & Other LA						
Squid	88.03	1.68	5.40	0.10	93.43	1.78
Spiny Lobsters	26.98	0.00	0.00	0.00	26.98	0.00
Wetfish	0.36	0.00	0.17	0.00	0.53	0.01
Total	**115.37**	**0.01**	**5.57**	**0.00**	**120.94**	**0.01**
11. Newport Beach						
Squid	1.11	0.45	0.07	0.03	1.18	0.47
Tuna	4.27	0.44	14.11	1.44	18.38	1.88
Total	**5.38**	**0.00**	**14.18**	**0.00**	**19.56**	**0.00**
12. San Diego						
Urchins	4,067.67	11.33	0.00	0.00	4,067.67	11.33
Tuna	32.31	0.01	106.77	0.02	139.08	0.03
Sharks	5.90	0.00	1.79	0.00	7.69	0.00
Total	**4,105.88**	**0.12**	**108.56**	**0.00**	**4,214.44**	**0.12**

1. Percents are amount of loss as a percent of total ex vessel value of Port landings (1996-1999 annual average).

APPENDIX D

Table D.4. Commercial Fishing: Impacts of Alternative 4 on Ex Vessel Value by Port and Species Group - Step 1 Analysis

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
1. Moss Landing						
Wetfish	6.28	N/A	2.08	N/A	8.36	N/A
Total	**6.28**	**N/A**	**2.08**	**N/A**	**8.36**	**N/A**
2. Morro Bay						
Squid	480.39	1.67	15.53	0.05	495.92	1.72
Rockfishes	13,812.65	0.90	5,808.36	0.38	19,621.01	1.28
CA Sheepshead	79.17	1.55	0.00	0.00	79.17	1.55
Total	14,372.20	0.32	5,823.89	0.13	20,196.10	0.44
3. Avila/Port San Luis						
Flatfish	32.84	0.01	9.95	0.00	42.79	0.01
Sharks	3.80	0.02	1.07	0.00	4.87	0.02
Total	**36.64**	**0.00**	**11.02**	**0.00**	**47.66**	**0.00**
4. Santa Barbara						
Squid	15,685.89	7.01	507.23	0.23	16,193.11	7.23
Urchins	967,958.39	24.22	0.00	0.00	967,958.39	24.22
Spiny Lobsters	143,197.99	11.99	0.00	0.00	143,197.99	11.99
Rockfishes	97,386.54	31.42	40,952.03	13.21	138,338.58	44.63
Prawn	6,011.66	0.58	10,561.26	1.01	16,572.92	1.59
Crab	46,131.95	6.95	0.00	0.00	46,131.95	6.95
CA Sheepshead	11,889.48	14.79	0.00	0.00	11,889.48	14.79
Flatfish	925.19	0.45	280.31	0.14	1,205.50	0.59
Sea Cucumbers	6,959.67	12.87	0.00	0.00	6,959.67	12.87
Tuna	24.52	0.33	59.93	0.81	84.45	1.14
Total	**1,296,171.28**	**15.09**	**52,360.75**	**0.61**	**1,348,532.03**	**15.70**
5. Ventura Harbor						
Squid	110,703.01	3.93	3,579.74	0.13	114,282.74	4.06
Urchins	1,744.45	1.13	0.00	0.00	1,744.45	1.13
Spiny Lobsters	6,231.16	1.82	0.00	0.00	6,231.16	1.82
Rockfishes	597.39	0.22	251.21	0.09	848.60	0.31
Prawn	8,637.21	1.76	15,173.81	3.10	23,811.02	4.86
Crab	219.18	0.33	0.00	0.00	219.18	0.33
Wetfish	6.81	0.08	2.26	0.02	9.07	0.10
CA Sheepshead	20,040.32	41.78	0.00	0.00	20,040.32	41.78
Flatfish	7,218.80	2.60	2,187.14	0.79	9,405.94	3.39
Sculpin & Bass	1,569.75	7.81	1,417.06	7.05	2,986.81	14.87
Tuna	5.91	0.01	14.45	0.01	20.37	0.02
Sharks	1,128.67	1.81	316.90	0.51	1,445.57	2.31
Total	**158,102.67**	**2.93**	**22,942.58**	**0.43**	**181,045.25**	**3.36**
6. Channel Islands/Oxnard						
Squid	185.01	1.26	5.98	0.04	190.99	1.30
Urchins	88,077.15	2.95	0.00	0.00	88,077.15	2.95
Spiny Lobsters	582.25	0.25	0.00	0.00	582.25	0.25
Rockfishes	4,243.45	1.69	1,784.41	0.71	6,027.86	2.40
Prawn	85,294.93	14.39	149,845.69	25.29	235,140.62	39.68
Crab	2,131.87	3.80	0.00	0.00	2,131.87	3.80
Wetfish	80.87	0.54	26.81	0.18	107.68	0.72
CA Sheepshead	10,021.81	5.28	0.00	0.00	10,021.81	5.28
Flatfish	7,218.80	3.31	2,187.14	1.00	9,405.94	4.31
Sea Cucumbers	25,482.61	16.51	0.00	0.00	25,482.61	16.51
Sculpin & Bass	3,784.91	20.38	3,416.76	18.39	7,201.68	38.77
Tuna	66.19	0.75	161.74	1.82	227.93	2.57
Sharks	2,637.09	9.03	740.43	2.54	3,377.51	11.56
Total	**229,806.93**	**4.70**	**158,168.96**	**3.23**	**387,975.89**	**7.93**

APPENDIX D

Table D.4. (continued)

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
7. Port Hueneme						
Squid	1,402,715.56	10.79	45,358.78	0.35	1,448,074.34	11.14
Prawn	4,914.20	2.64	8,633.24	4.64	13,547.44	7.29
Wetfish	17,382.62	4.97	5,761.70	1.65	23,144.31	6.62
Tuna	248.25	0.64	606.65	1.55	854.91	2.19
Total	**1,425,260.63**	**10.45**	**60,360.37**	**0.44**	**1,485,621.00**	**10.89**
8. San Pedro						
Squid	149,290.67	3.75	4,827.52	0.12	154,118.19	3.87
Urchins	4,001.57	1.37	0.00	0.00	4,001.57	1.37
Spiny Lobsters	279.96	0.06	0.00	0.00	279.96	0.06
Wetfish	2,022.07	0.06	670.24	0.02	2,692.31	0.08
CA Sheepshead	6,531.23	16.00	0.00	0.00	6,531.23	16.00
Flatfish	3.90	0.00	1.18	0.00	5.08	0.00
Sea Cucumbers	466.72	11.57	0.00	0.00	466.72	11.57
Sculpin & Bass	1,892.31	2.17	1,708.25	1.96	3,600.56	4.14
Tuna	709.97	0.02	1,734.96	0.05	2,444.93	0.07
Sharks	157.60	0.10	44.25	0.03	201.85	0.12
Total	**165,355.99**	**1.18**	**8,986.41**	**0.06**	**174,342.40**	**1.25**
9. Terminal Island						
Squid	36,936.21	4.34	1,194.38	0.14	38,130.60	4.48
Urchins	907.04	0.04	0.00	0.00	907.04	0.04
Wetfish	1,175.61	0.09	389.67	0.03	1,565.28	0.12
Tuna	6,781.11	0.06	16,571.10	0.14	23,352.21	0.20
Sharks	1,383.03	5.67	388.32	1.59	1,771.35	7.26
Total	**47,183.01**	**0.26**	**18,543.47**	**0.10**	**65,726.48**	**0.36**
10. Avalon & Other LA						
Squid	217.10	4.15	7.02	0.13	224.12	4.28
Spiny Lobsters	41.64	0.00	0.00	0.00	41.64	0.00
Wetfish	0.74	0.01	0.25	0.00	0.99	0.01
Total	**259.48**	**0.01**	**7.27**	**0.00**	**266.75**	**0.01**
11. Newport Beach						
Squid	2.75	1.10	0.09	0.04	2.84	1.14
Tuna	5.79	0.59	14.16	1.44	19.95	2.04
Total	**8.54**	**0.00**	**14.25**	**0.00**	**22.79**	**0.00**
12. San Diego						
Urchins	5,764.41	16.06	0.00	0.00	5,764.41	16.06
Tuna	43.84	0.01	107.12	0.02	150.96	0.03
Sharks	10.81	0.00	3.03	0.00	13.84	0.01
Total	**5,819.05**	**0.17**	**110.16**	**0.00**	**5,929.21**	**0.18**

1. Percents are amount of loss as a percent of total ex vessel value of Port landings (1996-1999 annual average).

APPENDIX D

Table D.5. Commercial Fishing: Impacts of Alternative 5 on Ex Vessel Value by Port and Species Group - Step 1 Analysis

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
1. Moss Landing						
Wetfish	10.00	N/A	9.49	N/A	19.49	N/A
Total	**10.00**	**N/A**	**9.49**	**N/A**	**19.49**	**N/A**
2. Morro Bay						
Squid	581.96	2.02	21.51	0.07	603.47	2.09
Rockfishes	17,254.74	1.12	4,030.12	0.26	21,284.86	1.38
CA Sheepshead	102.86	2.01	0.00	0.00	102.86	2.01
Total	17,939.57	0.40	4,051.63	0.09	21,991.19	0.48
3. Avila/Port San Luis						
Flatfish	45.43	0.01	10.79	0.00	56.22	0.01
Sharks	4.54	0.02	1.16	0.00	5.70	0.02
Total	**49.97**	**0.00**	**11.95**	**0.00**	**61.91**	**0.00**
4. Santa Barbara						
Squid	19,002.55	8.49	702.33	0.31	19,704.88	8.80
Urchins	1,212,820.51	30.35	2,434.27	0.06	1,215,254.78	30.41
Spiny Lobsters	192,604.26	16.13	0.00	0.00	192,604.26	16.13
Rockfishes	121,655.13	39.25	28,414.48	9.17	150,069.61	48.41
Prawn	3,627.42	0.35	8,169.96	0.78	11,797.38	1.13
Crab	51,777.25	7.80	0.00	0.00	51,777.25	7.80
CA Sheepshead	15,448.34	19.22	0.00	0.00	15,448.34	19.22
Flatfish	1,279.80	0.62	303.95	0.15	1,583.75	0.77
Sea Cucumbers	9,194.61	17.01	0.00	0.00	9,194.61	17.01
Tuna	29.53	0.40	97.34	1.32	126.87	1.72
Total	**1,627,439.39**	**18.94**	**40,122.34**	**0.47**	**1,667,561.73**	**19.41**
5. Ventura Harbor						
Squid	134,110.33	4.77	4,956.71	0.18	139,067.04	4.94
Urchins	2,185.73	1.41	4.39	0.00	2,190.12	1.41
Spiny Lobsters	8,381.04	2.45	0.00	0.00	8,381.04	2.45
Rockfishes	746.26	0.27	174.30	0.06	920.56	0.33
Prawn	5,211.67	1.06	11,738.13	2.40	16,949.80	3.46
Crab	246.00	0.37	0.00	0.00	246.00	0.37
Wetfish	10.85	0.12	10.30	0.11	21.15	0.23
CA Sheepshead	26,038.96	54.28	0.00	0.00	26,038.96	54.28
Flatfish	9,985.67	3.60	2,371.60	0.86	12,357.27	4.46
Sculpin & Bass	1,864.95	9.28	1,520.37	7.57	3,385.32	16.85
Tuna	7.12	0.01	23.48	0.02	30.60	0.03
Sharks	1,347.15	2.15	343.63	0.55	1,690.78	2.70
Total	**190,135.74**	**3.53**	**21,142.91**	**0.39**	**211,278.65**	**3.92**
6. Channel Islands/Oxnard						
Squid	224.13	1.53	8.28	0.06	232.41	1.58
Urchins	110,357.81	3.69	221.50	0.01	110,579.31	3.70
Spiny Lobsters	783.14	0.34	0.00	0.00	783.14	0.34
Rockfishes	5,300.91	2.11	1,238.11	0.49	6,539.02	2.60
Prawn	51,466.70	8.68	115,917.41	19.56	167,384.11	28.25
Crab	2,392.76	4.27	0.00	0.00	2,392.76	4.27
Wetfish	128.78	0.87	122.23	0.82	251.02	1.69
CA Sheepshead	13,021.62	6.86	0.00	0.00	13,021.62	6.86
Flatfish	9,985.67	4.58	2,371.60	1.09	12,357.27	5.66
Sea Cucumbers	33,665.79	21.81	0.00	0.00	33,665.79	21.81
Sculpin & Bass	4,496.67	24.21	3,665.85	19.74	8,162.53	43.94
Tuna	79.69	0.90	262.71	2.96	342.40	3.86
Sharks	3,147.56	10.78	802.87	2.75	3,950.43	13.53
Total	**235,051.22**	**4.80**	**124,610.58**	**2.55**	**359,661.80**	**7.35**

APPENDIX D

Table D.5. (continued)

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
7. Port Hueneme						
Squid	1,699,309.30	13.07	62,806.35	0.48	1,762,115.65	13.55
Prawn	2,965.21	1.60	6,678.49	3.59	9,643.70	5.19
Wetfish	27,681.03	7.92	26,272.76	7.51	53,953.79	15.43
Tuna	298.91	0.77	985.36	2.52	1,284.27	3.29
Total	**1,730,254.45**	**12.69**	**96,742.97**	**0.71**	**1,826,997.42**	**13.40**
8. San Pedro						
Squid	180,857.06	4.55	6,684.46	0.17	187,541.53	4.72
Urchins	5,013.84	1.72	10.06	0.00	5,023.90	1.73
Spiny Lobsters	376.55	0.08	0.00	0.00	376.55	0.08
Wetfish	3,220.05	0.09	3,056.23	0.09	6,276.29	0.18
CA Sheepshead	8,486.21	20.78	0.00	0.00	8,486.21	20.78
Flatfish	5.39	0.00	1.28	0.00	6.67	0.00
Sea Cucumbers	616.60	15.28	0.00	0.00	616.60	15.28
Sculpin & Bass	2,248.17	2.58	1,832.79	2.11	4,080.95	4.69
Tuna	854.85	0.03	2,818.03	0.08	3,672.87	0.11
Sharks	188.10	0.11	47.98	0.03	236.09	0.14
Total	**201,866.82**	**1.44**	**14,450.84**	**0.10**	**216,317.66**	**1.55**
9. Terminal Island						
Squid	44,746.10	5.26	1,653.81	0.19	46,399.91	5.45
Urchins	1,136.50	0.04	2.28	0.00	1,138.78	0.04
Wetfish	1,872.10	0.15	1,776.86	0.14	3,648.96	0.29
Tuna	8,164.87	0.07	26,915.76	0.23	35,080.63	0.30
Sharks	1,650.75	6.77	421.07	1.73	2,071.82	8.49
Total	**57,570.32**	**0.32**	**30,769.78**	**0.17**	**88,340.10**	**0.49**
10. Avalon & Other LA						
Squid	263.00	5.02	9.72	0.19	272.72	5.21
Spiny Lobsters	56.01	0.01	0.00	0.00	56.01	0.01
Wetfish	1.18	0.02	1.12	0.01	2.31	0.03
Total	**320.19**	**0.02**	**10.84**	**0.00**	**331.04**	**0.02**
11. Newport Beach						
Squid	3.33	1.34	0.12	0.05	3.45	1.39
Tuna	6.98	0.71	23.00	2.35	29.97	3.06
Total	**10.30**	**0.00**	**23.12**	**0.00**	**33.42**	**0.01**
12. San Diego						
Urchins	7,222.62	20.13	14.50	0.04	7,237.11	20.17
Tuna	52.78	0.01	174.00	0.04	226.78	0.05
Sharks	12.90	0.00	3.29	0.00	16.19	0.01
Total	**7,288.30**	**0.22**	**191.78**	**0.01**	**7,480.08**	**0.22**

1. Percents are amount of loss as a percent of total ex vessel value of Port landings (1996-1999 annual average).

APPENDIX D

Table D.6 Commercial Fishing: Impact of Preferred Alternative on Ex Vessel Value By Port and Species Group - Step 1 Analysis

Ports/Species Groups	State Waters Value	% [1]	Federal Waters Value	%	Total Value	%
1. Moss Landing						
Wetfish	8.66	N/A	10.07	N/A	18.73	N/A
Total	**8.66**	**N/A**	**10.07**	**N/A**	**18.73**	**N/A**
2. Morro Bay						
Squid	464.85	1.61	14.34	0.05	479.19	1.66
Rockfishes	10,473.17	0.68	3,529.70	0.23	14,002.87	0.91
CA Sheepshead	62.96	1.23	0.00	0.00	62.96	1.23
Total	11,000.98	0.24	3,544.04	0.08	14,545.02	0.32
3. Avila/Port San Luis						
Flatfish	36.21	0.01	4.80	0.00	41.00	0.01
Sharks	3.49	0.01	0.51	0.00	4.00	0.02
Total	**39.69**	**0.00**	**5.31**	**0.00**	**45.00**	**0.00**
4. Santa Barbara						
Squid	15,178.64	6.78	468.23	0.21	15,646.87	6.99
Urchins	752,353.73	18.83	2,434.27	0.06	754,788.00	18.89
Spiny Lobsters	142,054.94	11.90	0.00	0.00	142,054.94	11.90
Rockfishes	73,841.39	23.82	24,886.27	8.03	98,727.67	31.85
Prawn	3,360.48	0.32	3,372.92	0.32	6,733.41	0.65
Crab	47,707.65	7.18	0.00	0.00	47,707.65	7.18
CA Sheepshead	9,455.86	11.77	0.00	0.00	9,455.86	11.77
Flatfish	1,020.02	0.50	135.09	0.07	1,155.11	0.56
Sea Cucumbers	5,864.61	10.85	0.00	0.00	5,864.61	10.85
Tuna	26.57	0.36	99.49	1.35	126.06	1.71
Total	**1,050,863.89**	**12.23**	**31,396.28**	**0.37**	**1,082,260.17**	**12.60**
5. Ventura Harbor						
Squid	107,123.12	3.81	3,304.52	0.12	110,427.64	3.92
Urchins	1,355.89	0.87	4.39	0.00	1,360.27	0.88
Spiny Lobsters	6,181.42	1.81	0.00	0.00	6,181.42	1.81
Rockfishes	452.96	0.16	152.66	0.06	605.62	0.22
Prawn	4,828.15	0.99	4,846.02	0.99	9,674.18	1.97
Crab	226.67	0.34	0.00	0.00	226.67	0.34
Wetfish	9.40	0.10	10.93	0.12	20.33	0.22
CA Sheepshead	15,938.33	33.23	0.00	0.00	15,938.33	33.23
Flatfish	7,958.74	2.87	1,054.04	0.38	9,012.78	3.25
Sculpin & Bass	1,486.80	7.40	690.66	3.44	2,177.47	10.84
Tuna	6.41	0.01	23.99	0.02	30.40	0.03
Sharks	1,034.92	1.66	152.72	0.24	1,187.64	1.90
Total	**146,602.80**	**2.72**	**10,239.95**	**0.19**	**156,842.75**	**2.91**
6. Channel Islands/Oxnard						
Squid	179.02	1.22	5.52	0.04	184.55	1.26
Urchins	68,458.70	2.29	221.50	0.01	68,680.20	2.30
Spiny Lobsters	577.60	0.25	0.00	0.00	577.60	0.25
Rockfishes	3,217.51	1.28	1,084.38	0.43	4,301.88	1.71
Prawn	47,679.36	8.05	47,855.87	8.08	95,535.23	16.12
Crab	2,204.69	3.93	0.00	0.00	2,204.69	3.93
Wetfish	111.52	0.75	129.71	0.87	241.24	1.62
CA Sheepshead	7,970.48	4.20	0.00	0.00	7,970.48	4.20
Flatfish	7,958.74	3.65	1,054.04	0.48	9,012.78	4.13
Sea Cucumbers	21,473.10	13.91	0.00	0.00	21,473.10	13.91
Sculpin & Bass	3,584.91	19.30	1,665.30	8.97	5,250.21	28.26
Tuna	71.71	0.81	268.51	3.03	340.23	3.84
Sharks	2,418.03	8.28	356.83	1.22	2,774.86	9.50
Total	**165,905.37**	**3.39**	**52,641.67**	**1.08**	**218,547.05**	**4.47**

Table D.6 (continued)

Ports/Species Groups	State Waters Value	% 1	Federal Waters Value	%	Total Value	%
7. Port Hueneme						
Squid	1,357,354.90	10.44	41,871.54	0.32	1,399,226.43	10.76
Prawn	2,747.01	1.48	2,757.18	1.48	5,504.19	2.96
Wetfish	23,970.78	6.86	27,881.13	7.97	51,851.91	14.83
Tuna	268.98	0.69	1,007.12	2.58	1,276.10	3.27
Total	**1,384,341.66**	**10.15**	**73,516.97**	**0.54**	**1,457,858.63**	**10.69**
8. San Pedro						
Squid	144,462.94	3.63	4,456.38	0.11	148,919.32	3.74
Urchins	3,110.25	1.07	10.06	0.00	3,120.32	1.07
Spiny Lobsters	277.73	0.06	0.00	0.00	277.73	0.06
Wetfish	2,788.45	0.08	3,243.33	0.09	6,031.78	0.17
CA Sheepshead	5,194.37	12.72	0.00	0.00	5,194.37	12.72
Flatfish	4.30	0.00	0.57	0.00	4.86	0.00
Sea Cucumbers	393.28	9.75	0.00	0.00	393.28	9.75
Sculpin & Bass	1,792.32	2.06	832.59	0.96	2,624.90	3.02
Tuna	769.26	0.02	2,880.25	0.08	3,649.51	0.11
Sharks	144.51	0.09	21.32	0.01	165.83	0.10
Total	**158,937.41**	**1.14**	**11,444.50**	**0.08**	**170,381.91**	**1.22**
9. Terminal Island						
Squid	35,741.78	4.20	1,102.56	0.13	36,844.34	4.33
Urchins	705.01	0.03	2.28	0.00	707.29	0.03
Wetfish	1,621.17	0.13	1,885.63	0.15	3,506.80	0.28
Tuna	7,347.39	0.06	27,510.10	0.23	34,857.49	0.30
Sharks	1,268.15	5.20	187.14	0.77	1,455.29	5.96
Total	**46,683.50**	**0.26**	**30,687.71**	**0.17**	**77,371.21**	**0.43**
10. Avalon & Other LA						
Squid	210.08	4.01	6.48	0.12	216.56	4.14
Spiny Lobsters	41.31	0.00	0.00	0.00	41.31	0.00
Wetfish	1.03	0.01	1.19	0.02	2.22	0.03
Total	**252.41**	**0.01**	**7.67**	**0.00**	**260.08**	**0.01**
11. Newport Beach						
Squid	2.66	1.07	0.08	0.03	2.74	1.10
Tuna	6.28	0.64	23.50	2.40	29.78	3.04
Total	**8.94**	**0.00**	**23.59**	**0.00**	**32.52**	**0.00**
12. San Diego						
Urchins	4,480.43	12.48	14.50	0.04	4,494.93	12.52
Tuna	47.50	0.01	177.84	0.04	225.33	0.05
Sharks	9.91	0.00	1.46	0.00	11.37	0.00
Total	**4,537.84**	**0.13**	**193.80**	**0.01**	**4,731.64**	**0.14**

1. Percents are amount of loss as a percent of total ex vessel value of Port landings (1996-1999 annual average).

APPENDIX D

Table D.7. Profiles of Fishermen Impacted by Alternative, Barilotti Sample - Step 1 Analysis

	Alternatives 2, 4, 5, Preferred[1]			Alternatives 1&3		
EXPERIENCE						
	N	Mean	Range	N	Mean	Range
Years Commercial Fishing	58	20.16	8 - 32	54	20.19	8 - 36
Years Fishingin in CINMS	57	19.11	4 - 32	53	19.25	4 - 32
AGE	58	44.83	30 - 64	55	44.80	30 - 64
EDUCATION						
Years of Schooling	57	12.89	0 - 17	54	13.00	0 - 17
DEPENDENCY ON FISHING						
Percent of 1999 Income from Fishing	57	90.02	10 - 100	54	89.56	10 - 100
Percent of 1999 Household Income from Fishing	57	83.49	10 - 100	54	83.22	10 - 100
Percent of Fishing Outside CINMS	55	17.71	0 - 97	52	17.38	0 - 97
Percent of 1999 Fishing Revenue from CINMS						
Urchin	40	73.76	0 - 100	39	73.27	0 - 100
Spiny Lobster	10	58.39	0 - 100	9	64.88	0 - 100
Sea Cucumbers	13	71.88	0 - 100	12	69.61	0 - 100
Rockfish	17	20.42	0 - 100	17	20.42	0 - 100
Crab	17	35.85	0 - 100	16	38.09	0 - 100
Flatfish	11	10.47	0 - 52.16	11	10.47	0 - 52.16
CA Sheepshead	16	49.27	0 - 100	15	46.83	0 - 100
Sculpin & Bass	6	10.02	0 - 37.74	6	10.02	0 - 37.74
Shark	8	4.72	0 - 18.93	8	4.72	0 - 18.93
Other (those not listed above)	17	52.92	0 - 100	17	52.92	0 - 100
All Species/Species Groups	57	71.46	2.8 - 100	55	71.42	2.8 - 100
PEOPLE DIRECTLY EMPLOYED AND FAMILY MEMBERS SUPPORTED	N	Mean	Range	N	Mean	Range
Number of Crew	55	1.36	0 - 11	52	1.38	0 - 11
Number of Crew with Own Fishing Licenses	55	1.29	0 - 11	52	1.33	0 - 11
Number of Family Members Supported by Captains/Owners, not including self	58	2.10	0 - 5	55	2.07	0 - 5
OWNERSHIP/INVESTMENT	N	%		N	%	
Boat Ownership (Percent Yes)	51	88.3		48	87.5	
Replacement Value of Boat	57	120,930	0 - 1,400,000	53	125,340	0 - 1,400,000
Replacement Value of Electronic Equipment	53	11,126	0 - 90,000	49	11,147	0 - 90,000
Replacement Value of Fishing/Diving Gear	54	16,231	1,000 - 110,000	50	15,730	1,000 - 110,000
Replacement Value Boat, including Equipment and Gear	50	128,104	1,500 - 660,000	46	130,910	1,500 - 660,000
RESIDENCE/MAIN LANDING PORT	N	%		N	%	
State						
California	59	100		54	100	

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Table D.7. (Continued)

	Alternatives 2, 4, 5, Preferred[1]		Alternatives 1&3	
RESIDENCE/MAIN LANDING PORT				
City	57		56	
Arroyo Grande	1	1.8	1	1.9
Atascadero	2	3.5	2	3.7
Carpenteria	3	5.3	3	5.6
Goleta	2	3.5	2	3.7
La Conchita	1	1.8	1	1.9
Morro Bay	1	1.8	1	1.9
Newbury Park	1	1.8	1	1.9
Ojai	1	1.8	1	1.9
Oxnard	4	7.0	4	7.4
Oak View	1	1.8	1	1.9
San Pedro	1	1.8	1	1.9
Santa Barbara	30	52.6	30	55.6
Simi Valley	1	1.8	1	1.9
Tarzana	1	1.8	1	1.9
Ventura	7	12.3	4	7.4
Main Landing Port	58	%	55	%
Channel Islands Harbor	8	13.8	8	14.5
Santa Barbara	37	63.8	37	67.3
San Pedro	1	1.7	1	1.8
Ventura Harbor	9	15.5	6	10.9
Multiple	3	5.1	3	5.4

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Appendix E. Consumptive Recreation: Preferred Alternative – Detailed Tables

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Table E.1. Recreation Consumptive Activities - Preferred Alternative - State Waters - Santa Barbara County Step 1

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	1,474	16.84%	507	15.98%	1,463	14.02%	1,984	25.01%
Market Impact								
Direct Sales	$ 209,787	16.84%	$ 74,587	15.98%	$ 60,779	14.02%	$ 109,145	25.01%
Direct Wages and Salaries	$ 98,476	16.84%	$ 36,453	15.98%	$ 18,184	14.02%	$ 31,779	25.01%
Direct Employment	4	17.13%	1	16.21%	1	13.21%	1	27.18%
Total Income								
Upper Bound	$ 172,333	16.84%	$ 63,792	15.98%	$ 31,822	14.02%	$ 55,613	25.01%
Lower Bound	$ 147,714	16.84%	$ 54,679	15.98%	$ 27,276	14.02%	$ 47,668	25.01%
Total Employment								
Upper Bound	6	16.62%	2	15.63%	1	14.16%	2	25.48%
Lower Bound	5	16.82%	2	16.58%	1	13.76%	2	24.27%
Non-Market Impact								
Consumer's Surplus	$ 17,072	16.84%	$ 5,867	15.98%	$ 16,945	14.02%	$ 22,977	25.01%
Profit[1]	$ 4,374	16.84%	$ 1,079	15.98%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table E.2. Charter Party Boat Fishing - Preferred Alternative - State Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	22,809	0.185405925	4,229	11786.88293	0.4
Lodging	8.65	12,754	0.232375514	2,964	14245.93348	0.2
Private Transportation	16.64	24,534	0.170880464	4,192	21624.38212	0.2
Public Transportation	33.07	48,759	0.170880464	8,332	21624.38212	0.4
Boat Fuel	0.00	0	0.056686529	0	12788.05621	0.0
Access/Boat launch Fees	1.18	1,740	0.231621184	403	20200.13202	0.0
Equipment Rental	6.01	8,861	0.272281346	2,413	14929.50237	0.2
Bait and Ice	0.52	767	0.104264901	80	18232.86584	0.0
Charter Boat fee	60.74	89,563	0.239509323	21,451	12917.92929	1.7
Total	142.28	**209,787**		**44,064**		**3.0**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			98,476		3.8
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**147,714**	Lower	**4.7**
Upper 2.5			Upper	**172,333**	Upper	**5.7**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.002%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.001%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.3. Charter Party Boat Diving - Preferred Alternative - State Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	26,854	0.23237551	6,240	14,246	0.4
Eating & Drinking	29.00	14,694	0.17458227	2,565	11,194	0.2
Transportation	10.00	5,067	0.17088046	866	21,624	0.0
Charter Boat fee	40.21	20,373	0.23950932	4,879	12,918	0.4
Miscellaneous	15.00	7,600	0.23162118	1,760	20,200	0.1
Total	147.21	**74,587**		**16,311**		**1.2**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			36,453		1.5
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**54,679**	Lower	**1.8**
Upper 2.5			Upper	**63,792**	Upper	**2.2**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.001%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.001%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.4. Private Boat Fishing - Preferred Alternative - State Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	11,123	0.185405925	2,062	11786.88293	0.2
Lodging	1.20	1,756	0.232375514	408	14245.93348	0.0
Private Transportation	8.90	13,025	0.170880464	2,226	21624.38212	0.1
Public Transportation	1.89	2,766	0.170880464	473	21624.38212	0.0
Boat Fuel	12.74	18,645	0.056686529	1,057	12788.05621	0.1
Access/Boat launch Fees	1.52	2,225	0.231621184	515	20200.13202	0.0
Equipment Rental	0.91	1,332	0.272281346	363	14929.50237	0.0
Bait and Ice	6.77	9,908	0.104264901	1,033	18232.86584	0.1
Charter Boat fee	0.00	0	0.239509323	0	12917.92929	0.0
Total	41.53	**60,779**		**8,137**		**0.5**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			18,184		0.7
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**27,276**	Lower	**0.8**
Upper 2.5			Upper	**31,822**	Upper	**1.0**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.5. Private Boat Diving - Preferred Alternative - State Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	37,705	0.056686529	2,137	12,788	0.2
Air Refills	7.00	13,891	0.239509323	3,327	12,918	0.3
Ice	2.50	4,961	0.104264901	517	18,233	0.0
Boat Ramp Fee	1.50	2,977	0.239509323	713	12,918	0.1
Food & Drink	11.00	21,829	0.174582272	3,811	11,194	0.3
Auto Gas	9.00	17,860	0.056686529	1,012	12,788	0.1
Equipment Rental	5.00	9,922	0.272281346	2,702	14,930	0.2
Total	55.00	109,145		**14,220**		**1.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			31,779		1.4
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**47,668**	Lower	**1.7**
Upper 2.5			Upper	**55,613**	Upper	**2.0**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.001%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu"$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta"$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
$\mu"$ = Regional income multipliers (upper and lower range).
$\delta"$ = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.6. Recreation Consumptive Activities - Preferred Alternative - State Waters - Ventura County Step 1

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	16,581	11.16%	2,636	18.31%	27,126	14.09%	8,351	24.52%
Market Impact								
Direct Sales	$ 2,141,636	11.16%	$ 452,141	18.31%	$ 1,126,541	14.09%	$ 459,302	24.52%
Direct Wages and Salaries	$ 985,486	11.16%	$ 219,133	18.31%	$ 321,697	14.09%	$ 123,299	24.52%
Direct Employment	28	11.17%	7	18.41%	11	14.00%	4	24.27%
Total Income								
Upper Bound	$ 1,724,601	11.16%	$ 383,482	18.31%	$ 562,969	14.09%	$ 215,774	24.52%
Lower Bound	$ 1,478,229	11.16%	$ 328,699	18.31%	$ 482,545	14.09%	$ 184,949	24.52%
Total Employment								
Upper Bound	43	11.17%	10	18.41%	16	14.06%	6	24.75%
Lower Bound	35	11.15%	9	18.22%	13	14.04%	5	24.55%
Non-Market Impact								
Consumer's Surplus	$ 191,990	11.16%	$ 30,526	18.31%	$ 314,085	14.09%	$ 96,694	24.52%
Profit[1]	$ 38,160	11.16%	$ 6,445	18%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table E.7. Charter Party Boat Fishing - Preferred Alternative - State Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	256,512	0.171537003	44,001	11740.46679	3.7
Lodging	8.65	143,428	0.213109652	30,566	14138.05668	2.2
Private Transportation	16.64	275,912	0.166580417	45,962	21582.30187	2.1
Public Transportation	33.07	548,342	0.166580417	91,343	21582.30187	4.2
Boat Fuel	0.00	0	0.037661501	0	13082.33276	0.0
Access/Boat launch Fees	1.18	19,566	0.197079821	3,856	26686.02901	0.1
Equipment Rental	6.01	99,653	0.24102252	24,019	26205.88235	0.9
Bait and Ice	0.52	8,622	0.105851657	913	19902.47277	0.0
Charter Boat fee	47.62	789,601	0.229005998	180,823	24,860	7.3
Total	129.16	**2,141,636**		**421,482**		**20.7**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salaries	2.338143047			985,486		28.4
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**1,478,229**	Lower	**35.5**
Upper 2.5			Upper	**1,724,601**	Upper	**42.5**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.043%
to Employment	21027.31293			0.014%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.008%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.8. Charter Party Boat Diving - Preferred Alternative - State Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	139,729	0.21310965	29,778	14,138	2.1
Eating & Drinking	29.00	76,455	0.16762701	12,816	11,507	1.1
Transportation	10.00	26,364	0.16658042	4,392	21,582	0.2
Charter Boat fee	64.50	170,048	0.229006	38,942	24,860	1.6
Miscellaneous	15.00	39,546	0.19707982	7,794	26,686	0.3
Total	171.50	**452,141**		**93,721**		**5.3**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			219,133		7.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**328,699**	Lower	**8.7**
Upper 2.5			Upper	**383,482**	Upper	**10.5**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.011%
to Employment	21027.31293			0.003%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.002%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.9. Private Boat Fishing - Preferred Alternative - State Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	206,157	0.171537003	35,364	11740.46679	3.0
Lodging	1.20	32,551	0.213109652	6,937	14138.05668	0.5
Private Transportation	8.90	241,421	0.166580417	40,216	21582.30187	1.9
Public Transportation	1.89	51,268	0.166580417	8,540	21582.30187	0.4
Boat Fuel	12.74	345,585	0.037661501	13,015	13082.33276	1.0
Access/Boat launch Fees	1.52	41,231	0.197079821	8,126	26686.02901	0.3
Equipment Rental	0.91	24,685	0.24102252	5,950	26205.88235	0.2
Bait and Ice	6.77	183,643	0.105851657	19,439	19902.47277	1.0
Charter Boat fee	0.00	0	0.229005998	0	24,860	0.0
Total	41.53	**1,126,541**		**137,586**		**8.3**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			321,697		10.8
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**482,545**	Lower	**13.5**
Upper 2.5			Upper	**562,969**	Upper	**16.2**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.016%
to Employment	21027.31293			0.005%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.003%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.10. Private Boat Diving - Preferred Alternative - State Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	158,668	0.037661501	5,976	13,082	0.5
Air Refills	7.00	58,457	0.229005998	13,387	24,860	0.5
Ice	2.50	20,877	0.105851657	2,210	19,902	0.1
Boat Ramp Fee	1.50	12,526	0.229005998	2,869	24,860	0.1
Food & Drink	11.00	91,860	0.167627006	15,398	11,507	1.3
Auto Gas	9.00	75,159	0.037661501	2,831	13,082	0.2
Equipment Rental	5.00	41,755	0.24102252	10,064	26,206	0.4
Total	55.00	**459,302**		**52,734**		**3.2**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			123,299		4.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**184,949**	Lower	**5.2**
Upper 2.5			Upper	**215,774**	Upper	**6.2**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.006%
to Employment	21027.31293			0.002%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.001%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table E.11. Recreation Consumptive Activities - Preferred Alternative - State Waters - LA County Step 1

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	257	18.69%	93	25.62%	1,559	14.16%	1,289	24.78%
Market Impact								
Direct Sales	$ 36,334	18.70%	$ 18,608	25.65%	$ 64,728	14.16%	$ 70,912	24.78%
Direct Wages and Salaries	$ 10,480	18.70%	$ 6,183	25.65%	$ 12,151	14.16%	$ 13,286	24.78%
Direct Employment	0	17.42%	0	21.30%	1	14.16%	1	24.77%
Total Income								
Upper Bound	$ 18,340	18.70%	$ 10,820	25.65%	$ 21,264	14.16%	$ 23,250	24.78%
Lower Bound	$ 15,720	18.70%	$ 9,274	25.65%	$ 18,227	14.16%	$ 19,928	24.78%
Total Employment								
Upper Bound	1	17.42%	0	31.94%	1	14.16%	1	24.81%
Lower Bound	0	21.78%	0	26.62%	1	14.16%	1	24.80%
Non-Market Impact								
Consumer's Surplus	$ 2,973	18.70%	$ 1,080	25.64%	$ 18,046	14.16%	$ 14,929	24.78%
Profit[1]	$ 1,540	18.70%	$ 528	25.65%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table E.12. Charter Party Boat Fishing - Preferred Alternative - State Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	3,973	0.175118965	696	12848.82845	0.1
Lodging	8.65	2,221	0.20181569	448	16112.61061	0.0
Private Transportation	16.64	4,273	0.119408566	510	19952.00329	0.0
Public Transportation	33.07	8,492	0.119408566	1,014	19952.00329	0.1
Boat Fuel	0.00	0	0.039248605	0	13772.40377	0.0
Access/Boat launch Fees	1.18	303	0.268261264	81	29734.05276	0.0
Equipment Rental	6.01	1,543	0.243828383	376	19544.97354	0.0
Bait and Ice	0.52	134	0.103146649	14	19023.1563	0.0
Charter Boat fee	59.95	15,394	0.205539552	3,164	28,630	0.1
Total	141.49	**36,334**		**6,304**		**0.3**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			10,480		0.3
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**15,720**	Lower	**0.4**
Upper 2.5			Upper	**18,340**	Upper	**0.5**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000005%
to Employment	26601.36574			0.000009%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000007%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu"$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta"$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
$\mu"$ = Regional income multipliers (upper and lower range).
$\delta"$ = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.13. Charter Party Boat Diving - Preferred Alternative - State Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	4,942	0.20181569	997	16,113	0.1
Eating & Drinking	29.00	2,704	0.17046229	461	12,333	0.0
Transportation	10.00	932	0.11940857	111	19,952	0.0
Charter Boat fee	92.56	8,631	0.20553955	1,774	28,630	0.1
Miscellaneous	15.00	1,399	0.26826126	375	29,734	0.0
Total	199.56	**18,608**		**3,719**		**0.2**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			6,183		0.2
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**9,274**	Lower	**0.3**
Upper 2.5			Upper	**10,820**	Upper	**0.3**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000003%
to Employment	26601.36574			0.000005%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000004%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table E.14. Private Boat Fishing - Preferred Alternative - State Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	11,845	0.175118965	2,074	12848.82845	0.2
Lodging	1.20	1,870	0.20181569	377	16112.61061	0.0
Private Transportation	8.90	13,871	0.119408566	1,656	19952.00329	0.1
Public Transportation	1.89	2,946	0.119408566	352	19952.00329	0.0
Boat Fuel	12.74	19,856	0.039248605	779	13772.40377	0.1
Access/Boat launch Fees	1.52	2,369	0.268261264	636	29734.05276	0.0
Equipment Rental	0.91	1,418	0.243828383	346	19544.97354	0.0
Bait and Ice	6.77	10,552	0.103146649	1,088	19023.1563	0.1
Charter Boat fee	0.00	0	0.205539552	0	28,630	0.0
Total	41.53	**64,728**		**7,309**		**0.4**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			12,151		0.5
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**18,227**	Lower	**0.6**
Upper 2.5			Upper	**21,264**	Upper	**0.8**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.0000001%
to Employment	26601.36574			0.00001%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.00001%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.15. Private Boat Diving - Preferred Alternative - State Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	24,497	0.039248605	961	13,772	0.1
Air Refills	7.00	9,025	0.205539552	1,855	28,630	0.1
Ice	2.50	3,223	0.103146649	332	19,023	0.0
Boat Ramp Fee	1.50	1,934	0.205539552	398	28,630	0.0
Food & Drink	11.00	14,182	0.170462286	2,418	12,333	0.2
Auto Gas	9.00	11,604	0.039248605	455	13,772	0.0
Equipment Rental	5.00	6,447	0.243828383	1,572	19,545	0.1
Total	55.00	**70,912**		**7,991**		**0.5**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			13,286		0.5
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**19,928**	Lower	**0.7**
Upper 2.5			Upper	**23,250**	Upper	**0.8**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000007%
to Employment	26601.36574			0.00001%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.00001%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: (βx)/γ + y (see below for symbol definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.16. Recreation Consumptive Activities - Preferred Alternative - Federal Waters - Santa Barbara County Step 1

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	276	3.15%	41	1.31%	331	3.17%	95	1.20%
Market Impact								
Direct Sales	$ 39,289	3.15%	$ 6,103	1.31%	$ 13,760	3.17%	$ 5,246	1.20%
Direct Wages and Salaries	$ 18,443	3.15%	$ 2,983	1.31%	$ 4,117	3.17%	$ 1,527	1.20%
Direct Employment	1	3.21%	0	1.33%	0	2.99%	0	1.31%
Total Income								
Upper Bound	$ 32,275	3.15%	$ 5,220	1.31%	$ 7,204	3.17%	$ 2,673	1.20%
Lower Bound	$ 27,664	3.15%	$ 4,474	1.31%	$ 6,175	3.17%	$ 2,291	1.20%
Total Employment								
Upper Bound	1	3.11%	0	1.28%	0	3.21%	0	1.22%
Lower Bound	1	3.15%	0	1.36%	0	3.12%	0	1.17%
Non-Market Impact								
Consumer's Surplus	$ 3,197	3.15%	$ 480	1.31%	$ 3,836	3.17%	$ 1,104	1.20%
Profit[1]	$ 819	3.15%	$ 88	1.31%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table E.17. Charter Party Boat Fishing - Preferred Alternative - Federal Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	4,272	0.185405925	792	11786.88293	0.1
Lodging	8.65	2,389	0.232375514	555	14245.93348	0.0
Private Transportation	16.64	4,595	0.170880464	785	21624.38212	0.0
Public Transportation	33.07	9,132	0.170880464	1,560	21624.38212	0.1
Boat Fuel	0.00	0	0.056686529	0	12788.05621	0.0
Access/Boat launch Fees	1.18	326	0.231621184	75	20200.13202	0.0
Equipment Rental	6.01	1,660	0.272281346	452	14929.50237	0.0
Bait and Ice	0.52	144	0.104264901	15	18232.86584	0.0
Charter Boat fee	60.74	16,773	0.239509323	4,017	12917.92929	0.3
Total	142.28	**39,289**		**8,252**		**0.6**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			18,443		0.7
Regional Income Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**27,664**	Lower	**0.9**
Upper 2.5			Upper	**32,275**	Upper	**1.1**
Proprietors Income to Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.000%		
Regional Employment Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table E.18. Charter Party Boat Diving - Preferred Alternative - Federal Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	2,197	0.23237551	511	14,246	0.0
Eating & Drinking	29.00	1,202	0.17458227	210	11,194	0.0
Transportation	10.00	415	0.17088046	71	21,624	0.0
Charter Boat fee	40.21	1,667	0.23950932	399	12,918	0.0
Miscellaneous	15.00	622	0.23162118	144	20,200	0.0
Total	147.21	**6,103**		**1,335**		**0.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			2,983		0.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**4,474**	Lower	**0.1**
Upper 2.5			Upper	**5,220**	Upper	**0.2**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.19. Private Boat Fishing - Preferred Alternative - Federal Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	2,518	0.185405925	467	11786.88293	0.0
Lodging	1.20	398	0.232375514	92	14245.93348	0.0
Private Transportation	8.90	2,949	0.170880464	504	21624.38212	0.0
Public Transportation	1.89	626	0.170880464	107	21624.38212	0.0
Boat Fuel	12.74	4,221	0.056686529	239	12788.05621	0.0
Access/Boat launch Fees	1.52	504	0.231621184	117	20200.13202	0.0
Equipment Rental	0.91	302	0.272281346	82	14929.50237	0.0
Bait and Ice	6.77	2,243	0.104264901	234	18232.86584	0.0
Charter Boat fee	0.00	0	0.239509323	0	12917.92929	0.0
Total	41.53	**13,760**		**1,842**		**0.1**

Total Income to			Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794		4,117		0.1
Regional Income					
Multiplier			Total Income[3]		Total Employment[4]
Lower 2.0		Lower	**6,175**	Lower	**0.2**
Upper 2.5		Upper	**7,204**	Upper	**0.2**
Proprietors Income to					
Total Income by Work	0.188784335		% County by		% County
Proprietors Income			Place of Work		0.000%
to Employment	23974.67315		0.000%		
Regional Employment					
Multiplier					
Lower 1.5			% County by		
Upper 2.0			Place of Residence		
			0.000%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table E.20. Private Boat Diving - Preferred Alternative - Federal Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	1,812	0.056686529	103	12,788	0.0
Air Refills	7.00	668	0.239509323	160	12,918	0.0
Ice	2.50	238	0.104264901	25	18,233	0.0
Boat Ramp Fee	1.50	143	0.239509323	34	12,918	0.0
Food & Drink	11.00	1,049	0.174582272	183	11,194	0.0
Auto Gas	9.00	858	0.056686529	49	12,788	0.0
Equipment Rental	5.00	477	0.272281346	130	14,930	0.0
Total	55.00	5,246		**683**		**0.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			1,527		0.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**2,291**	Lower	**0.1**
Upper 2.5			Upper	**2,673**	Upper	**0.1**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.21. Recreation Consumptive Activities - Preferred Alternative - Federal Waters - Ventura County Step 1

	Charter Boat Fishing			Charter Boat Diving			Private Boat Fishing			Private Boat Diving		
		Boundary Alternative	% of Study Area[2]		Boundary Alternative	% of Study Area[2]		Boundary Alternative	% of Study Area[2]		Boundary Alternative	% of Study Area[2]
Person-days		7,170	4.82%		269	1.87%		5,580	2.90%		377	1.11%
Market Impact												
Direct Sales	$	926,059	4.82%	$	46,148	1.87%	$	231,719	2.90%	$	20,749	1.11%
Direct Wages and Salaries	$	426,131	4.82%	$	22,366	1.87%	$	66,170	2.90%	$	5,570	1.11%
Direct Employment		12	4.83%		1	1.88%		2	2.88%		0	1.10%
Total Income												
Upper Bound	$	745,730	4.82%	$	39,140	1.87%	$	115,798	2.90%	$	9,748	1.11%
Lower Bound	$	639,197	4.82%	$	33,549	1.87%	$	99,255	2.90%	$	8,355	1.11%
Total Employment												
Upper Bound		18	4.83%		1	1.88%		3	2.89%		0	1.12%
Lower Bound		15	4.82%		1	1.86%		3	2.89%		0	1.11%
Non-Market Impact												
Consumer's Surplus	$	83,018	4.82%	$	3,116	1.87%	$	64,604	2.90%	$	4,368	1.11%
Profit[1]	$	16,501	4.82%	$	658	2%		n/a	n/a		n/a	n/a

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table E.22. Charter Party Boat Fishing - Preferred Alternative - Federal Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	110,918	0.171537003	19,026	11740.46679	1.6
Lodging	8.65	62,019	0.213109652	13,217	14138.05668	0.9
Private Transportation	16.64	119,306	0.166580417	19,874	21582.30187	0.9
Public Transportation	33.07	237,107	0.166580417	39,497	21582.30187	1.8
Boat Fuel	0.00	0	0.037661501	0	13082.33276	0.0
Access/Boat launch Fees	1.18	8,460	0.197079821	1,667	26686.02901	0.1
Equipment Rental	6.01	43,091	0.24102252	10,386	26205.88235	0.4
Bait and Ice	0.52	3,728	0.105851657	395	19902.47277	0.0
Charter Boat fee	47.62	341,429	0.229005998	78,189	24,860	3.1
Total	129.16	**926,059**		**182,252**		**8.9**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salaries	2.338143047			426,131		12.3
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**639,197**	Lower	**15.3**
Upper 2.5			Upper	**745,730**	Upper	**18.4**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.019%
to Employment	21027.31293			0.006%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.003%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table E.23. Charter Party Boat Diving - Preferred Alternative - Federal Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	14,261	0.21310965	3,039	14,138	0.2
Eating & Drinking	29.00	7,803	0.16762701	1,308	11,507	0.1
Transportation	10.00	2,691	0.16658042	448	21,582	0.0
Charter Boat fee	64.50	17,356	0.229006	3,975	24,860	0.2
Miscellaneous	15.00	4,036	0.19707982	795	26,686	0.0
Total	171.50	**46,148**		**9,566**		**0.5**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			22,366		0.7
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**33,549**	Lower	**0.9**
Upper 2.5			Upper	**39,140**	Upper	**1.1**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.001%
to Employment	21027.31293			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table E.24. Private Boat Fishing - Preferred Alternative - Federal Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	42,405	0.171537003	7,274	11740.46679	0.6
Lodging	1.20	6,695	0.213109652	1,427	14138.05668	0.1
Private Transportation	8.90	49,658	0.166580417	8,272	21582.30187	0.4
Public Transportation	1.89	10,545	0.166580417	1,757	21582.30187	0.1
Boat Fuel	12.74	71,084	0.037661501	2,677	13082.33276	0.2
Access/Boat launch Fees	1.52	8,481	0.197079821	1,671	26686.02901	0.1
Equipment Rental	0.91	5,077	0.24102252	1,224	26205.88235	0.0
Bait and Ice	6.77	37,774	0.105851657	3,998	19902.47277	0.2
Charter Boat fee	0.00	0	0.229005998	0	24,860	0.0
Total	41.53	**231,719**		**28,300**		**1.7**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			66,170		2.2
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**99,255**	Lower	**2.8**
Upper 2.5			Upper	**115,798**	Upper	**3.3**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.003%
to Employment	21027.31293			0.001%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.001%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.25. Private Boat Diving - Preferred Alternative - Federal Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	7,168	0.037661501	270	13,082	0.0
Air Refills	7.00	2,641	0.229005998	605	24,860	0.0
Ice	2.50	943	0.105851657	100	19,902	0.0
Boat Ramp Fee	1.50	566	0.229005998	130	24,860	0.0
Food & Drink	11.00	4,150	0.167627006	696	11,507	0.1
Auto Gas	9.00	3,395	0.037661501	128	13,082	0.0
Equipment Rental	5.00	1,886	0.24102252	455	26,206	0.0
Total	55.00	**20,749**		**2,382**		**0.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			5,570		0.2
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**8,355**	Lower	**0.2**
Upper 2.5			Upper	**9,748**	Upper	**0.3**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	21027.31293			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table E.26. Recreation Consumptive Activities - Preferred Alternative - Federal Waters - LA County Step 1

	Charter Boat Fishing		Charter Boat Diving		Private Boat Fishing		Private Boat Diving	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	8	0.59%	32	8.71%	322	2.93%	84	1.62%
Market Impact								
Direct Sales	$ 1,156	0.59%	$ 6,326	8.72%	$ 13,380	2.93%	$ 4,640	1.62%
Direct Wages and Salaries	$ 333	0.59%	$ 2,102	8.72%	$ 2,512	2.93%	$ 869	1.62%
Direct Employment	0	0.55%	0	7.24%	0	2.93%	0	1.62%
Total Income								
Upper Bound	$ 583	0.59%	$ 3,678	8.72%	$ 4,396	2.93%	$ 1,521	1.62%
Lower Bound	$ 500	0.59%	$ 3,153	8.72%	$ 3,768	2.93%	$ 1,304	1.62%
Total Employment								
Upper Bound	0	0.55%	0	10.86%	0	2.93%	0	1.62%
Lower Bound	0	0.69%	0	9.05%	0	2.93%	0	1.62%
Non-Market Impact								
Consumer's Surplus	$ 95	0.59%	$ 367	8.72%	$ 3,730	2.93%	$ 977	1.62%
Profit[1]	$ 49	0.59%	$ 179	8.72%	n/a	n/a	n/a	n/a

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table E.27. Charter Party Boat Fishing - Preferred Alternative - Federal Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	15.47	126	0.175118965	22	12848.82845	0.0
Lodging	8.65	71	0.20181569	14	16112.61061	0.0
Private Transportation	16.64	136	0.119408566	16	19952.00329	0.0
Public Transportation	33.07	270	0.119408566	32	19952.00329	0.0
Boat Fuel	0.00	0	0.039248605	0	13772.40377	0.0
Access/Boat launch Fees	1.18	10	0.268261264	3	29734.05276	0.0
Equipment Rental	6.01	49	0.243828383	12	19544.97354	0.0
Bait and Ice	0.52	4	0.103146649	0	19023.1563	0.0
Charter Boat fee	59.95	490	0.205539552	101	28,630	0.0
Total	141.49	**1,156**		**201**		**0.0**

Total Income to			Total Direct Income[1]		Total Direct Employment[2]	
Wages & Salary	1.662507805			333		0.0
Regional Income						
Multiplier			Total Income[3]		Total Employment[4]	
Lower 2.0		Lower		**500**	Lower	**0.0**
Upper 2.5		Upper		**583**	Upper	**0.0**
Proprietors Income to						
Total Income by Work	0.144206695		% County by		% County	
Proprietors Income			Place of Work			0.00000000%
to Employment	26601.36574			0.000000%		
Regional Employment						
Multiplier						
Lower 1.5			% County by			
Upper 2.0			Place of Residence			
				0.000000%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: (βx)/γ + y (see below for symbol definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.28. Charter Party Boat Diving - Preferred Alternative - Federal Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	1,680	0.20181569	339	16,113	0.0
Eating & Drinking	29.00	919	0.17046229	157	12,333	0.0
Transportation	10.00	317	0.11940857	38	19,952	0.0
Charter Boat fee	92.56	2,934	0.20553955	603	28,630	0.0
Miscellaneous	15.00	476	0.26826126	128	29,734	0.0
Total	199.56	**6,326**		**1,264**		**0.1**

Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			2,102		0.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**3,153**	Lower	**0.1**
Upper 2.5			Upper	**3,678**	Upper	**0.1**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000001%
to Employment	26601.36574			0.000002%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000001%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu"$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta"$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
$\mu"$ = Regional income multipliers (upper and lower range).
$\delta"$ = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

APPENDIX E

Table E.29. Private Boat Fishing - Preferred Alternative - Federal Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Food	7.60	2,449	0.175118965	429	12848.82845	0.0
Lodging	1.20	387	0.20181569	78	16112.61061	0.0
Private Transportation	8.90	2,867	0.119408566	342	19952.00329	0.0
Public Transportation	1.89	609	0.119408566	73	19952.00329	0.0
Boat Fuel	12.74	4,105	0.039248605	161	13772.40377	0.0
Access/Boat launch Fees	1.52	490	0.268261264	131	29734.05276	0.0
Equipment Rental	0.91	293	0.243828383	71	19544.97354	0.0
Bait and Ice	6.77	2,181	0.103146649	225	19023.1563	0.0
Charter Boat fee	0.00	0	0.205539552	0	28,630	0.0
Total	41.53	**13,380**		**1,511**		**0.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			2,512		0.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**3,768**	Lower	**0.1**
Upper 2.5			Upper	**4,396**	Upper	**0.2**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.0000000%
to Employment	26601.36574			0.00000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.00000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table E.30. Private Boat Diving - Preferred Alternative - Federal Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Boat Gas & Oil	19.00	1,603	0.039248605	63	13,772	0.0
Air Refills	7.00	591	0.205539552	121	28,630	0.0
Ice	2.50	211	0.103146649	22	19,023	0.0
Boat Ramp Fee	1.50	127	0.205539552	26	28,630	0.0
Food & Drink	11.00	928	0.170462286	158	12,333	0.0
Auto Gas	9.00	759	0.039248605	30	13,772	0.0
Equipment Rental	5.00	422	0.243828383	103	19,545	0.0
Total	55.00	**4,640**		**523**		**0.0**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			869		0.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**1,304**	Lower	**0.0**
Upper 2.5			Upper	**1,521**	Upper	**0.1**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000000%
to Employment	26601.36574			0.00000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.00000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

APPENDIX F

Appendix F. Non-Consumptive Recreation: Preferred Alternative – Detailed Tables

<u>Table</u>

APPENDIX F

Table F.1. Recreation Non-consumptive Activities - Preferred Alternative - State Waters - Santa Barbara County Step 1 Analysis

	Whale Watching		Non-consumptive Diving		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	547	6.6%	730	16.2%	340	29.1%
Market Impact						
Direct Sales	$ 87,684	6.6%	$ 107,724	16.2%	$ 71,882	29.1%
Direct Wages and Salaries	$ 43,190	6.6%	$ 52,659	16.2%	$ 36,149	29.1%
Direct Employment	2	6.6%	2	16.2%	1	29.1%
Total Income						
Upper Bound	$ 75,583	6.6%	$ 92,154	16.2%	$ 63,262	29.1%
Lower Bound	$ 64,785	6.6%	$ 78,989	16.2%	$ 54,224	29.1%
Total Employment						
Upper Bound	3	6.7%	3	16.6%	2	27.7%
Lower Bound	2	6.6%	3	16.5%	2	30.8%
Non-Market Impact						
Consumer's Surplus	$ 6,328	6.6%	$ 8,453	16.2%	$ 3,932	29.1%
Profit[1]	$ 5,803	6.6%	$ 1,582	16.2%	$ 736	29.1%

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table F.2. Whale Watching - Preferred Alterantive - State Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	28,967	0.232375514	6,731	14,246	0.5
Eating & Drinking	29.00	15,850	0.174582272	2,767	11,194	0.2
Transportation	10.00	5,465	0.170880464	934	21,624	0.0
Charter Boat fee	53.43	29,204	0.239509323	6,995	12,918	0.5
Miscellaneous	15.00	8,198	0.231621184	1,899	20,200	0.1
Total	160.43	**87,684**		**19,326**		**1.4**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			43,190		1.7
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**64,785**	Lower	**2.2**
Upper 2.5			Upper	**75,583**	Upper	**2.6**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.001%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.001%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

APPENDIX F

Table F.3. Nonconsumptive Diving - Preferred Alterantive - State Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	38,692	0.23237551	8,991	14,246	0.6
Eating & Drinking	29.00	21,171	0.17458227	3,696	11,194	0.3
Transportation	10.00	7,300	0.17088046	1,247	21,624	0.1
Charter Boat fee	40.56	29,610	0.23950932	7,092	12,918	0.5
Miscellaneous	15.00	10,951	0.23162118	2,536	20,200	0.1
Total	147.56	**107,724**		**23,563**		**1.7**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			52,659		2.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**78,989**	Lower	**2.6**
Upper 2.5			Upper	**92,154**	Upper	**3.2**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.001%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.001%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.4. Kayaking - Preferred Alterantive - State Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	17,998	0.232375514	4,182	14,246	0.3
Eating & Drinking	29.00	9,848	0.174582272	1,719	11,194	0.2
Transportation	10.00	3,396	0.170880464	580	21,624	0.0
Charter Boat fee	104.67	35,546	0.239509323	8,514	12,918	0.7
Miscellaneous	15.00	5,094	0.231621184	1,180	20,200	0.1
Total	**211.67**	**71,882**		**16,175**		**1.2**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			36,149		1.5
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**54,224**	Lower	**1.8**
Upper 2.5			Upper	**63,262**	Upper	**2.2**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.001%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.001%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.5. Recreation Non-consumptive Activities - Preferred Alternative - State Waters - Ventura County Step 1 Analysis

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	3,240	18.3%	1,235	20.5%	395	10.6%	18	27.0%
Market Impact								
Direct Sales	$ 541,750	18.3%	$ 233,212	20.5%	$ 66,770	10.6%	$ 2,765	27.0%
Direct Wages and Salaries	$ 261,852	18.3%	$ 114,112	20.5%	$ 32,310	10.6%	$ 1,328	27.0%
Direct Employment	8	18.3%	4	20.5%	1	10.6%	0.04	27.0%
Total Income								
Upper Bound	$ 458,241	18.3%	$ 199,696	20.5%	$ 56,543	10.6%	$ 2,324	27.0%
Lower Bound	$ 392,778	18.3%	$ 171,168	20.5%	$ 48,465	10.6%	$ 1,992	27.0%
Total Employment								
Upper Bound	13	18.3%	5	20.6%	2	10.4%	0.1	#DIV/0!
Lower Bound	11	18.4%	4	20.3%	1	10.8%	0.1	#DIV/0!
Non-Market Impact								
Consumer's Surplus	$ 37,520	18.3%	$ 14,304	20.5%	$ 4,575	10.6%	$ 203	27.0%
Profit[1]	$ 12,706	18.3%	$ 6,569	20.5%	$ 881	10.6%	$ 63	27.0%

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table F.6. Whale Watching - Preferred Alterantive - State Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	171,742	0.213109652	36,600	14,138	2.6
Eating & Drinking	29.00	93,972	0.167627006	15,752	11,507	1.4
Transportation	10.00	32,404	0.166580417	5,398	21,582	0.3
Charter Boat fee	60.19	195,027	0.229005998	44,662	24,860	1.8
Miscellaneous	15.00	48,606	0.197079821	9,579	26,686	0.4
Total	167.19	541,750		**111,991**		**6.4**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salaries	2.338143047			261,852		8.4
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**392,778**	Lower	**10.5**
Upper 2.5			Upper	**458,241**	Upper	**12.6**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.013%
to Employment	21027.31293			0.004%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.002%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table F.7. Nonconsumptive Diving - Preferred Alterantive - State Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	65,473	0.21310965	13,953	14,138	1.0
Eating & Drinking	29.00	35,825	0.16762701	6,005	11,507	0.5
Transportation	10.00	12,353	0.16658042	2,058	21,582	0.1
Charter Boat fee	81.78	101,030	0.229006	23,136	24,860	0.9
Miscellaneous	15.00	18,530	0.19707982	3,652	26,686	0.1
Total	188.78	**233,212**		**48,804**		**2.7**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			114,112		3.6
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**171,168**	Lower	**4.5**
Upper 2.5			Upper	**199,696**	Upper	**5.3**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.005%
to Employment	21027.31293			0.002%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.001%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu"$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta"$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
$\mu"$ = Regional income multipliers (upper and lower range).
$\delta"$ = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.8. Sailing - Preferred Alterantive - State Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	20,940	0.213109652	4,463	14,138	0.3
Eating & Drinking	29.00	11,458	0.167627006	1,921	11,507	0.2
Transportation	10.00	3,951	0.166580417	658	21,582	0.0
Charter Boat fee	61.99	24,494	0.229005998	5,609	24,860	0.2
Miscellaneous	15.00	5,927	0.197079821	1,168	26,686	0.0
Total	168.99	**66,770**		**13,819**		**0.8**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			32,310		1.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**48,465**	Lower	**1.3**
Upper 2.5			Upper	**56,543**	Upper	**1.6**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.002%
to Employment	21027.31293			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.9. Kayaking - Preferred Alterantive - State Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	929	0.213109652	198	14,138	0.0
Eating & Drinking	29.00	508	0.167627006	85	11,507	0.0
Transportation	10.00	175	0.166580417	29	21,582	0.0
Charter Boat fee	50.77	890	0.229005998	204	24,860	0.0
Miscellaneous	15.00	263	0.197079821	52	26,686	0.0
Total	**157.77**	**2,765**		**568**		**0.0**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			1,328		0.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**1,992**	Lower	**0.1**
Upper 2.5			Upper	**2,324**	Upper	**0.1**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	21027.31293			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.10. Recreation Non-consumptive Activities - Preferred Alternative - State Waters - LA County Step 1 Analysis

	Sailing		Non-consumptive Diving	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	45	15.8%	7	2.8%
Market Impact				
Direct Sales	$ 10,107	15.8%	$ 1,598	2.8%
Direct Wages and Salaries	$ 3,369	15.8%	$ 517	2.8%
Direct Employment	0.11	15.8%	0.02	2.8%
Total Income				
Upper Bound	$ 5,895	15.8%	$ 905	2.8%
Lower Bound	$ 5,053	15.8%	$ 775	2.8%
Total Employment				
Upper Bound	0.17	15.8%	0.03	2.8%
Lower Bound	0.14	15.9%	0.03	2.8%
Non-Market Impact				
Consumer's Surplus	$ 521	15.8%	$ 81	2.8%
Profit[1]	$ 1,537	15.8%	$ 127	2.8%

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table F.11. Sailing - Preferred Alterantive - State Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	2,385	0.20181569	481	16,113	0.0
Eating & Drinking	29.00	1,305	0.17046229	222	12,333	0.0
Transportation	10.00	450	0.11940857	54	19,952	0.0
Charter Boat fee	117.61	5,292	0.20553955	1,088	28,630	0.0
Miscellaneous	15.00	675	0.26826126	181	29,734	0.0
Total	224.61	**10,107**		**2,026**		**0.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			3,369		0.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**5,053**	Lower	**0.1**
Upper 2.5			Upper	**5,895**	Upper	**0.2**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000001%
to Employment	26601.36574			0.000003%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000002%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.12. Nonconsumptive Diving - Preferred Alterantive - State Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	92.00	641	0.20181569	129	16,113	0.0
Eating & Drinking	64.00	446	0.17046229	76	12,333	0.0
Transportation	10.00	70	0.11940857	8	19,952	0.0
Charter Boat fee	48.48	338	0.20553955	69	28,630	0.0
Miscellaneous	15.00	104	0.26826126	28	29,734	0.0
Total	229.48	**1,598**		**311**		**0.0**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			517		0.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**775**	Lower	**0.0**
Upper 2.5			Upper	**905**	Upper	**0.0**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000000%
to Employment	26601.36574			0.000000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table F.13. Recreation Non-consumptive Activities - Preferred Alternative - Federal Waters - Santa Barbara County Step 1 Analysis

	Whale Watching			Non-consumptive Diving			Kayaking/Sightseeing		
	Boundary Alternative		% of Study Area[2]	Boundary Alternative		% of Study Area[2]	Boundary Alternative		% of Study Area[2]
Person-days		23	0.3%		59	1.3%		-	0.0%
Market Impact									
Direct Sales	$	3,638	0.3%	$	8,662	1.3%	$	-	0.0%
Direct Wages and Salaries	$	1,792	0.3%	$	4,235	1.3%	$	-	0.0%
Direct Employment		0	0.3%		0	1.3%		-	0.0%
Total Income									
Upper Bound	$	3,136	0.3%	$	7,410	1.3%	$	-	0.0%
Lower Bound	$	2,688	0.3%	$	6,352	1.3%	$	-	0.0%
Total Employment									
Upper Bound		0	0.3%		0	1.3%		-	0.0%
Lower Bound		0	0.3%		0	1.3%		-	0.0%
Non-Market Impact									
Consumer's Surplus	$	263	0.3%	$	680	1.3%	$	-	0.0%
Profit[1]	$	241	0.3%	$	127	1.3%	$	-	0.0%

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table F.14. Whale Watching - Preferred Alterantive - Federal Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	1,202	0.232375514	279	14,246	0.0
Eating & Drinking	29.00	658	0.174582272	115	11,194	0.0
Transportation	10.00	227	0.170880464	39	21,624	0.0
Charter Boat fee	53.43	1,212	0.239509323	290	12,918	0.0
Miscellaneous	15.00	340	0.231621184	79	20,200	0.0
Total	160.43	**3,638**		**802**		**0.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			1,792		0.1
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**2,688**	Lower	**0.1**
Upper 2.5			Upper	**3,136**	Upper	**0.1**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.15. Nonconsumptive Diving - Preferred Alterantive - Federal Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	3,111	0.23237551	723	14,246	0.1
Eating & Drinking	29.00	1,702	0.17458227	297	11,194	0.0
Transportation	10.00	587	0.17088046	100	21,624	0.0
Charter Boat fee	40.56	2,381	0.23950932	570	12,918	0.0
Miscellaneous	15.00	881	0.23162118	204	20,200	0.0
Total	147.56	**8,662**		**1,895**		**0.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			4,235		0.2
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**6,352**	Lower	**0.2**
Upper 2.5			Upper	**7,410**	Upper	**0.3**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: (βx)/γ + y (see below for definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.16. Kayaking - Preferred Alterantive - Federal Waters - Santa Barbara County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	0	0.232375514	0	14,246	0.0
Eating & Drinking	29.00	0	0.174582272	0	11,194	0.0
Transportation	10.00	0	0.170880464	0	21,624	0.0
Charter Boat fee	104.67	0	0.239509323	0	12,918	0.0
Miscellaneous	15.00	0	0.231621184	0	20,200	0.0
Total	**211.67**	**0**		**0**		**0.0**

Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.234846794			0		0.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**0**	Lower	**0.0**
Upper 2.5			Upper	**0**	Upper	**0.0**
Proprietors Income to						
Total Income by Work	0.188784335			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	23974.67315			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu''$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta''$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ'' = Regional income multipliers (upper and lower range).
δ'' = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.17. Recreation Non-consumptive Activities - Preferred Alternative - Federal Waters - Ventura County Step 1 Analysis

	Whale Watching		NC Diving		Sailing		Kayaking/Sightseeing	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	295	1.7%	166	2.8%	59	1.6%	-	0.0%
Market Impact								
Direct Sales	$ 49,376	1.7%	$ 31,404	2.8%	$ 9,897	1.6%	$ -	0.0%
Direct Wages and Salaries	$ 23,866	1.7%	$ 15,366	2.8%	$ 4,789	1.6%	$ -	0.0%
Direct Employment	1	1.7%	0	2.8%	0	1.6%	-	0.0%
Total Income								
Upper Bound	$ 41,765	1.7%	$ 26,891	2.8%	$ 8,381	1.6%	$ -	0.0%
Lower Bound	$ 35,799	1.7%	$ 23,049	2.8%	$ 7,184	1.6%	$ -	0.0%
Total Employment								
Upper Bound	1	1.7%	1	2.8%	0	1.5%	-	#DIV/0!
Lower Bound	1	1.7%	1	2.7%	0	1.6%	-	#DIV/0!
Non-Market Impact								
Consumer's Surplus	$ 3,420	1.7%	$ 1,926	2.8%	$ 678	1.6%	$ -	0.0%
Profit[1]	$ 1,158	1.7%	$ 885	2.8%	$ 131	1.6%	$ -	0.0%

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table F.18. Whale Watching - Preferred Alterantive - Federal Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	15,653	0.213109652	3,336	14,138	0.2
Eating & Drinking	29.00	8,565	0.167627006	1,436	11,507	0.1
Transportation	10.00	2,953	0.166580417	492	21,582	0.0
Charter Boat fee	60.19	17,775	0.229005998	4,071	24,860	0.2
Miscellaneous	15.00	4,430	0.197079821	873	26,686	0.0
Total	167.19	49,376		**10,207**		**0.6**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salaries	2.338143047			23,866		0.8
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**35,799**	Lower	**1.0**
Upper 2.5			Upper	**41,765**	Upper	**1.2**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.001%
to Employment	21027.31293			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table F.19. Nonconsumptive Diving - Preferred Alterantive - Federal Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	8,817	0.21310965	1,879	14,138	0.1
Eating & Drinking	29.00	4,824	0.16762701	809	11,507	0.1
Transportation	10.00	1,664	0.16658042	277	21,582	0.0
Charter Boat fee	81.78	13,605	0.229006	3,116	24,860	0.1
Miscellaneous	15.00	2,495	0.19707982	492	26,686	0.0
Total	188.78	**31,404**		**6,572**		**0.4**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			15,366		0.5
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**23,049**	Lower	**0.6**
Upper 2.5			Upper	**26,891**	Upper	**0.7**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.001%
to Employment	21027.31293			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu"$ (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta"$ (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
$\mu"$ = Regional income multipliers (upper and lower range).
$\delta"$ = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.20. Sailing - Preferred Alterantive - Federal Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	3,104	0.213109652	662	14,138	0.0
Eating & Drinking	29.00	1,698	0.167627006	285	11,507	0.0
Transportation	10.00	586	0.166580417	98	21,582	0.0
Charter Boat fee	61.99	3,631	0.229005998	831	24,860	0.0
Miscellaneous	15.00	879	0.197079821	173	26,686	0.0
Total	168.99	**9,897**		**2,048**		**0.1**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			4,789		0.2
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**7,184**	Lower	**0.2**
Upper 2.5			Upper	**8,381**	Upper	**0.2**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	21027.31293			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.21. Kayaking - Preferred Alterantive - Federal Waters - Ventura County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	0	0.213109652	0	14,138	0.0
Eating & Drinking	29.00	0	0.167627006	0	11,507	0.0
Transportation	10.00	0	0.166580417	0	21,582	0.0
Charter Boat fee	50.77	0	0.229005998	0	24,860	0.0
Miscellaneous	15.00	0	0.197079821	0	26,686	0.0
Total	**157.77**	**0**		**0**		**0.0**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	2.338143047			0		0.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**0**	Lower	**0.0**
Upper 2.5			Upper	**0**	Upper	**0.0**
Proprietors Income to						
Total Income by Work	0.164550026			% County by		% County
Proprietors Income				Place of Work		0.000%
to Employment	21027.31293			0.000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment is calculated by using the following formula: $(\beta x)/\gamma + y$ (see below for definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

Table F.22. Recreation Non-consumptive Activities - Preferred Alternative - Federal Waters - LA County Step 1 Analysis

	Sailing		Non-consumptive Diving	
	Boundary Alternative	% of Study Area[2]	Boundary Alternative	% of Study Area[2]
Person-days	-	0.0%	-	0.0%
Market Impact				
Direct Sales	$ -	0.0%	$ -	0.0%
Direct Wages and Salaries	$ -	0.0%	$ -	0.0%
Direct Employment	-	0.0%	-	0.0%
Total Income				
Upper Bound	$ -	0.0%	$ -	0.0%
Lower Bound	$ -	0.0%	$ -	0.0%
Total Employment				
Upper Bound	-	0.0%	-	0.0%
Lower Bound	-	0.0%	-	0.0%
Non-Market Impact				
Consumer's Surplus	$ -	0.0%	$ -	0.0%
Profit[1]	$ -	0.0%	$ -	0.0%

1. Profit is used as a proxy for producer's surplus.
2. Amount of activity/economic measure impacted by the alternative in the county divided by the total amount of activity/economic measure in the county related to the study area.

Table F.23. Sailing - Preferred Alterantive - Federal Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	53.00	0	0.20181569	0	16,113	0.0
Eating & Drinking	29.00	0	0.17046229	0	12,333	0.0
Transportation	10.00	0	0.11940857	0	19,952	0.0
Charter Boat fee	117.61	0	0.20553955	0	28,630	0.0
Miscellaneous	15.00	0	0.26826126	0	29,734	0.0
Total	224.61	**0**		**0**		**0.0**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			0		0.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**0**	Lower	**0.0**
Upper 2.5			Upper	**0**	Upper	**0.0**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000000%
to Employment	26601.36574			0.000000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000000%		

1. Direct wages and salaries is calculated using the following formula: xα (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: (βx)/γ + y (see below for symbol definitions).
3. Total income is calculated by using the following formula: Xμ" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: Yδ" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

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Table F.24. Nonconsumptive Diving - Preferred Alterantive - Federal Waters - LA County Step 1 Analysis

Expenditure Category	Expenditure Per Person Per Day $	Total Expenditures $	Wages to Sales Ratio	Wages & Salary	Wages to Employment Ratio	Employment
Lodging	92.00	0	0.20181569	0	16,113	0.0
Eating & Drinking	64.00	0	0.17046229	0	12,333	0.0
Transportation	10.00	0	0.11940857	0	19,952	0.0
Charter Boat fee	48.48	0	0.20553955	0	28,630	0.0
Miscellaneous	15.00	0	0.26826126	0	29,734	0.0
Total	229.48	**0**		**0**		**0.0**
Total Income to				Total Direct Income[1]		Total Direct Employment[2]
Wages & Salary	1.662507805			0		0.0
Regional Income						
Multiplier				Total Income[3]		Total Employment[4]
Lower 2.0			Lower	**0**	Lower	**0.0**
Upper 2.5			Upper	**0**	Upper	**0.0**
Proprietors Income to						
Total Income by Work	0.144206695			% County by		% County
Proprietors Income				Place of Work		0.00000000%
to Employment	26601.36574			0.000000%		
Regional Employment						
Multiplier						
Lower 1.5				% County by		
Upper 2.0				Place of Residence		
				0.000000%		

1. Direct wages and salaries is calculated using the following formula: $x\alpha$ (see below for symbol definitions).
2. Direct employment takes into account proprietors emplyment by using the following formula: $(\beta x)/\gamma + y$ (see below for symbol definitions).
3. Total income is calculated by using the following formula: $X\mu$" (see below for symbol definitions).
4. Total employment is calculated by using the following formula: $Y\delta$" (see below for symbol definitions).

α = Ratio of total income to wages and salaries.
β = Ratio of proprietors income to total income by work.
γ = Ratio of proprietors income to employment.
μ" = Regional income multipliers (upper and lower range).
δ" = Regional employment multipliers (upper and lower range).
x=Wages and salaries
y=employment
X=Direct wages and salaries
Y=Direct Employment

APPENDIX G

Table G.1. Maximum Potential Loss By Species for the Anacapa Marine Reserve

Species Group	State		Federal		Total	
	Value	%	Value	%	Value	%
Squid	$ 192,115	1.47	$ -	0.00	$ 192,115	1.47
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ 10,747	0.20	$ -	0.00	$ 10,747	0.20
Spiny Lobster	$ -	0.00	$ -	0.00	$ -	0.00
Prawn	$ 5,607	0.80	$ 5,607	0.80	$ 11,214	1.59
Rockfish	$ 1,969	0.36	$ -	0.00	$ 1,969	0.36
Crab	$ 805	0.23	$ -	0.00	$ 805	0.23
Tuna	$ 255	0.08	$ -	0.00	$ 255	0.08
Wetfish	$ 1,528	0.51	$ -	0.00	$ 1,528	0.51
CA Sheepshead	$ 3,630	1.54	$ -	0.00	$ 3,630	1.54
Flatfishes	$ -	0.00	$ -	0.00	$ -	0.00
Sea Cucumbers	$ 479	0.29	$ -	0.00	$ 479	0.29
Sculpin & Bass	$ -	0.00	$ -	0.00	$ -	0.00
Shark	$ 296	0.85	$ -	0.00	$ 296	0.85
Total	$ 217,431	0.77	$ 5,607	0.02	$ 223,038	0.79

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

Table G.2. Maximum Potential Loss By Species for the Carrington Point Marine Reserve

Species Group	State		Federal		Total	
	Value	%	Value	%	Value	%
Squid	$ 311,650	2.39	$ -	0.00	$ 311,650	2.39
Kelp	$ 4,226	0.07	$ -	0.00	$ 4,226	0.07
Urchins	$ 182,516	3.47	$ -	0.00	$ 182,516	3.47
Spiny Lobster	$ 45,600	4.95	$ -	0.00	$ 45,600	4.95
Prawn	$ -	0.00	$ -	0.00	$ -	0.00
Rockfish	$ 11,996	2.18	$ -	0.00	$ 11,996	2.18
Crab	$ 16,873	4.91	$ -	0.00	$ 16,873	4.91
Tuna	$ 696	0.23	$ -	0.00	$ 696	0.23
Wetfish	$ 2,171	0.72	$ -	0.00	$ 2,171	0.72
CA Sheepshead	$ 1,558	0.66	$ -	0.00	$ 1,558	0.66
Flatfishes	$ 12,753	6.94	$ -	0.00	$ 12,753	6.94
Sea Cucumbers	$ 3,999	2.38	$ -	0.00	$ 3,999	2.38
Sculpin & Bass	$ 2,304	3.82	$ -	0.00	$ 2,304	3.82
Shark	$ 1,822	5.24	$ -	0.00	$ 1,822	5.24
Total	$ 598,164	2.13	$ -	0.00	$ 598,164	2.13

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

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Table G.3. Maximum Potential Loss By Species for the Footprint Marine Reserve

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ 8,538	0.07	$ -	0.00	$ 8,538	0.07
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ -	0.00	$ -	0.00	$ -	0.00
Spiny Lobster	$ -	0.00	$ -	0.00	$ -	0.00
Prawn	$ 8,716	1.24	$ 12,819	1.82	$ 21,535	3.06
Rockfish	$ -	0.00	$ -	0.00	$ -	0.00
Crab	$ 38	0.01	$ -	0.00	$ 38	0.01
Tuna	$ 1,621	0.53	$ 8,044	2.63	$ 9,665	3.16
Wetfish	$ 2,663	0.88	$ 3,523	1.17	$ 6,186	2.05
CA Sheepshead	$ 296	0.13	$ -	0.00	$ 296	0.13
Flatfishes	$ -	0.00	$ -	0.00	$ -	0.00
Sea Cucumbers	$ -	0.00	$ -	0.00	$ -	0.00
Sculpin & Bass	$ -	0.00	$ -	0.00	$ -	0.00
Shark	$ -	0.00	$ -	0.00	$ -	0.00
Total	$ 21,872	0.08	$ 24,386	0.09	$ 46,258	0.16

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

Table G.4. Maximum Potential Loss By Species for the Gull Island Marine Reserve

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ 209,191	1.60	$ -	0.00	$ 209,191	1.60
Kelp	$ 102,322	1.71	$ -	0.00	$ 102,322	1.71
Urchins	$ 134,840	2.56	$ -	0.00	$ 134,840	2.56
Spiny Lobster	$ 38,288	4.15	$ -	0.00	$ 38,288	4.15
Prawn	$ 13,960	1.99	$ -	0.00	$ 13,960	1.99
Rockfish	$ 1,182	0.22	$ -	0.00	$ 1,182	0.22
Crab	$ 2,167	0.63	$ -	0.00	$ 2,167	0.63
Tuna	$ 3,591	1.17	$ 2,456	0.80	$ 6,047	1.98
Wetfish	$ 7,271	2.41	$ 2,663	0.88	$ 9,934	3.30
CA Sheepshead	$ 12,900	5.47	$ -	0.00	$ 12,900	5.47
Flatfishes	$ 932	0.51	$ -	0.00	$ 932	0.51
Sea Cucumbers	$ 7,647	4.56	$ -	0.00	$ 7,647	4.56
Sculpin & Bass	$ 490	0.81	$ -	0.00	$ 490	0.81
Shark	$ 230	0.66	$ -	0.00	$ 230	0.66
Total	$ 535,011	1.90	$ 5,119	0.02	$ 540,130	1.92

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

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Table G.5. Maximum Potential Loss By Species for the Harris Point Marine Reserve

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ 157,961	1.21	$ -	0.00	$ 157,961	1.21
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ 156,382	2.97	$ -	0.00	$ 156,382	2.97
Spiny Lobster	$ 5,481	0.59	$ -	0.00	$ 5,481	0.59
Prawn	$ -	0.00	$ 22,383	3.18	$ 22,383	3.18
Rockfish	$ 13,899	2.53	$ 4,204	0.77	$ 18,103	3.30
Crab	$ 9,982	2.91	$ -	0.00	$ 9,982	2.91
Tuna	$ -	0.00	$ -	0.00	$ -	0.00
Wetfish	$ -	0.00	$ -	0.00	$ -	0.00
CA Sheepshead	$ 1,558	0.66	$ -	0.00	$ 1,558	0.66
Flatfishes	$ 5,911	3.21	$ 1,575	0.86	$ 7,486	4.07
Sea Cucumbers	$ 3,997	2.38	$ -	0.00	$ 3,997	2.38
Sculpin & Bass	$ 2,007	3.33	$ 1,707	2.83	$ 3,714	6.16
Shark	$ 1,293	3.72	$ 378	1.09	$ 1,671	4.81
Total	$ 358,471	1.28	$ 30,247	0.11	$ 388,718	1.38

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

Table G.6. Maximum Potential Loss By Species for the Judith Rock Marine Reserve

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ -	0.00	$ -	0.00	$ -	0.00
Kelp	$ 67,682	1.13	$ -	0.00	$ 67,682	1.13
Urchins	$ 149,353	2.84	$ -	0.00	$ 149,353	2.84
Spiny Lobster	$ 1,212	0.13	$ -	0.00	$ 1,212	0.13
Prawn	$ -	0.00	$ -	0.00	$ -	0.00
Rockfish	$ 22,456	4.09	$ 4,254	0.77	$ 26,710	4.86
Crab	$ 7,878	2.29	$ -	0.00	$ 7,878	2.29
Tuna	$ -	0.00	$ 409	0.13	$ 409	0.13
Wetfish	$ -	0.00	$ -	0.00	$ -	0.00
CA Sheepshead	$ 4,674	1.98	$ -	0.00	$ 4,674	1.98
Flatfishes	$ -	0.00	$ -	0.00	$ -	0.00
Sea Cucumbers	$ 2,740	1.63	$ -	0.00	$ 2,740	1.63
Sculpin & Bass	$ 204	0.34	$ -	0.00	$ 204	0.34
Shark	$ -	0.00	$ -	0.00	$ -	0.00
Total	$ 256,199	0.91	$ 4,663	0.02	$ 260,862	0.93

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

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Table G.7. Maximum Potential Loss By Species for the Painted Cave Marine Park

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ 81,115	0.62	$ -	0.00	$ 81,115	0.62
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ 2,908	0.06	$ -	0.00	$ 2,908	0.06
Spiny Lobster	$ 4,642	0.50	$ -	0.00	$ 4,642	0.50
Prawn	$ -	0.00	$ -	0.00	$ -	0.00
Rockfish	$ -	0.00	$ -	0.00	$ -	0.00
Crab	$ -	0.00	$ -	0.00	$ -	0.00
Tuna	$ 252	0.08	$ -	0.00	$ 252	0.08
Wetfish	$ 334	0.11	$ -	0.00	$ 334	0.11
CA Sheepshead	$ 592	0.25	$ -	0.00	$ 592	0.25
Flatfishes	$ -	0.00	$ -	0.00	$ -	0.00
Sea Cucumbers	$ 2,216	1.32	$ -	0.00	$ 2,216	1.32
Sculpin & Bass	$ -	0.00	$ -	0.00	$ -	0.00
Shark	$ -	0.00	$ -	0.00	$ -	0.00
Total	$ 92,059	0.33	$ -	0.00	$ 92,059	0.33

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

Table G.8. Maximum Potential Loss By Species for the Richardson Rock Marine

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ -	0.00	$ -	0.00	$ -	0.00
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ -	0.00	$ -	0.00	$ -	0.00
Spiny Lobster	$ -	0.00	$ -	0.00	$ -	0.00
Prawn	$ -	0.00	$ -	0.00	$ -	0.00
Rockfish	$ 27,626	5.03	$ 21,195	3.86	$ 48,821	8.89
Crab	$ -	0.00	$ -	0.00	$ -	0.00
Tuna	$ 614	0.20	$ 3,479	1.14	$ 4,093	1.34
Wetfish	$ -	0.00	$ -	0.00	$ -	0.00
CA Sheepshead	$ -	0.00	$ -	0.00	$ -	0.00
Flatfishes	$ 750	0.41	$ 825	0.45	$ 1,575	0.86
Sea Cucumbers	$ -	0.00	$ -	0.00	$ -	0.00
Sculpin & Bass	$ 780	1.29	$ 858	1.42	$ 1,638	2.72
Shark	$ 180	0.52	$ 198	0.57	$ 378	1.09
Total	$ 29,950	0.11	$ 26,555	0.09	$ 56,505	0.20

1. Percents are the amount of each species/species groups ex vessel value impacted by an divided by the Study Area Total for the species/species

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Table G.9. Maximum Potential Loss By Species for the Santa Barbara Marine Reserve

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ 200,653	1.54	$ 38,423	0.29	$ 239,076	1.83
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ 14,339	0.27	$ -	0.00	$ 14,339	0.27
Spiny Lobster	$ 28,990	3.14	$ -	0.00	$ 28,990	3.14
Prawn	$ -	0.00	$ -	0.00	$ -	0.00
Rockfish	$ -	0.00	$ -	0.00	$ -	0.00
Crab	$ 759	0.22	$ -	0.00	$ 759	0.22
Tuna	$ 1,072	0.35	$ 17,602	5.76	$ 18,674	6.11
Wetfish	$ 11,380	3.77	$ 26,976	8.95	$ 38,356	12.72
CA Sheepshead	$ 1,776	0.75	$ -	0.00	$ 1,776	0.75
Flatfishes	$ 1,340	0.73	$ -	0.00	$ 1,340	0.73
Sea Cucumbers	$ -	0.00	$ -	0.00	$ -	0.00
Sculpin & Bass	$ 668	1.11	$ -	0.00	$ 668	1.11
Shark	$ 312	0.90	$ -	0.00	$ 312	0.90
Total	$ 261,289	0.93	$ 83,000	0.30	$ 344,290	1.22

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

Table G.10. Maximum Potential Loss By Species for the Scorpion Marine Reserve

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ 102,460	0.79	$ -	0.00	$ 102,460	0.79
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ 10,746	0.20	$ -	0.00	$ 10,746	0.20
Spiny Lobster	$ 8,252	0.89	$ -	0.00	$ 8,252	0.89
Prawn	$ -	0.00	$ 12,416	1.77	$ 12,416	1.77
Rockfish	$ 186	0.03	$ -	0.00	$ 186	0.03
Crab	$ 476	0.14	$ -	0.00	$ 476	0.14
Tuna	$ 64	0.02	$ -	0.00	$ 64	0.02
Wetfish	$ 1,303	0.43	$ -	0.00	$ 1,303	0.43
CA Sheepshead	$ 4,300	1.82	$ -	0.00	$ 4,300	1.82
Flatfishes	$ -	0.00	$ 600	0.33	$ 600	0.33
Sea Cucumbers	$ 2,435	1.45	$ -	0.00	$ 2,435	1.45
Sculpin & Bass	$ 68	0.11	$ 624	1.03	$ 692	1.15
Shark	$ -	0.00	$ 144	0.41	$ 144	0.41
Total	$ 130,290	0.46	$ 13,784	0.05	$ 144,074	0.51

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

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Table G.11. Maximum Potential Loss By Species for the Skunk Point Marine Reserve

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ -	0.00	$ -	0.00	$ -	0.00
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ 24,754	0.47	$ -	0.00	$ 24,754	0.47
Spiny Lobster	$ 3,506	0.38	$ -	0.00	$ 3,506	0.38
Prawn	$ -	0.00	$ -	0.00	$ -	0.00
Rockfish	$ -	0.00	$ -	0.00	$ -	0.00
Crab	$ -	0.00	$ -	0.00	$ -	0.00
Tuna	$ -	0.00	$ -	0.00	$ -	0.00
Wetfish	$ 250	0.08	$ -	0.00	$ 250	0.08
CA Sheepshead	$ 592	0.25	$ -	0.00	$ 592	0.25
Flatfishes	$ -	0.00	$ -	0.00	$ -	0.00
Sea Cucumbers	$ 1,000	0.60	$ -	0.00	$ 1,000	0.60
Sculpin & Bass	$ -	0.00	$ -	0.00	$ -	0.00
Shark	$ -	0.00	$ -	0.00	$ -	0.00
Total	$ 30,102	0.11	$ -	0.00	$ 30,102	0.11

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

Table G.12. Maximum Potential Loss By Species for the South Point Marine Reserve

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ 140,881	1.08	$ 12,807	0.10	$ 153,688	1.18
Kelp	$ 158,564	2.65	$ -	0.00	$ 158,564	2.65
Urchins	$ 130,446	2.48	$ -	0.00	$ 130,446	2.48
Spiny Lobster	$ 13,162	1.43	$ -	0.00	$ 13,162	1.43
Prawn	$ 28,463	4.05	$ -	0.00	$ 28,463	4.05
Rockfish	$ 6,702	1.22	$ -	0.00	$ 6,702	1.22
Crab	$ 10,356	3.01	$ -	0.00	$ 10,356	3.01
Tuna	$ -	0.00	$ -	0.00	$ -	0.00
Wetfish	$ -	0.00	$ -	0.00	$ -	0.00
CA Sheepshead	$ -	0.00	$ -	0.00	$ -	0.00
Flatfishes	$ -	0.00	$ -	0.00	$ -	0.00
Sea Cucumbers	$ 1,781	1.06	$ -	0.00	$ 1,781	1.06
Sculpin & Bass	$ -	0.00	$ -	0.00	$ -	0.00
Shark	$ 226	0.65	$ -	0.00	$ 226	0.65
Total	$ 490,581	1.75	$ 12,807	0.05	$ 503,388	1.79

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

Table G.13. Maximum Potential Loss By Species for the South West Anacapa Conservation Area

Species Group	State Value	State %	Federal Value	Federal %	Total Value	Total %
Squid	$ 256,153	1.96	$ -	0.00	$ 256,153	1.96
Kelp	$ -	0.00	$ -	0.00	$ -	0.00
Urchins	$ 13,433	0.26	$ 2,687	0.05	$ 16,120	0.31
Spiny Lobster	$ -	0.00	$ -	0.00	$ -	0.00
Prawn	$ 1,869	0.27	$ 5,607	0.80	$ 7,476	1.06
Rockfish	$ 1,969	0.36	$ -	0.00	$ 1,969	0.36
Crab	$ 805	0.23	$ -	0.00	$ 805	0.23
Tuna	$ 380	0.12	$ -	0.00	$ 380	0.12
Wetfish	$ 1,611	0.53	$ -	0.00	$ 1,611	0.53
CA Sheepshead	$ 6,746	2.86	$ -	0.00	$ 6,746	2.86
Flatfishes	$ 966	0.53	$ -	0.00	$ 966	0.53
Sea Cucumbers	$ 1,437	0.86	$ -	0.00	$ 1,437	0.86
Sculpin & Bass	$ 344	0.57	$ -	0.00	$ 344	0.57
Shark	$ 520	1.50	$ -	0.00	$ 520	1.50
Total	$ 286,233	1.02	$ 8,294	0.03	$ 294,527	1.05

1. Percents are the amount of each species/species groups ex vessel value impacted by an alternative divided by the Study Area Total for the species/species group.

Table G.14. Commercial Fishing and Kelp - Summary of Impacts by Individual Reserves - Step 1 Analysis

	State		Federal		Total	
Measure/Reserve	Value	%[1]	Value	%	Value	%
Ex Vessel Revenue[2]						
Anacapa	$ 217,431	0.77%	$ 5,607	0.02%	$ 223,038	0.79%
Carrington Point	$ 598,164	2.13%	$ -	0.00%	$ 598,164	2.13%
Footprint	$ 21,872	0.08%	$ 24,386	0.09%	$ 46,258	0.16%
Gull Island	$ 535,011	1.90%	$ 5,119	0.02%	$ 540,130	1.92%
Harris Point	$ 358,471	1.28%	$ 30,247	0.11%	$ 388,718	1.38%
Judith Rock	$ 256,199	0.91%	$ 4,663	0.02%	$ 260,862	0.93%
Painted Cave	$ 92,059	0.33%	$ -	0.00%	$ 92,059	0.33%
Richardson Rock	$ 29,950	0.11%	$ 26,555	0.09%	$ 56,505	0.20%
Santa Barbara	$ 261,289	0.93%	$ 83,000	0.30%	$ 344,289	1.22%
Scorpion	$ 130,290	0.46%	$ 13,784	0.05%	$ 144,074	0.51%
Skunk Point	$ 30,102	0.11%	$ -	0.00%	$ 30,102	0.11%
South Point	$ 490,581	1.75%	$ 12,807	0.05%	$ 503,388	1.79%
West Anacapa	$ 286,233	1.02%	$ 8,294	0.03%	$ 294,527	1.05%
Income[3]						
Anacapa	$ 852,481	1.03%	$ 11,310	0.01%	$ 863,791	1.04%
Carrington Point	$ 1,873,542	2.26%	$ -	0.00%	$ 1,873,542	2.26%
Footprint	$ 70,973	0.09%	$ 43,614	0.05%	$ 114,587	0.14%
Gull Island	$ 1,505,173	1.82%	$ 12,112	0.01%	$ 1,517,285	1.83%
Harris Point	$ 1,058,575	1.28%	$ 56,027	0.07%	$ 1,114,602	1.34%
Judith Rock	$ 476,990	0.58%	$ 5,526	0.01%	$ 482,516	0.58%
Painted Cave	$ 363,259	0.44%	$ -	0.00%	$ 363,259	0.44%
Richardson Rock	$ 39,762	0.05%	$ 30,908	0.04%	$ 70,670	0.09%
Santa Barbara	$ 981,113	1.18%	$ 275,766	0.33%	$ 1,256,879	1.52%
Scorpion	$ 486,396	0.59%	$ 27,121	0.03%	$ 513,517	0.62%
Skunk Point	$ 62,006	0.07%	$ -	0.00%	$ 62,006	0.07%
South Point	$ 1,225,324	1.48%	$ 51,898	0.06%	$ 1,277,222	1.54%
West Anacapa	$ 1,128,087	1.36%	$ 16,710	0.02%	$ 1,144,796	1.38%
Employment[4]						
Anacapa	25	1.08%	<1	0.01%	25	1.08%
Carrington Point	57	2.47%	-	0.00%	57	2.47%
Footprint	2	0.09%	1	0.04%	3	0.13%
Gull Island	42	1.82%	<1	0.01%	42	1.82%
Harris Point	32	1.39%	2	0.09%	34	1.47%
Judith Rock	13	0.56%	<1	0.01%	13	0.56%
Painted Cave	11	0.48%	-	0.00%	11	0.48%
Richardson Rock	1	0.04%	1	0.04%	2	0.09%
Santa Barbara	29	1.26%	8	0.35%	37	1.60%
Scorpion	15	0.65%	1	0.04%	16	0.69%
Skunk Point	2	0.09%	-	0.00%	2	0.09%
South Point	32	1.39%	2	0.09%	34	1.47%
West Anacapa	34	1.47%	1	0.04%	34	1.47%

1. Percents are the percent of total baseline 1996-1999 impacted.
2. Ex vessel Revenue received by fishermen and processed value of kelp, Baseline Annual Average 1996-1999 for the entire CINMS is equal to $28,111,179.
3. Income is total income, including multiplier impacts. Baseline Annual Average 1996-1999 for the entire CINMS is equal to $82, 913,552.
4. Employment is total employment, including multiplier impacts. Baseline Annual Average 1996-1999 for the entire CINMS is equal to 2,307.

Table G.15. Consumptive Recreation Summary - Anacapa Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	9,728	2.22%	301	0.07%	10,029	2.29%
Market Impact						
Direct Sales	$ 691,877	1.97%	$ 36,078	0.10%	$ 727,955	2.07%
Direct Wages and Salaries	$ 252,426	1.79%	$ 16,291	0.12%	$ 268,718	1.90%
Direct Employment	8	1.86%	0.5	0.11%	9	1.96%
Total Income						
Upper Bound	$ 441,746	1.79%	$ 28,510	0.12%	$ 470,256	1.90%
Lower Bound	$ 378,639	1.79%	$ 24,437	0.12%	$ 403,077	1.90%
Total Employment						
Upper Bound	12	1.86%	1	0.11%	13	1.96%
Lower Bound	10	1.85%	1	0.11%	11	1.96%
Non-Market Impact						
Consumer's Surplus	$ 112,636	2.22%	$ 3,482	0.07%	$ 116,118	2.29%
Profit[1]	$ 5,448	1.30%	$ 608	0.14%	$ 6,055	1.44%

1. Profit is used as a proxy for producer's surplus.

Table G.16. Consumptive Recreation Summary - Carrington Point Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	$ 5,665	1.29%	-	0.00%	5,665	1.29%
Market Impact						
Direct Sales	$ 439,982	1.25%	$ -	0.00%	$ 439,982	1.25%
Direct Wages and Salaries	$ 176,440	1.25%	$ -	0.00%	$ 176,440	1.25%
Direct Employment	5	1.26%	-	0.00%	5	1.26%
Total Income						
Upper Bound	$ 308,770	1.25%	$ -	0.00%	$ 308,770	1.25%
Lower Bound	$ 264,660	1.25%	$ -	0.00%	$ 264,660	1.25%
Total Employment						
Upper Bound	8	1.26%	-	0.00%	8	1.26%
Lower Bound	7	1.26%	-	0.00%	7	1.26%
Non-Market Impact						
Consumer's Surplus	$ 65,594	1.29%	$ -	0.00%	$ 65,594	1.29%
Profit[1]	$ 5,204	1.24%	$ -	0.00%	$ 5,204	1.24%

1. Profit is used as a proxy for producer's surplus.

Table G.17. Consumptive Recreation Summary - Footprint Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	1,854	0.42%	6,078	1.39%	7,932	1.81%
Market Impact						
Direct Sales	$ 136,746	0.39%	$ 452,421	1.29%	$ 589,167	1.68%
Direct Wages and Salaries	$ 54,088	0.38%	$ 179,435	1.27%	$ 233,523	1.66%
Direct Employment	2	0.39%	5.5	1.27%	7	1.65%
Total Income						
Upper Bound	$ 94,654	0.38%	$ 314,012	1.27%	$ 408,666	1.66%
Lower Bound	$ 81,132	0.38%	$ 269,153	1.27%	$ 350,285	1.66%
Total Employment						
Upper Bound	3	0.39%	8	1.27%	11	1.65%
Lower Bound	2	0.39%	7	1.27%	9	1.65%
Non-Market Impact						
Consumer's Surplus	$ 21,466	0.42%	$ 70,374	1.39%	$ 91,841	1.81%
Profit[1]	$ 1,572	0.37%	$ 5,219	1.24%	$ 6,791	1.62%

1. Profit is used as a proxy for producer's surplus.

Table G.18. Consumptive Recreation Summary - Gull Island Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	7,680	1.75%	1,628	0.37%	9,309	2.13%
Market Impact						
Direct Sales	$ 559,845	1.59%	$ 134,648	0.38%	$ 694,493	1.98%
Direct Wages and Salaries	$ 216,813	1.54%	$ 55,267	0.39%	$ 272,081	1.93%
Direct Employment	7	1.56%	1.7	0.38%	8	1.94%
Total Income						
Upper Bound	$ 379,423	1.54%	$ 96,718	0.39%	$ 476,141	1.93%
Lower Bound	$ 325,220	1.54%	$ 82,901	0.39%	$ 408,121	1.93%
Total Employment						
Upper Bound	10	1.56%	2	0.38%	13	1.94%
Lower Bound	9	1.56%	2	0.38%	11	1.94%
Non-Market Impact						
Consumer's Surplus	$ 88,930	1.75%	$ 18,855	0.37%	$ 107,785	2.13%
Profit[1]	$ 5,586	1.33%	$ 1,717	0.41%	$ 7,303	1.74%

1. Profit is used as a proxy for producer's surplus.

Table G.19. Consumptive Recreation Summary - Harris Point Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	6,245	1.43%	1,584	0.36%	7,829	1.79%
Market Impact						
Direct Sales	$ 554,152	1.58%	$ 195,240	0.56%	$ 749,392	2.13%
Direct Wages and Salaries	$ 232,815	1.65%	$ 88,981	0.63%	$ 321,795	2.28%
Direct Employment	7	1.69%	2.6	0.60%	10	2.29%
Total Income						
Upper Bound	$ 407,426	1.65%	$ 155,716	0.63%	$ 563,142	2.28%
Lower Bound	$ 349,222	1.65%	$ 133,471	0.63%	$ 482,693	2.28%
Total Employment						
Upper Bound	11	1.69%	4	0.60%	15	2.29%
Lower Bound	9	1.69%	3	0.60%	12	2.29%
Non-Market Impact						
Consumer's Surplus	$ 72,310	1.43%	$ 18,341	0.36%	$ 90,651	1.79%
Profit[1]	$ 7,529	1.79%	$ 3,345	0.80%	$ 10,874	2.59%

1. Profit is used as a proxy for producer's surplus.

Table G.20. Consumptive Recreation Summary - Judith Rock Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	2,348	0.54%	336	0.08%	2,684	0.61%
Market Impact						
Direct Sales	$ 167,055	0.48%	$ 27,938	0.08%	$ 194,993	0.56%
Direct Wages and Salaries	$ 64,804	0.46%	$ 11,377	0.08%	$ 76,180	0.54%
Direct Employment	2	0.47%	0.3	0.08%	2	0.55%
Total Income						
Upper Bound	$ 113,406	0.46%	$ 19,909	0.08%	$ 133,315	0.54%
Lower Bound	$ 97,205	0.46%	$ 17,065	0.08%	$ 114,270	0.54%
Total Employment						
Upper Bound	3	0.47%	0.5	0.08%	4	0.55%
Lower Bound	3	0.47%	0.4	0.08%	3	0.55%
Non-Market Impact						
Consumer's Surplus	$ 27,189	0.54%	$ 3,888	0.08%	$ 31,077	0.61%
Profit[1]	$ 1,673	0.40%	$ 339	0.08%	$ 2,013	0.48%

1. Profit is used as a proxy for producer's surplus.

Table G.21. Consumptive Recreation Summary - Painted Cave Marine Park - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	$ 879	0.20%	-	0.00%	879	0.20%
Market Impact						
Direct Sales	$ 71,901	0.20%	$ -	0.00%	$ 71,901	0.20%
Direct Wages and Salaries	$ 29,439	0.21%	$ -	0.00%	$ 29,439	0.21%
Direct Employment	1	0.21%	-	0.00%	1	0.21%
Total Income						
Upper Bound	$ 51,519	0.21%	$ -	0.00%	$ 51,519	0.21%
Lower Bound	$ 44,159	0.21%	$ -	0.00%	$ 44,159	0.21%
Total Employment						
Upper Bound	1	0.21%	-	0.00%	1	0.21%
Lower Bound	1	0.21%	-	0.00%	1	0.21%
Non-Market Impact						
Consumer's Surplus	$ 10,178	0.20%	$ -	0.00%	$ 10,178	0.20%
Profit[1]	$ 912	0.22%	$ -	0.00%	$ 912	0.22%

1. Profit is used as a proxy for producer's surplus.

Table G.22. Consumptive Recreation Summary - Richardson Rock Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	5,587	1.28%	2,003	0.46%	7,590	1.73%
Market Impact						
Direct Sales	$ 540,838	1.54%	$ 213,935	0.61%	$ 754,773	2.15%
Direct Wages and Salaries	$ 232,644	1.65%	$ 94,472	0.67%	$ 327,115	2.32%
Direct Employment	7	1.64%	2.8	0.65%	10	2.30%
Total Income						
Upper Bound	$ 407,126	1.65%	$ 165,325	0.67%	$ 572,452	2.32%
Lower Bound	$ 348,965	1.65%	$ 141,708	0.67%	$ 490,673	2.32%
Total Employment						
Upper Bound	11	1.64%	4.3	0.65%	15	2.30%
Lower Bound	9	1.64%	3.6	0.65%	13	2.29%
Non-Market Impact						
Consumer's Surplus	$ 64,695	1.28%	$ 23,193	0.46%	$ 87,888	1.73%
Profit[1]	$ 7,923	1.89%	$ 3,392	0.81%	$ 11,314	2.69%

1. Profit is used as a proxy for producer's surplus.

Table G.23. Consumptive Recreation Summary - Santa Barbara Marine Reserve - Step 1 Analysis

	State			Federal			Total		
		Value	% of Study Area		Value	% of Study Area		Value	% of Study Area
Person-days		6,129	1.40%		1,117	0.26%		7,246	1.65%
Market Impact									
Direct Sales	$	427,220	1.22%	$	97,467	0.28%	$	524,687	1.49%
Direct Wages and Salaries	$	150,772	1.07%	$	38,736	0.27%	$	189,508	1.34%
Direct Employment		5	1.10%		1.2	0.28%		6	1.38%
Total Income									
Upper Bound	$	263,852	1.07%	$	67,787	0.27%	$	331,639	1.34%
Lower Bound	$	226,159	1.07%	$	58,103	0.27%	$	284,262	1.34%
Total Employment									
Upper Bound		7	1.10%		1.8	0.28%		9	1.38%
Lower Bound		6	1.10%		1.5	0.28%		8	1.38%
Non-Market Impact									
Consumer's Surplus	$	70,963	1.40%	$	12,933	0.26%	$	83,896	1.65%
Profit[1]	$	5,038	1.20%	$	1,264	0.30%	$	6,303	1.50%

1. Profit is used as a proxy for producer's surplus.

Table G.24. Consumptive Recreation Summary - Scorpion Marine Reserve - Step 1 Analysis

	State			Federal			Total		
		Value	% of Study Area		Value	% of Study Area		Value	% of Study Area
Person-days		3,963	0.91%		999	0.23%		4,962	1.13%
Market Impact									
Direct Sales	$	315,795	0.90%	$	103,819	0.30%	$	419,614	1.19%
Direct Wages and Salaries	$	126,086	0.89%	$	45,643	0.32%	$	171,729	1.22%
Direct Employment		4	0.91%		1.3	0.31%		5	1.21%
Total Income									
Upper Bound	$	220,651	0.89%	$	79,876	0.32%	$	300,527	1.22%
Lower Bound	$	189,129	0.89%	$	68,465	0.32%	$	257,594	1.22%
Total Employment									
Upper Bound		6	0.91%		2.0	0.31%		8	1.21%
Lower Bound		5	0.90%		1.7	0.31%		7	1.21%
Non-Market Impact									
Consumer's Surplus	$	45,890	0.91%	$	11,568	0.23%	$	57,458	1.13%
Profit[1]	$	3,404	0.81%	$	1,620	0.39%	$	5,024	1.20%

1. Profit is used as a proxy for producer's surplus.

Table G.25. Consumptive Recreation Summary - Skunk Point Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	$ 1,218	0.28%	-	0.00%	1,218	0.28%
Market Impact						
Direct Sales	$ 86,607	0.25%	$ -	0.00%	$ 86,607	0.25%
Direct Wages and Salaries	$ 33,753	0.24%	$ -	0.00%	$ 33,753	0.24%
Direct Employment	1	0.24%	-	0.00%	1	0.24%
Total Income						
Upper Bound	$ 59,068	0.24%	$ -	0.00%	$ 59,068	0.24%
Lower Bound	$ 50,630	0.24%	$ -	0.00%	$ 50,630	0.24%
Total Employment						
Upper Bound	2	0.24%	-	0.00%	2	0.24%
Lower Bound	1	0.24%	-	0.00%	1	0.24%
Non-Market Impact						
Consumer's Surplus	$ 14,106	0.28%	$ -	0.00%	$ 14,106	0.28%
Profit[1]	$ 936	0.22%	$ -	0.00%	$ 936	0.22%

1. Profit is used as a proxy for producer's surplus.

Table G.26. Consumptive Recreation Summary - South Point Marine Reserve - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	3,400	0.78%	285	0.07%	3,686	0.84%
Market Impact						
Direct Sales	$ 242,303	0.69%	$ 23,893	0.07%	$ 266,196	0.76%
Direct Wages and Salaries	$ 93,853	0.67%	$ 9,897	0.07%	$ 103,750	0.74%
Direct Employment	3	0.67%	0.3	0.07%	3	0.74%
Total Income						
Upper Bound	$ 164,243	0.67%	$ 17,320	0.07%	$ 181,562	0.74%
Lower Bound	$ 140,779	0.67%	$ 14,845	0.07%	$ 155,625	0.74%
Total Employment						
Upper Bound	4	0.67%	0.4	0.07%	5	0.74%
Lower Bound	4	0.67%	0.4	0.07%	4	0.74%
Non-Market Impact						
Consumer's Surplus	$ 39,372	0.78%	$ 3,304	0.07%	$ 42,676	0.84%
Profit[1]	$ 2,500	0.59%	$ 312	0.07%	$ 2,812	0.67%

1. Profit is used as a proxy for producer's surplus.

Table G.27. Consumptive Recreation Summary - West Anacapa Marine Conservation Area - Step 1 Analysis

	State		Federal		Total	
	Value	% of Study Area	Value	% of Study Area	Value	% of Study Area
Person-days	9,696	2.21%	8,093	1.85%	17,789	4.06%
Market Impact						
Direct Sales	$ 667,193	1.90%	$ 670,114	1.91%	$ 1,337,307	3.81%
Direct Wages and Salaries	$ 238,951	1.69%	$ 275,836	1.96%	$ 514,787	3.65%
Direct Employment	8	1.77%	8.3	1.92%	16	3.69%
Total Income						
Upper Bound	$ 418,164	1.69%	$ 482,713	1.96%	$ 900,877	3.65%
Lower Bound	$ 358,426	1.69%	$ 413,754	1.96%	$ 772,180	3.65%
Total Employment						
Upper Bound	12	1.77%	12.5	1.92%	24	3.69%
Lower Bound	10	1.77%	10.4	1.91%	20	3.69%
Non-Market Impact						
Consumer's Surplus	$ 112,268	2.21%	$ 93,711	1.85%	$ 205,978	4.06%
Profit[1]	$ 4,790	1.14%	$ 8,647	2.06%	$ 13,437	3.20%

1. Profit is used as a proxy for producer's surplus.

APPENDIX G

Table G.28. Consumptive Recreation - Summary of Impacts by Individual Reserves - Step 1 Analysis

	State		Federal		Total	
Measure/Reserve	Value	%[1]	Value	%	Value	%
Person-Days[2]						
Anacapa	9,728	2.22%	301	0.07%	10,029	2.29%
Carrington Point	5,665	1.29%	-	0.00%	5,665	1.29%
Footprint	1,854	0.42%	6,078	1.39%	7,932	1.81%
Gull Island	7,680	1.75%	1,628	0.37%	9,308	2.13%
Harris Point	6,245	1.43%	1,584	0.36%	7,829	1.79%
Judith Rock	2,348	0.54%	336	0.08%	2,684	0.61%
Painted Cave	879	0.20%	-	0.00%	879	0.20%
Richardson Rock	5,587	1.28%	2,003	0.46%	7,590	1.73%
Santa Barbara	6,129	1.40%	1,117	0.26%	7,246	1.65%
Scorpion	3,963	0.90%	999	0.23%	4,962	1.13%
Skunk Point	1,218	0.28%	-	0.00%	1,218	0.28%
South Point	3,400	0.78%	285	0.07%	3,685	0.84%
West Anacapa	9,696	2.21%	8,093	1.85%	17,789	4.06%
Income[3]						
Anacapa	$ 441,746	1.79%	$ 28,510	0.12%	$ 470,256	1.90%
Carrington Point	$ 308,770	1.25%	$ -	0.00%	$ 308,770	1.25%
Footprint	$ 94,654	0.38%	$ 314,012	1.27%	$ 408,666	1.66%
Gull Island	$ 379,423	1.54%	$ 96,718	0.39%	$ 476,141	1.93%
Harris Point	$ 407,426	1.65%	$ 155,716	0.63%	$ 563,142	2.28%
Judith Rock	$ 113,406	0.46%	$ 19,909	0.08%	$ 133,315	0.54%
Painted Cave	$ 51,519	0.21%	$ -	0.00%	$ 51,519	0.21%
Richardson Rock	$ 407,126	1.65%	$ 165,325	0.67%	$ 572,452	2.32%
Santa Barbara	$ 263,852	1.07%	$ 67,787	0.27%	$ 331,639	1.34%
Scorpion	$ 220,651	0.89%	$ 79,876	0.32%	$ 300,527	1.22%
Skunk Point	$ 59,068	0.24%	$ -	0.00%	$ 59,068	0.24%
South Point	$ 164,243	0.67%	$ 17,320	0.07%	$ 181,562	0.74%
West Anacapa	$ 418,164	1.69%	$ 482,713	1.96%	$ 900,877	3.65%
Employment[4]						
Anacapa	12.1	1.86%	0.7	0.01%	12.8	1.96%
Carrington Point	8.2	1.26%	-	0.00%	8.2	1.26%
Footprint	2.5	0.39%	8.3	1.27%	10.8	1.65%
Gull Island	10.2	1.56%	2.5	0.01%	12.7	1.94%
Harris Point	11.1	1.69%	3.9	0.60%	15.0	2.29%
Judith Rock	3.1	0.47%	0.5	0.01%	3.6	0.55%
Painted Cave	1.4	0.21%	-	0.00%	1.4	0.21%
Richardson Rock	10.7	1.64%	4.3	0.65%	15.0	2.30%
Santa Barbara	7.2	1.10%	1.8	0.28%	9.0	1.38%
Scorpion	5.9	0.90%	2.0	0.31%	7.9	1.21%
Skunk Point	1.6	0.24%	-	0.00%	1.6	0.24%
South Point	4.4	0.67%	0.4	0.07%	4.8	0.74%
West Anacapa	11.6	1.77%	12.5	0.01%	24.1	3.69%

1. Percents are the percent of total baseline amounts from the recreation data.
2. Total Person-days of consumptive activities is equal to 437,907.
3. Total income, including multiplier impacts, is equal to $24,686,919
4. Total employment, including multiplier impacts, is equal to 654 jobs.

Table G.29. Overall Consumptive Use - Summary of Impacts by Individual Reserves - Step 1 Analysis

	State		Federal		Total	
Measure/Reserve	Value	%[1]	Value	%	Value	%
Income[2]						
Anacapa	$ 1,649,843	1.26%	$ 60,447	0.05%	$ 1,710,290	1.31%
Carrington Point	$ 2,488,275	1.91%	$ -	0.00%	$ 2,488,275	1.91%
Footprint	$ 267,175	0.20%	$ 690,441	0.53%	$ 957,616	0.73%
Gull Island	$ 2,258,048	1.73%	$ 201,134	0.15%	$ 2,459,182	1.88%
Harris Point	$ 1,827,042	1.40%	$ 323,921	0.25%	$ 2,150,963	1.65%
Judith Rock	$ 709,733	0.54%	$ 43,226	0.03%	$ 752,959	0.58%
Painted Cave	$ 464,114	0.36%	$ -	0.00%	$ 464,114	0.36%
Richardson Rock	$ 784,229	0.60%	$ 326,490	0.25%	$ 1,110,719	0.85%
Santa Barbara	$ 1,518,000	1.16%	$ 398,552	0.31%	$ 1,916,552	1.47%
Scorpion	$ 900,691	0.69%	$ 172,205	0.13%	$ 1,072,896	0.82%
Skunk Point	$ 186,172	0.14%	$ -	0.00%	$ 186,172	0.14%
South Point	$ 1,563,615	1.20%	$ 85,887	0.07%	$ 1,649,502	1.26%
West Anacapa	$ 1,888,893	1.45%	$ 963,511	0.74%	$ 2,852,403	2.18%
Employment[3]						
Anacapa	45	1.28%	1	0.01%	46	1.31%
Carrington Point	72	2.05%	-	0.00%	72	2.05%
Footprint	7	0.20%	17	0.49%	24	0.68%
Gull Island	61	1.74%	5	0.01%	66	1.88%
Harris Point	52	1.48%	9	0.26%	61	1.74%
Judith Rock	19	0.54%	1	0.01%	20	0.57%
Painted Cave	14	0.40%	-	0.00%	14	0.40%
Richardson Rock	20	0.57%	8	0.23%	28	0.80%
Santa Barbara	43	1.23%	11	0.31%	54	1.54%
Scorpion	25	0.71%	5	0.14%	30	0.86%
Skunk Point	5	0.14%	-	0.00%	5	0.14%
South Point	40	1.14%	3	0.09%	43	1.23%
West Anacapa	54	1.54%	23	0.01%	77	2.20%

1. Percents are the percent of total baseline amounts from the sum of commercial fishing, kelp and the recreation industry.
2. Total income, including multiplier impacts, is equal to $130,559,110
3. Total employment, including multiplier impacts, is equal to 3,504 jobs.

APPENDIX H

Response to the American Sports Fishing Association Sponsored Report and Revisions of Economic Impact Estimation for Recreation Activities

American Sports Fishing Association Report

On March 7, 2002, the American Sports Fishing Association (ASA) in cooperation with the United Anglers of Southern California released a report developed by Robert Southwick of Southwick Associates, Inc of Fernandina Beach, Florida entitled "*The Economic Effects of Sportsfishing Closures in Marine Protected Areas: The Channel Islands Example*". The report is posted on the ASA web site (http://www.asafishing.org). A press conference was held in Long Beach, California at the Fred Hall Fishing Tackle and Boat Show announcing the report and its' basic findings.

The report's stated goal was to broaden understanding of the economic issues related to the proposed Marine Protected Areas within the Channel Islands National Marine Sanctuary. Unfortunately, the report instead applies blatantly bad science in what can only be described as "pure advocacy analysis". The report attacks the methods employed by us in our Step 1 analysis of four marine reserve alternatives, which we had done while advising the Marine Reserve Working Group (MRWG). The MRWG was charged with developing alternatives for marine reserves in the Channel Islands National Marine Sanctuary (CINMS). The four alternatives were labeled A, B, C, and D and definitions, maps and our Step 1 analyses were posted on the CINMS web site (http://www.cinms.noaa.gov/MRWGsocioec/panel.html).

The report made several claims about our report, some true and some false. The most important claim was that our method underestimates the impacts of marine reserves on the local and regional economies. We show here that the opposite is true. The data and methods we employed actually overestimate the economic impacts from recreational fishing on the local and regional economy and overstate the impacts from marine reserves in the CINMS on the local and regional economy. Below we address all the issues mentioned in the ASA sponsored report.

Inclusion of Durable Good and Annual Expenses in Economic Impact Analyses. The ASA reports main criticism of our estimates of economic impact of fishing is that we did not include equipment purchases and other expenses that are not related to specific fishing trips. This would include items such as rod & reels, boats & motors, vacation homes, fishing vehicles, clothing, magazines, club dues and license fees. These are labeled "Annual Expenditures" in the report by Gentner, Price and Steinback (2001) entitled "*Marine Angler Expenditures in the Pacific Coast Region, 2000*". This report included detailed trip expenditures by fishing mode (e.g., shore, charter/party boat and private household rental boat) and resident status (e.g., coastal residents and nonresidents). Annual expenditures were reported by resident status. Estimates were provided for the Southern California region.

The author of the ASA report divides the annual expenditures by the annual number of days of fishing and adds this to the spending per day for trip expenditures to arrive at a total spending per day. There is nothing wrong with this, if the purpose is to estimate the economic impact of the recreational fishing industry on the local or regional economy. However, ***it is not appropriate to include the annual expenditures in analyses of marginal changes in the total numbers of days of fishing caused by a change in management strategies or regulations.*** By marginal changes we mean relatively small percents of total activity, which we will show is the case for the currently proposed marine reserve alternatives in the CINMS, as well as the previous ones we analyzed for the MRWG.

Why is it not appropriate to include annual expenditures in the analysis of marine reserves? First, the decision to purchase a rod, reel, boat, motor, vacation home, fishing license, etc. is not related to the decision to fish on any given day. As Gentner, Price and Steinback (2001) mention, those that fished the most days had higher expenditures on annual expenditure items. This is expected, since a person who only fishes a couple of days a year most likely cannot justify the large expenditure required to purchase a boat, motor, fishing vehicle or vacation home. But whether a person chooses to fish on any given day doesn't determine expenditure on annual expenditure items, such as boats and motors. So any event that changes a small portion of a person's total fishing activity would not be expected to have any impact on the spending on annual items.

Nobel Laureate economist, James Tobin, first developed a statistical method for estimating changes in durable good expenditures (Tobin 1958). Tobin recognized that, in any given year, only a small portion of people purchase a specific durable good. Durable goods by their nature have useful lives, often extending many years. A person doesn't purchase a boat or even a rod and reel each time they go fishing. For analyzing and predicting changes in durable good expenditures, Tobin developed what is now called the "Tobit Model" that model accounts for the fact that, in any given year, only a small portion of people will actually make a purchase. Number of days of fishing might be included as an explanatory variable of the decision to purchase equipment or other annual expenditure items, but it is most likely that days would not explain very much of the variation in the data, and would have only some small marginal impact. The assumption that one could simply divide the total annual expenditures by the annual number of days of fishing, and then apply that to a change in the number of days would prove to be terribly wrong by this analysis.

Most likely, there is some threshold on the proportion of a person's fishing days impacted which might impact the decision of whether to make a purchase of an annual expenditure item. We don't have full information on all the days spent fishing or all the days people might use their boats, vacation homes, etc., while recreating. However, we know that in 1999 CINMS charter/party boat fishing accounted for 25.7% of all the charter/party boat fishing in Southern California. In addition, we know that private household/rental boat fishing in the CINMS accounted for 21% of all the private household/rental boat fishing in Southern California. We also know the amount of activity potentially impacted by each proposed marine reserve alternative.

Let's take the Preferred Alternative as an example. The current preferred alternative for the network of marine reserves in the CINMS cover 25% of the CINMS waters. It would potentially impact 16.23% of the charter/party boat fishing and 17% of the private household/rental boat fishing. So on net, only 4.2% of all the charter/party boat fishing in Southern California is potentially impacted by the preferred alternative. Similarly, on net only 3.6% of the private household/rental boat fishing would potentially be impacted by the preferred alternative. Across both types of fishing, 3.8% of Southern California boat fishing would potentially be impacted by the preferred alternative (Table H.1). Therefore, the potential impact of the preferred alternative network of marine reserves in the CINMS has only a small marginal impact on the total days of marine recreational fishing in Southern California and would therefore would be expected to have no impact on the purchase of annual expenditure type items. Spending on these types of items would not be appropriate to include in the analysis of marine reserves in the CINMS.

APPENDIX H

Table H.1 CINMS as a Percent of Southern California Recreational Fishing, 1999

	Number of Fishing Trips (Days)		
	Charter/Party Boat Fishing	Private Household/ Rental Boat Fishing	Total Boat Fishing
S. California	617,000	1,019,000	1,636,000
CINMS	158,768	214,015	372,783
Marine Reserve Preferred Alternative	25,767	36,381	62,148
% of S. CA in CINMS	25.73	21.00	22.79
Preferred Alternative as Percent of CINMS	16.23	17.00	16.67
Preferred Alternative as Percent of S. CA	4.18	3.57	3.80

Sources: National Marine Fisheries Service, Marine Recreational Fishing Statistics Survey (NMFS-MRFSS), http://www.st.nmfs.gov/st1 and Kolstad Survey of recreational charter/party/guide services for the CINMS.

When would it be appropriate to include annual expenditure items in an economic impact analysis? As the above discussion stated, there might be some threshold level of activity impacted that might start to impact people's decision to purchase annual expenditure items. For fishing licenses, if a certain high proportion of days were impacted and there were no substitute places to go fishing, a person might quit participating in fishing and not buy a fishing license. If they own a vacation home or a boat and motor, they may decide to sell them as well. Over the long-term, if fishing capacity is lowered by the marine reserves, this could result in some smaller number of new entrants into the fishery and thereby lower the amount of spending on new equipment and other annual expenditure items. But the majority of experiences suggest, and the most likely expected outcome is that, over the long-term, fishing capacity will be expanded by marine reserves through the replenishment of areas outside the protected areas.

Even in the short-term, the analysis would have to employ the techniques developed by Tobin (1958) to analyze how the marine reserves would possibly change the purchase of annual expenditure items. And, as discussed above, the amount of impact would be less than simply the percent of days of fishing impacted. For example, if the entire CINMS were made into a marine reserve, 25.7% of the charter/party boat fishing and 21% of the private household/rental boat fishing in southern California would be potentially impacted. This amount of impact might reach the threshold level and require analysis of the impacts on annual expenditure items. But as was pointed out, the impact would be much less than the percents of total activity impacted, since days of fishing would not be the only explanatory variable in the model explaining the decision to purchase an annual expenditure item (i.e., the Tobit Model).

Substitution. Our Step 1 analyses simply add up the activity currently taking place within the proposed marine reserve areas and apply the assumption that all is lost. No account is taken of people's ability to substitute or relocate their fishing activities to other fishing sites. Under the preferred alternative, only 25% of the CINMS waters are included in the proposed network of marine reserves leaving 75% of the CINMS plus all the areas outside the CINMS for people to find other fishing sites. Thus, we would expect that our Step 1 estimates are overestimates of impact. We don't have a model to tell us how much substitution might take place, and what the net impact will be either in the short or long term. However, some substitution is likely, and to the extent people are able to find suitable substitute fishing sites, this will lower estimates of impact that we make in our Step 1 analyses.

The ASA report claim that we had underestimated the potential economic impact is totally driven by their inclusion of annual expenditure items in their revised estimates. As we have shown above, this is not good economics and not good science, and represents "pure advocacy analysis".

Residency Status and the Multiplier Impacts. The author of the ASA report apparently did not understand our multiplier analysis and made claims that this was a further reason why our estimates of the impact of marine reserves were underestimates. We understand why this mistake could be made since we never published a report explaining our multiplier analysis, although we explained it to the MRWG and the public at several public meetings during the two-year MRWG process.

Actually, our multiplier analysis is related to the definition of where fishermen live relative to the place where they accessed the CINMS and spend their money locally for fishing trips. We used a range of multipliers (2.0 to 2.5 for income and 1.5 to 2.0 for employment). These multipliers are "Keynesian" type multipliers and are within the range of multipliers we would expect for counties like Santa Barbara, Ventura and Los Angeles counties, which have fairly diverse economies and would be expected to have relatively high multipliers. The range of multipliers was used to develop upper and lower bound estimates of impact. One of the reasons was that we did not have any information on where the people lived that accessed the CINMS from each county. By applying the multipliers to all fishermen spending, the assumption is that all fishermen are nonresidents of the county from which they accessed the CINMS. That means that none of the fishermen that accessed the CINMS from a Santa Barbara port live in Santa Barbara. Results will clearly be overstated because some percent are likely to be local residents. The reason for this result is that economists generally don't apply multipliers to local spending because it double-counts local spending. Spending by local residents is part of the multiplier process from basic or export industries, which bring new dollars into the community.

Our application of the multipliers to all spending seriously overstates the economic impacts of marine reserves. It would be much more reasonable to assume that some portion of those that accessed the CINMS from Santa Barbara county ports are local residents of Santa Barbara County, and similarly for the other two counties. We used the range of multipliers to account for some of the resident status problem, however, information from the National Marine fisheries Service, Marine Recreational Fishing Statistics Survey (NMFS-MRFSS) suggests that the range of multipliers is not a big enough adjustment to account for the possible overstatement of impact.

NMFS-MRFSS data for 1999 shows that 86.71% of the Southern California marine recreational fishing trips (days) for charter/party boat fishing were made by coastal residents. For private household/rental boat fishing, the estimate was 96.86%. Coastal residency doesn't give us precise enough information to extrapolate this to saying that those same percentages should apply to each county in the impact area. But it does indicate that our analysis overstates the impact by applying multiplier analysis to all fishermen expenditures.

We have developed two sets of estimates. One using our original assumption that 100% are nonresidents and therefore the multipliers are applied to all expenditures. The second set of estimates is based on the assumption that 50% accessed the CINMS from the county of their residence. We include only the direct sales, income and employment impacts for residents and the direct and multiplier impacts for nonresidents. Given the percentages of coastal residents for Southern California cited above, this is still likely to lead to an overestimate of impact, but our range of multipliers may now give a truer picture of the range of potential impacts. In our Step 1 analyses, we would still refer to the upper bound estimates as representing "maximum potential loss".

Import Substitution/Double Counting Economic Impact. As stated above, in local or regional economic impact analysis, the inclusion of resident spending impact is usually not done because it is already accounted for in the multiplier analyses of basic or export industries. Nonresident fishermen that bring new dollars into a county spend money, which is received by local businesses and they spend it on inputs of production, including wages and salaries for labor and a return to the business as profit. These workers and business owners spend a portion of their incomes in the local economy and thus the ripple or multiplier impacts. Some of the workers and business owners that received income through this multiplier impact will spend it locally on fishing trips in the CINMS. So this portion of resident spending would be double-counted.

We recognize that by including resident spending impacts, even only the direct impacts, does involve double counting. The reason for including it has to do with the "***import substitution***" argument. Import substitution means that the multiplier impact would be reduced from all basic or export industry spending, if the fishermen would substitute to fishing sites outside the local county. The multiplier impacts would be less without this spending. Local businesses have an incentive to keep this activity in the local area. So, this is another reason that supports our calling our Step 1 analysis estimates "maximum potential loss".

There is a gray area where resident direct impacts may not be double counting and which may not require the assumption of import substitution to count the impact. This would be the case of income earned from sources unrelated to work in the county of residence and spending. A good example is retirement and pension income. This source of income represents new dollars into the community and is thus a basic or export industry. Dollars of spending here have their own multiplier impacts that are not double counted. To the extent that local residents are spending from these sources of income for recreational fishing in the CINMS it is appropriate to include not only the direct impacts, but also the multiplier impacts of such spending.

As the above discussion indicates, our Step 1 analyses will tend to overestimate economic impacts of marine reserves on the recreational fishing community and associated industries in the local and regional economies. This is true even with our assumption of 50% local residency.

Outdated Expenditure Information. The ASA report also charged that we were using outdated expenditure information and therefore our estimates of spending and income and employment impacts were underestimated. It is true that the expenditure profiles that we used were based on a 1985 and a 1991 study. At the time we started the MRWG process in 1999, the expenditure report by the Gentner, Price and Steinback (2001) was not available. We knew the study was underway but were not aware the estimates were available to apply to the current six alternatives analyzed in this report. However, the new estimates of trip expenditures or spending per person per day are lower than those from the two older studies. This lowers our estimates of the impacts of the marine reserves even further.

Table H.2 shows the derivation of the updated spending profiles for charter/party boat and private household/rental boat fishing. Expenditures were reported by residency status (e.g., coastal residents versus nonresidents of coastal areas) in the first two columns. The third column reports the weighted average for residents and nonresidents using the year 2000 distribution between residents and nonresidents. The fourth column reports the same expenditures using the 1999 distribution of residents and nonresidents and also adjusts year 2000 dollars to 1999 dollars using the Consumer Price Index for all Urban Workers for All Items 1982-84=100. Our baseline activity estimates and impact estimates are for year 1999. As it turns out, some of our expenditures are higher for 1999 than for 2000 because the weights are higher for nonresident charter/party boat fishermen. Also, for charter/party boat fishing, we substitute our estimates of charter/party boat fees for those in the 2000 study because our estimates were based on a census, not a sample, of charter/party boat fishing in the CINMS, and our estimates vary by county. For charter/party boat fishing, our charter/party boat fees are higher for Santa Barbara and Los Angeles counties and lower for Ventura County than the 2000 study for all of Southern California (see footnote 5 of Table H.2).

APPENDIX H

Table H.2. Updated Spending Profiles for Recreational Fishermen in S. California, 2000

	Residents	Non-residents	Weighted 2000 $ [1]	Weighted 1999 $ [2]
Charter/Party boat				
Food	$12.62	$38.01	$15.69	$15.47
Lodging	$1.18	$59.55	$8.25	$8.65
Private transportation	$9.78	$65.62	$16.54	$16.64
Public transportation	$0.51	$253.90	$31.20	$33.07
Boat fuel	$0.00	$0.00	$0.00	$0.00
Charter/Party Fees [5]	$55.43	$37.40	$53.25	$51.31
Access/Boat Launch Fees	$0.96	$2.95	$1.20	$1.18
Equipment Rental	$1.81	$34.97	$5.83	$6.01
Bait & Ice	$0.27	$2.32	$0.52	$0.52
Total	$82.56	$494.72	$132.47	$132.87
Private Household/Rental boat				
	Residents	Non-residents	Weighted 2000 $ [3]	Weighted 1999 $ [4]
Food	$7.54	$17.53	$7.93	$7.60
Lodging	$0.52	$23.33	$1.42	$1.20
Private transportation	$7.07	$74.87	$9.74	$8.90
Public transportation	$0.03	$61.43	$2.45	$1.89
Boat fuel	$12.88	$21.97	$13.24	$12.74
Charter/Party Fees	$0.00	$0.00	$0.00	$0.00
Access/Boat Launch Fees	$1.54	$2.37	$1.57	$1.52
Equipment Rental	$0.72	$7.71	$1.00	$0.91
Bait & Ice	$6.87	$11.02	$7.03	$6.77
Total	$37.17	$220.23	$44.38	$41.52

1. Weight for residents on charter/party boats for year 2000 is .8789. Non-residents is .1211.
2. Weight for residents on charter/party boats for year 1999 is .8671. Non-residents is .1329. Consumer Price Index-All Urban Consumers-All Items 1982-84=100 was 172.2 for year 2000 and 166.6 for 1999. Conversion factor from 2000 to 1999 dollars is equal to 172.2 divided by 166.6 or 1.0336.
3. Weight for residents on private household/rental boats for year 2000 is .9606. Non-residents is 0.0394.
4. Weight for residents on private household/rental boats for year 1999 is .9686. Non-residents is 0.0314.
5. Since our effort involved a census of operators in the CINMS, we substitute the fees derived from the Kolstad survey: Santa Barbara $60.74; Ventura $47.62; and Los Angeles $59.95.

Sources: Gentner, Price and Steinback (2001) for Marine Angler Expenditures.
CPI, U.S. Dept. of Labor, Bureau of Labor Statistics, http://data.bls.gov/cgi.bin/surveymost
1999 and 2000 Number of Trips, NMFS, http://www.st.nmfs.gov/st1/recreational/database/queries/index.html

Table H.3 shows the expenditure profiles we used from the two older studies. For charter/party boat fishing, the estimates ranged from $153.35 to $166.47 per person per day (depending on county of access) from the older studies versus $129.18 to $142.30 from the new updated study or about a 14.5% to 15.8% reduction in the average spending per person per day. For private household/rental boat fishing, the reduction was even greater. The older studies produced an estimate of $71.73 per person per day. The new updated study produced an estimate of $41.52 per person per day or a 42% reduction. Thus, incorporating the new updated information will reduce greatly the estimated impact of marine reserves on recreational fishing spending and the associated economic impact on income and employment in the local economies, not increase it as the ASA report asserts. Again, the ASA report author failed to mention this fact because it did not support their contention. They were practicing “pure advocacy analysis” and did not want to mention anything that did not support their position. This represents blatantly bad science.

Table H.3. Old Expenditure Profiles for Recreational Fishing

	Expenditures Per Person Per Day (1999 $)	
Expenditure	Charter/Party Boat Fishing	Private Household/ Rental Boat Fishing
Boat Fees [1]	$47.62 - $60.74	$0.00
Boat Fuel	$0.00	$19.00
Food, Bev. & lodging	$69.21	$16.21
Transportation	$14.30	$14.30
Equipment Rental	$22.22	$22.22
Total	$153.35 - $166.47	$71.73

1. Boat fees used were actual by county and activity from the Kolstad survey. Charter/party boat fishing for Santa Barbara County was $60.74, Ventura County was $47.62 and Los Angeles County was $59.95.

Table H.4 shows a summary of the implications of both updating the expenditure profiles and our assumptions about residency and the use of multipliers on Step 1 level analysis of the marine reserve alternatives for the CINMS. Our original methods, as applied to MRWG alternatives A, B, C, D, E and I as found on the CINMS web site greatly overstated the potential economic impacts of the marine reserves associated with recreational fishing. Table H.4 shows an overstatement on income impact, assuming 100% nonresidents, between 16.7 % and 54.95 % and on employment of between 20 % and 52.94 % for the existing six marine reserve alternatives. For all consumptive recreation activities, the overstatement of income impacts were between 24.82% and 26.25 % and for employment between 25.80 % and 27.97 %. Using the 50% residency assumption, the income impacts were overstated by between 41.69 % and 68.47 %, and employment impacts were overstated by between 40.12 % and 64.71 %. For all consumptive recreation activities, the overstatement of income impacts were between 47.37 % and 48.37 % and employment impact between 44.44 % and 45.76 %.

Table H.4 Impact on Step 1 Analysis of Consumptive Recreation by Including Updated Spending Profiles for Fishing and the Assumption about Percent that are Local Residents

		Percent Changes from Original Step 1 Analysis			
		100 % Nonresidents [1]		50% Residents [2]	
Alternative	Acitivity	Income	Employment	Income	Employment
1	Consumptive Recreation	-26.25	-27.97	-48.37	-45.76
	Charter/Party Boat Fishing	-16.70	-20.27	-41.69	-40.54
	Private household/rental boat fishing	-54.95	-52.94	-68.46	-64.71
2	Consumptive Recreation	-25.37	-26.46	-47.76	-44.44
	Charter/Party Boat Fishing	-16.70	-20.59	-41.69	-40.20
	Private household/rental boat fishing	-54.95	-51.79	-68.46	-64.29
3	Consumptive Recreation	-25.30	-26.81	-47.71	-44.93
	Charter/Party Boat Fishing	-16.70	-20.00	-41.69	-40.00
	Private household/rental boat fishing	-54.95	-52.78	-68.47	-63.89
4	Consumptive Recreation	-25.17	-26.14	-47.62	-44.81
	Charter/Party Boat Fishing	-16.74	-20.42	-41.72	-40.14
	Private household/rental boat fishing	-54.95	-52.24	-68.46	-64.18
5	Consumptive Recreation	-24.82	-25.80	-47.37	-44.52
	Charter/Party Boat Fishing	-16.73	-20.37	-41.71	-40.12
	Private household/rental boat fishing	-54.95	-51.28	-68.46	-64.10
Preferred	Consumptive Recreation	-25.41	-26.21	-47.79	-44.66
	Charter/Party Boat Fishing	-16.74	-20.18	-41.72	-40.35
	Private household/rental boat fishing	-54.95	-51.67	-68.46	-63.33

1. Original Step 1 assumption was that all those that accessed the CINMS from Santa Barbara were not residents of Santa Barbara and multipliers were applied to income and employment estimates. The same is true for those that accessed the CINMS from Ventura or Los Angeles counties. Percent changes here are only for updating the spending profiles for charter/party boat fishing and private household/rental boat fishing using the year 2000 NMFS study (see Table H.2).
2. Here the assumption used is that 50 percent of all trips for all consumptive recreation activities were made by residents of the county from where they accessed the CINMS. Direct expenditures, income, and employment are counted for residents and multiplier impacts are applied to the 50 percent that are nonresidents of the county from which they accessed the CINMS.

Conclusion

On the positive side, the ASA report indirectly led to its stated goal of broadening understanding of the economic issues related to the proposed Marine Protected Areas within the Channel Islands National Marine Sanctuary. We were forced to address some issues specifically that had previously not been addressed and we were able to incorporate the latest expenditure estimates for recreational fishing, which should improve our estimates of the potential economic impact of marine reserves. This provides a better starting point for our Step 2 analyses, which take into account other factors that might increase or decrease our estimates of potential losses from Step 1 analyses. On the negative side, the ASA report was exposed for blatantly bad science and exposed the ASA for supporting “pure advocacy analysis”. In that respect, the ASA report did not serve the recreational community well.

APPENDIX I

Table I.1 Estimated Quality Elasticities from Marine Recreation Literature[1]

Study/Topic/Quality Attribute	Base Consumer's Surplus (CS)	Percent Change in Quality Attribute (QA)	Change in CS for Change in QA	Quality Elasticity
1. Cameron (1988)/Pacific Salmon/ Catch Rate	$34.22	100	$3.13	0.09
2. Agnello and Han (1992)/Multi-Species, Long Island Sound, NY/ Catch Rate	$23.84	100	$5.95	0.25
3. Agnello and Han (1992/Multi-Species, Long Island Sound, NY/ Catch Rate	$23.84	20	$1.31	0.27
4. Kaoru (1991)/Multi-Species, Albermarle Sound, NC/Catch Rate	$3.09	25	$0.25	0.32
5. Kaoru (1991)/Multi-Species, Albermarle Sound, NC/Catch Rate	$1.97	25	$0.25	0.51
6. Morey, Rowe and Watson (1991)/ Atlantic Salmon/Catch Rate	$96.00 (Mean)	100	$60 (Mean)	0.63
7. Morey, Rowe and Watson (1991)/ Atlantic Salmon/Catch Rate	$83.00 (Median)	100	$66 (Median)	0.80
8. Cameron (1992)/Red Drum, TX/ Catch Rate	$238.00	50	$88	0.74
9. Huppert (1989)/Striped Bass and Salmon, San Francisco Bay Area/ Catch Rate	$77.00	100	$141	1.83
10. Leeworthy (1990)/King Mackerel, West Coast, FL/Catch Rate	$56.40	50	$45	1.60
11. Leeworthy (1990)/King Mackerel, East Coast, FL/Catch Rate	$56.40	50	$122	4.33
12. Kaoru and Smith (1990)/Multi-Species, NC Sounds/Catch Rate	$4.30	25	$7.09	6.60
13. Kaoru and Smith (1990)/Multi-Species, NC Sounds/Catch Rate	$39.11	25	$11.07	1.13
14. Bockstael, et al (1989)/Boating, Swimming and Fishing in Chesapeake Bay/Water Quality-Nutrients[2]	$1.61 - $139.22	20	$0.77 - $13.98	0.24 - 1.29

1. The first 13 results are all are based on fishing studies done on the marine environment from Freeman (1995). Value ealsticities were calculated based on information summarized in Tables 2, 3 and 5 in Freeman (1995).

2. The ranges of value elasticities were calculated from results found in Bockstael, et al (1989) and the detailed calculations can be found in Wiley and Leeworthy (1999).

Table I.2 Comparison of Consumptive and Nonconsumptive Recreation Values[1]

Activity	Number of Studies	Number of Estimates	Mean $ Person-day	Median $ Person-day	SE of Mean	Range of Estimates $
Fishing	39	122	$35.89	$20.19	$3.42	1.73 - 210.94
Wildlife Viewing	16	157	$30.67	$28.26	$1.38	2.36 - 161.59
Swimming	9	12	$21.08	$18.19	$4.46	1.83 - 49.08
Nonmotorized boating	13	19	$61.57	$36.42	$13.76	15.04 - 263.68

1. From Rosenberger and Loomis (2001).