

# ESTABLISHING A SPATIAL & ECONOMIC BASELINE OF HUMAN USES IN THE NORTH CENTRAL COAST REGION OF CALIFORNIA

## EXECUTIVE SUMMARY REPORT

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A PART OF PROJECT R/MPA-16 09-015:

*Baseline Monitoring of Ecosystem & Socioeconomic Indicators for MPAs along the North Central Coast of California*



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# INTRODUCTION

**T**his executive summary report provides a summary of the methods and major findings from a four-part study conducted by Ecotrust to provide baseline estimates of the quantity, spatial distribution, and economic value of human uses in the North Central Coast (NCC) study region. The NCC region stretches from Alder Creek in the north to Pigeon Point in the south. Specifically, we provide results in the following four types of human uses: commercial fishing, commercial passenger fishing vessels, coastal recreation, and the recreational abalone fishery. This study is a part of the larger marine protected areas monitoring effort, entitled the MPA Baseline Program, which is tasked with characterizing the ecological and socioeconomic conditions within the NCC region and across the state. Specifically, this study addresses the Baseline Program's objective of describing human use patterns across the study region and establishing initial data points for long-term tracking of conditions and trends.

We would like to emphasize that the purpose of this report is not to measure or assess the impact of MPAs on human uses in the study region. To quantitatively measure the impact of MPAs requires robust long term data sets in both pre and post MPA periods that enable analyses to account or control for the complex interplay of regulatory, environmental, and socioeconomic factors that drive change in human use patterns. Such a study was beyond the scope of this project but the information we have collected can be used to help better understand the complex system of coastal and ocean human uses and inform future research efforts to measure and quantify the impact of MPAs.



# COASTAL RECREATION





# INTRODUCTION & METHODS

Coastal recreation provides significant economic and social benefits to coastal communities and to the state of California as a whole. These benefits include both the financial impact of direct expenditures (e.g., hotel stays, dining, shopping) as well as non-market benefits such as enhanced human well-being. To understand the impacts recently established marine protected areas (MPAs) might have on future coastal recreation use patterns in the region it is necessary to establish a baseline of how many people use the coast, what they do, and the economic contributions of these different types of uses—especially in a geospatial context. Through a peer-reviewed methodology we surveyed a probability-based sample of 5,079 individuals in select North Central Coast region counties to establish a baseline characterization of coastal recreation and visitation statistics and a spatial baseline of coastal recreation use patterns in the North Central Coast region.

## MAJOR FINDINGS

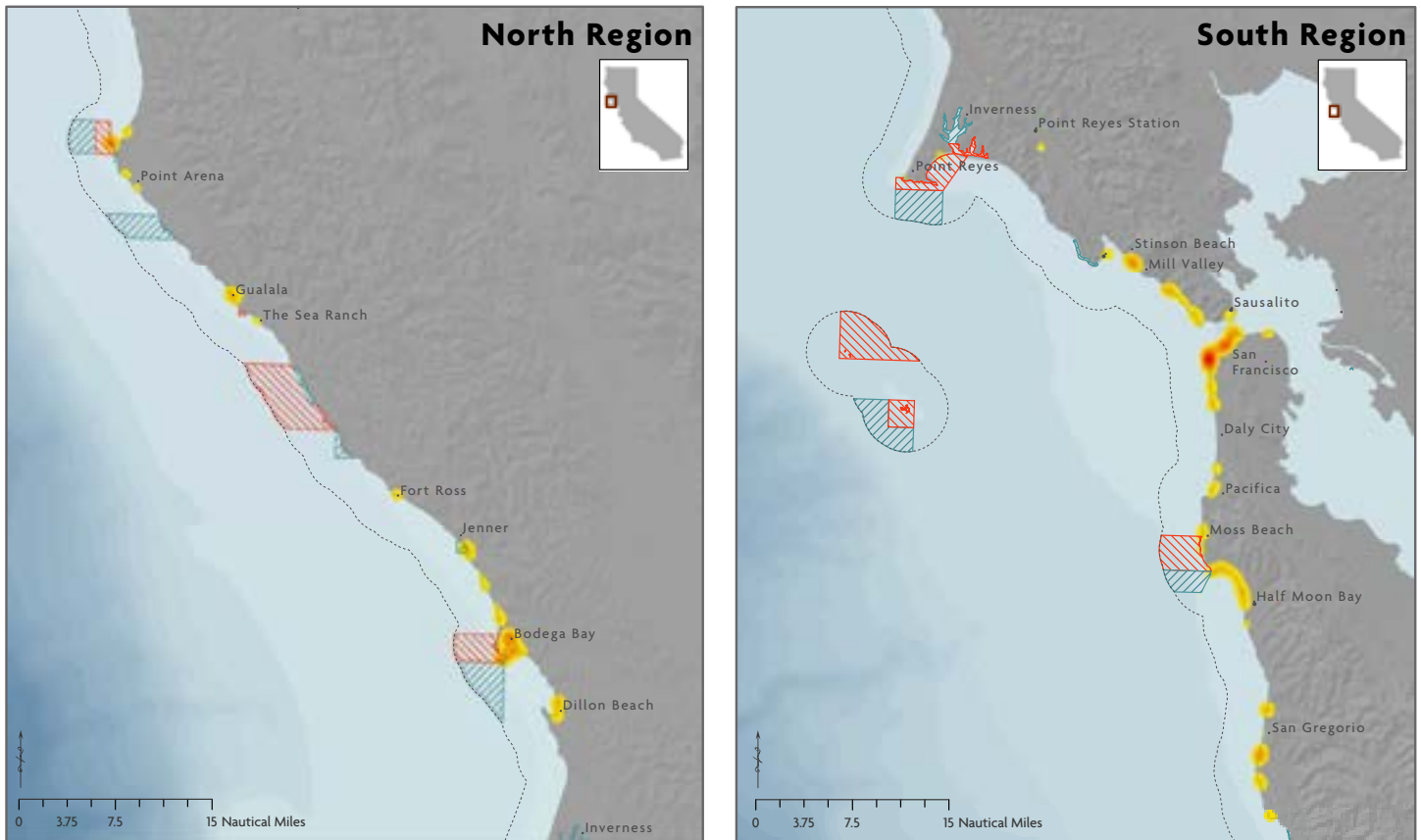
- Coastal trips to San Francisco County were most popular among respondents, constituting approximately 37.4% of total coastal trips. The county of San Mateo followed closely behind at 30.2% of total reported visits. Mendocino County had the fewest coastal visitors, at approximately 6.9% of survey respondents.
- The top five most popular coastal activities among people in the region were scenic enjoyment (77.1% of study population), beach going (65.2%), photography (41%), biking or hiking (39.3%) and watching birds and/or other marine life from shore (38.6%).
- Spatial data sets and maps were developed displaying the extent and intensity of use for coastal recreation overall and for specific coastal recreation activities (*Map 1*).
- The average individual in the North Central Coast takes approximately 3.2 trips a year to the coast for an estimated total of 22.2 million trips a year among the study population.
- On an average coastal recreation trip, an individual spends approximately \$54.48 for a total annual coastal recreation expenditure value of approximately \$1.21 billion dollars<sup>1</sup> (*Table 1*).



## MAP 1

# California North Central Coast Coastal Recreational Survey

## All Survey Waves – All Activities



**KEY** Map depicting the relative intensity of coastal recreation use in the North Central Coast region

### MARINE PROTECTED AREAS



= State Marine Conservation Area



= State Marine Reserve



= State Marine Recreational Management Area

### DENSITY OF RECREATIONAL ACTIVITY



----- = 3NM STATE WATER LINE

### TABLE 1

Estimated total number of coastal trips and direct trip expenditures in the North Central Coast region

STUDY POPULATION	AVERAGE # OF TRIPS PER YEAR PER PERSON	ESTIMATED # OF COASTAL TRIPS FOR STUDY POPULATION	AVERAGE EXPENDITURE PER TRIP	TOTAL ESTIMATED ANNUAL COASTAL RECREATION TRIP EXPENDITURES
6,943,138	3.2	22,197,663	54.48	1,209,258,380

<sup>1</sup> This is a higher bound estimate of coastal recreation trip expenditures. Please see the full report for the lower bound estimate



# COMMERCIAL FISHING



# INTRODUCTION & METHODS

The waters off the North Central Coast of California have long supported fishing activities that are integral to the cultural and economic history of the area. Commercial fishing exemplifies this interdependency between the natural environment and coastal communities that have characterized California since well before statehood.

The goal of this study was to establish a baseline characterization of the commercial fishing fleet in the California North Central Coast (NCC) region and assess initial changes since marine protected area (MPA) implementation in May, 2010. The results of this study provide a better understanding of the current economic health of the region's commercial fishermen and provide a benchmark of economic conditions and spatial fishing patterns against which future MPA impacts and benefits can be measured. Our study provides three sets of primary findings:

1. A baseline characterization of spatial fishing patterns and economic status of commercial fishermen in the North Central Coast region;
2. An assessment of initial changes in spatial fishing patterns and initial economic changes following NCC MPA implementation; and
3. A qualitative investigation into the impact of NCC MPAs on commercial fishermen and the specific MPAs impacting commercial fisheries at the port and region scale

To provide these findings our research team examined California Department of Fish and Wildlife (CDFW) commercial landings data and conducted in-person interviews with 101 commercial fishermen who made landings in 2010 in the study region for the following state water fisheries: *California halibut* (hook & line); *Dungeness crab* (trap); *Nearshore finfish* (live—fixed gear); *salmon* (troll); and *urchin* (dive).

## NORTH CENTRAL COAST FISHERY CATEGORIES



CALIFORNIA HALIBUT  
HOOK + LINE



DUNGENESS CRAB  
TRAP



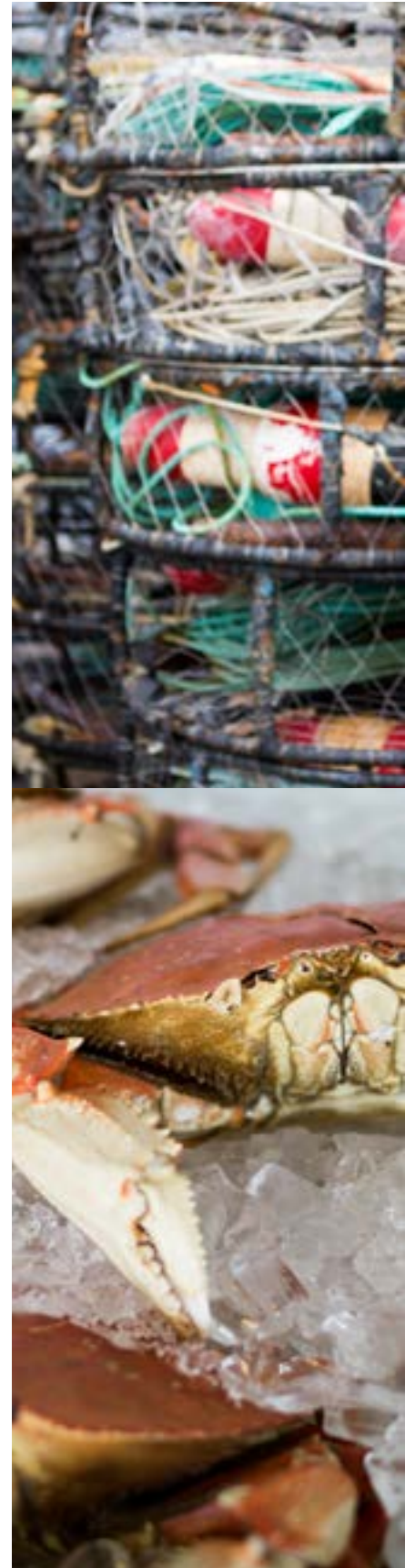
NEARSHORE FINFISH  
LIVE, HOOK & LINE



SALMON  
TROLL



SEA URCHIN  
DIVE





## MAJOR FINDINGS: HISTORICAL TRENDS & INITIAL CHANGES IN FISHERIES REVENUE

- Total landings in the North Central Coast for state water fisheries averaged 7.8 million pounds and \$16 million in ex-vessel revenue annually from 1992–2011 (*Figure 1*).
- The number of fishermen making landings in the North Central Coast region declined dramatically by 72.5% (from 2,126 to 584 fishermen) from 1992 to 2011. This decline has been due to series of factors such as increased fishery regulations/restrictions, economic decline, salmon fishery closures, and natural fishery cycles.
- State water fisheries are increasingly significant in the region. In 1992 these fisheries comprised 32% of the region's ex-vessel revenue increasing to 84.1% in 2011. This increase in significance is largely due to a reduction in the federal waters trawl fleet in California and recent large increases in revenue in the Dungeness crab fishery.
- Overall ex-vessel revenue in the region increased significantly since 2009 due to dramatic increases in revenue in the Dungeness crab fishery. Fishermen noted there were many factors influencing the growth of the Dungeness crab fishery which included reaching a peak in the natural cycle of the fishery, recent efforts to clean up the San Francisco Bay (an important nursery ground for crab), increased fishing effort from out of state and north coast fishermen, and expansion of both domestic and international markets.
- The average ex-vessel revenue per fisherman has been variable from pre to post MPA years, with notable increases in the Dungeness crab fishery as discussed above and decreases in the salmon fishery due the limited season of fishery (*Figure 2*).

FIGURE 1

### COMMERCIAL FISHERMAN + EX-VESSEL REVENUE IN THE NORTH CENTRAL COAST

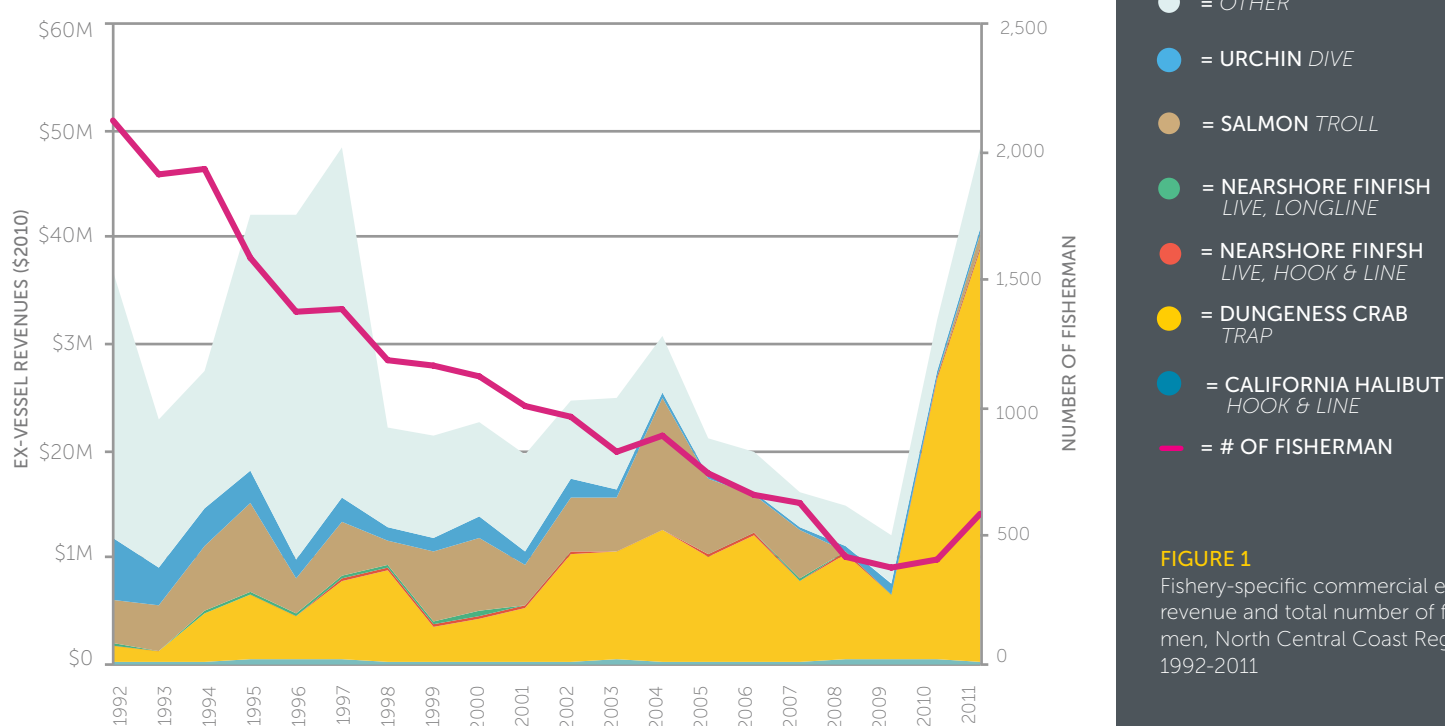




FIGURE 2

## COMMERCIAL FISHERMAN + EX-VESSEL REVENUE IN THE NORTH CENTRAL COAST

 = PRE-MPA: ANNUAL AVERAGE 2000-2009  
 = POST-MPA: 2011  
 = 10 FISHERMAN









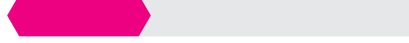




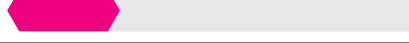




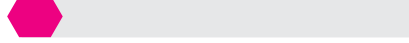


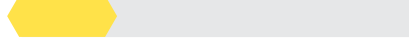

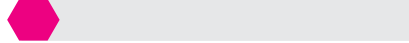


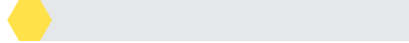

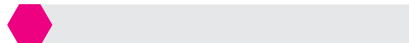

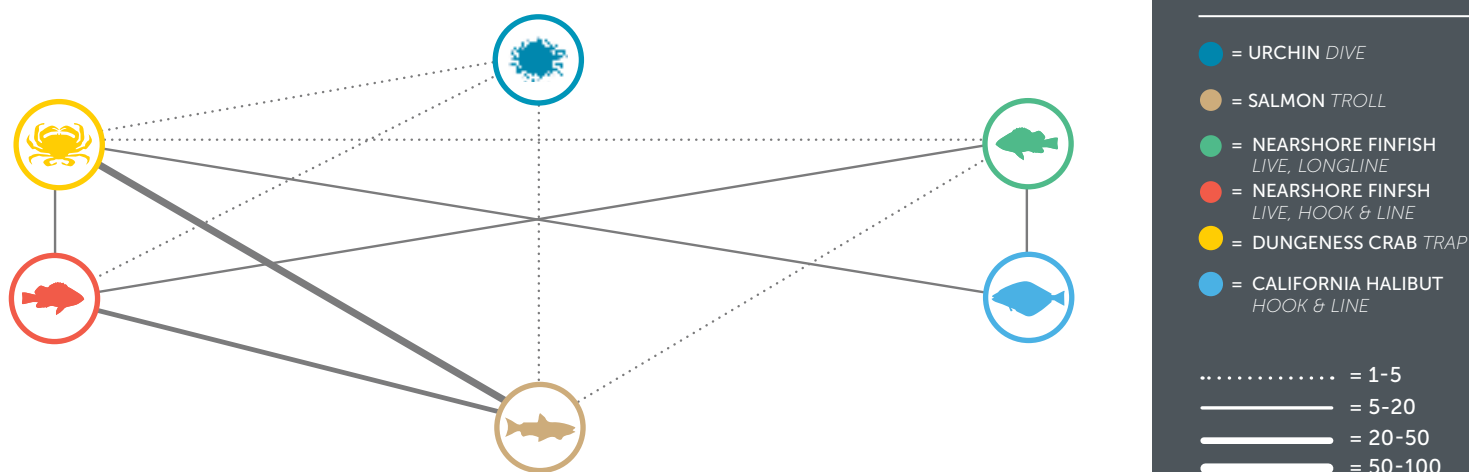
FISHERY	AVERAGE EX-VESSEL REVENUE PER FISHERMEN FOR EACH FISHERY	# OF FISHERMEN
 DUNGENESS CRAB TRAP	 \$40,684	
	 \$131,577	
 SEA URCHIN DIVE	 \$27,882	
	 \$23,189	
 NEARSHORE FINFISH LIVE, HOOK + LINE	 \$9,578	
	 \$17,167	
 NEARSHORE FINFISH LIVE, HOOK + LINE	 \$4,643	
	 \$6,166	
 SALMON TROLL	 \$11,056	
	 \$5,511	
 CALIFORNIA HALIBUT HOOK+LINE	 \$3,389	
	 \$4,067	
		TOTAL # OF FISHERMEN: PRE-MPA = 563 / POST-MPA = 494

FIGURE 3

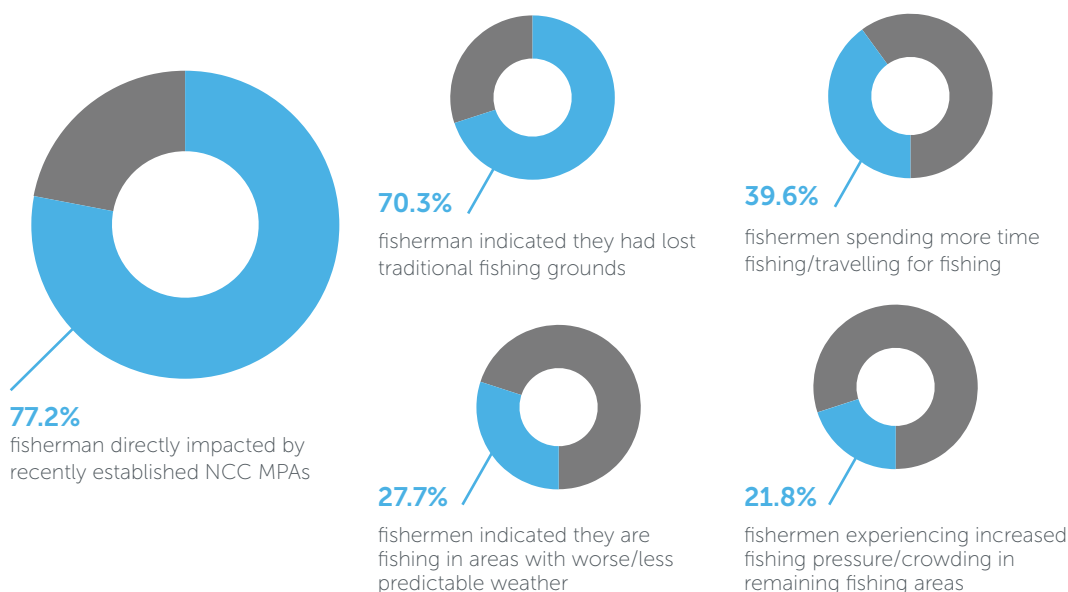
## HOW MANY FISHERMAN PARTICIPATE IN MULTIPLE FISHERIES?



## MAJOR FINDINGS: MARINE PROTECTED AREAS + COMMERCIAL FISHING

- Approximately 77.2% of fishermen interviewed indicated they had been directly impacted by recently established NCC MPAs.

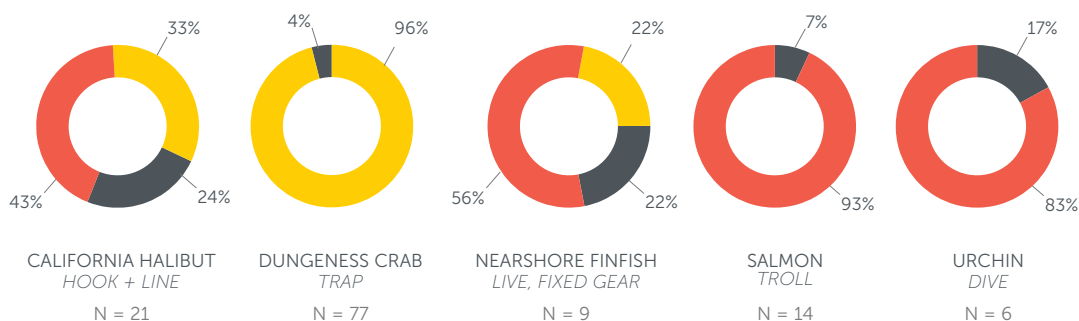
FIGURE 4



- Point Reyes State Marine Reserve is directly impacting the largest number of fishermen interviewed in the region (35.6%), followed by Stewarts Point State Marine Reserve (27.7%), and the Montara State Marine Reserve (22.8%).
- When asked to compare his/her success in specific fisheries compared to the previous five years the majority of Dungeness crab (trap) fishermen responded they were doing better, while the majority of fishermen in the nearshore finfish (live-fixed gear), salmon (troll), and urchin (dive) fisheries were doing worse (*Figure 5*).

FIGURE 5

How do you compare the success in your fishery last year to that of the previous five years?



### KEY:

● = BETTER

○ = THE SAME

● = WORSE

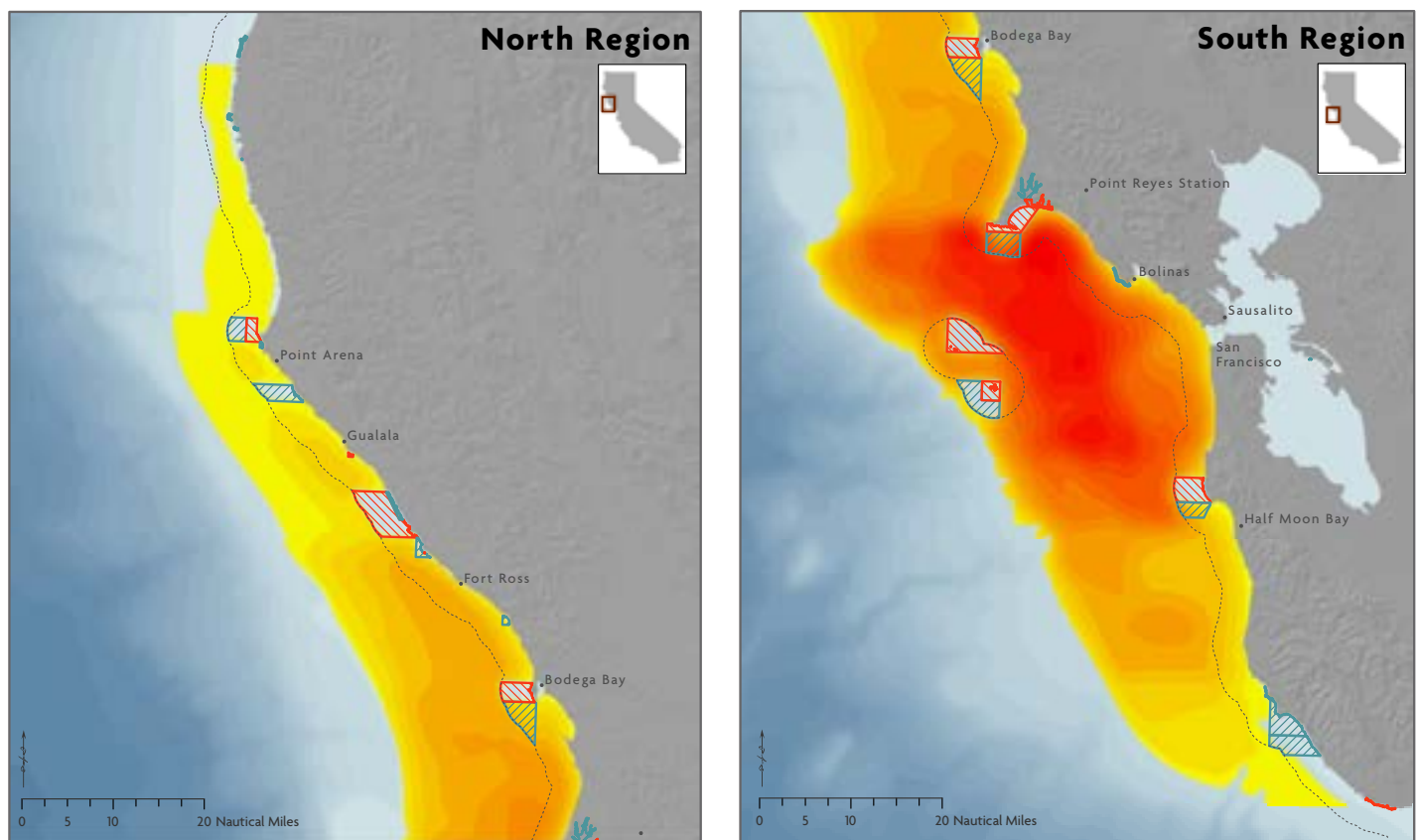
N = NUMBER RESPONDING

## MAJOR FINDINGS: SPATIAL FISHING PATTERNS

- Maps and spatial data sets were developed to establish a post-MPA baseline on the relative value of commercial fishing grounds for each commercial fishery at the port and region wide level (**Map 2**). These data can be used along with ecological data collected in and around MPAs to assess the impact of reductions or increases of fishing pressure on marine resources.

### MAP 2

## California North Central Coast 2010 Commercial Fishing Grounds & Landings All ports – Dungeness crab trap



**KEY** Survey Sample Size: 79 | Total Ex-vessel Revenue (2010): \$26,321,804.71 | Percent of Ex-vessel Revenue Represented by Survey Sample: 46.85%

#### MARINE PROTECTED AREAS

 = State Marine Conservation Area

 = State Marine Reserve

 = State Marine Recreational Management Area

#### RELATIVE VALUE OF FISHING GROUNDS

low  high

----- = 3NM STATE WATER LINE

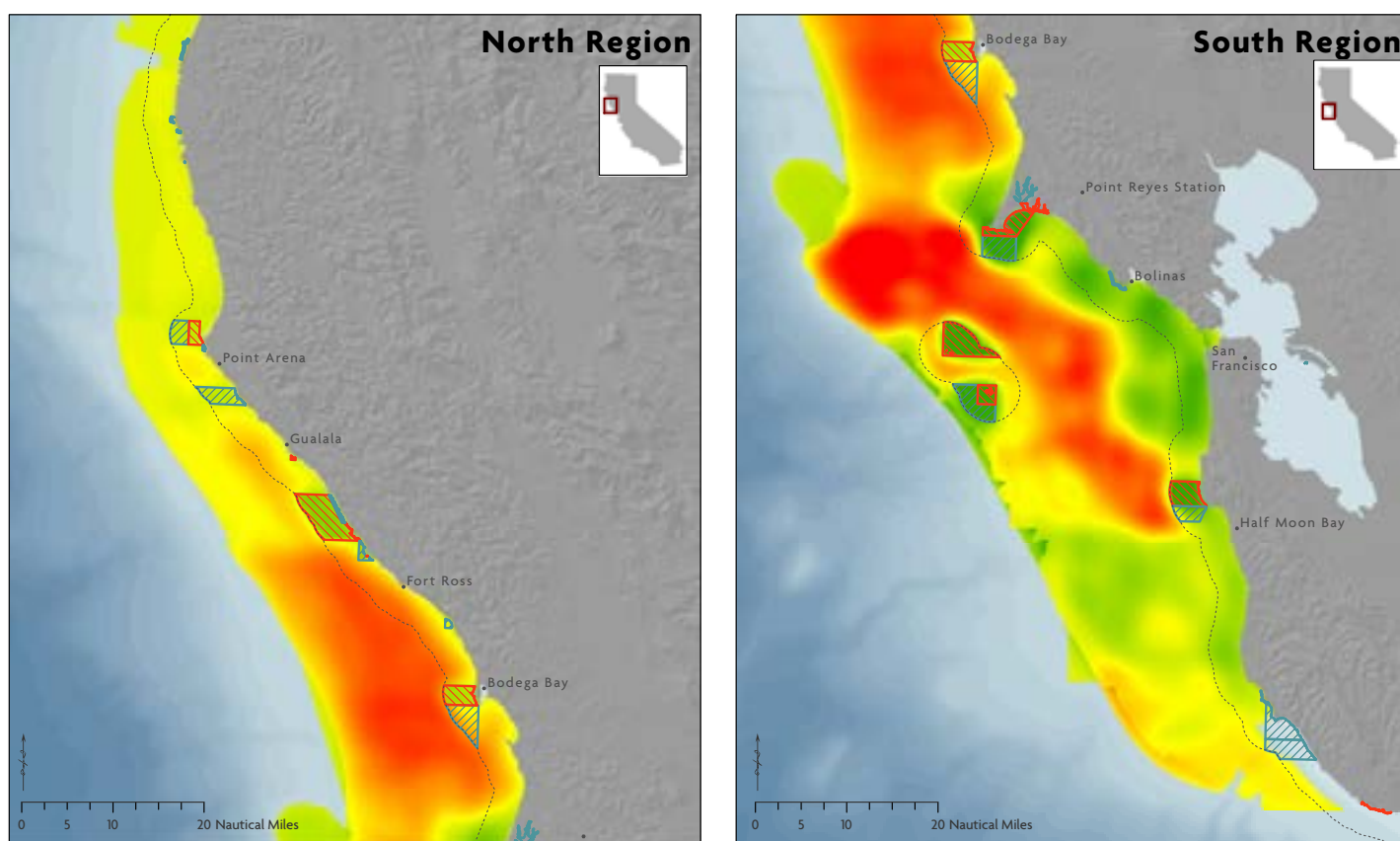
Dungeness crab (trap) commercial fishery map depicting the relative value of fishing grounds at the region-wide level for the 2010/2011 season.



- Maps and spatial data sets were developed to assess changes in spatial fishing patterns between pre- and post- MPA periods (**Map 3**). Developing a time series of spatial fishing patterns can help reveal how environmental and regulatory change may be influencing the location and value of fishing grounds.

**MAP 3**

### California North Central Coast Spatial Analysis: Relative Value of Commercial Fishing Grounds Pre-MPA (2007) to Post-MPA (2010), ALL PORTS Dungeness crab trap



**KEY** Survey Sample Size: 89 (2007) and 79 (2010) | Percent of Ex-vessel Revenue Represented by Survey Sample: 46% (2000-6) and 47% (2010)

**MARINE PROTECTED AREAS**

= State Marine Conservation Area



= State Marine Reserve



= State Marine Recreational Management Area

**RELATIVE CHANGE IN VALUE OF FISHING GROUND**

decrease



increase

----- = 3NM STATE WATER LINE

Spatial change in the relative value of **Dungeness crab** (trap) commercial fishing grounds between pre- and post-MPA periods. Red areas indicate high relative increases in value and green indicates relative decreases in value.

# COMMERCIAL PASSENGER FISHING VESSELS (CPFV)



# INTRODUCTION & METHODS

Commercial Passenger Fishing Vessels (CPFV) are often called party-boats or charter fishing boats and make a business in taking members of the public to recreationally fish and, more recently, to enjoy non-consumptive type trips such as whale watching or leisure cruises. In a study conducted by Responsive Management in 2007, the majority of Californian's (84.0 percent) agree that CPFV opportunities are important to maintain as they provide opportunities for people to experience coastal resources who otherwise would not be able to as they cannot afford a boat of their own.

The goal of this study was to establish a baseline characterization of the commercial passenger fishing vessel (CPFV) fleet of the California North Central Coast region. The results of this study provide a better understanding of the current economic health of the region's CPFV operations and provide a benchmark of economic conditions and spatial fishing patterns against which future MPA impacts and benefits can be measured. Our study provides three sets of primary findings:

1. A baseline characterization of spatial fishing patterns and the economic status of CPFV operators in the North Central Coast region;
2. An assessment of initial economic changes following MPA implementation; and
3. A qualitative investigation into the impact of NCC MPAs on CPFV operators and the specific MPAs impacting CPFV fisheries at the port and region scale.

To provide these findings our research team examined California Department of Fish and Wildlife CPFV logbook data and conducted in-person interviews with 30 CPFV operators who were operating in 2010 in the study region. The ports in which we targeted CPFV interview were: Bodega Bay, Sausalito, Berkeley, Emeryville, San Francisco, and Half Moon Bay.

## MAJOR FINDINGS

- On average from 2000 to 2011 the majority of fish caught (70.9%) in the region were rockfish; however, the majority of trips in the region (44.6%) target salmon (*Figure 6*).
- The total number of CPFV anglers has declined by approximately 46.1% from 2000 to 2011. This is largely due to general economic decline in recent years as well as the closure of the salmon fishery.
- The fisheries management closure of the salmon season in 2008 and 2009 caused dramatic decreases in the number of anglers, trips, and fish caught during those years.
- Total number of anglers, trips, and number of fish caught have increased in since 2009 due to the reopening of the salmon season, but have generally not recovered to pre-2008 levels. This may be due to the recent economic recession and generally shorter salmon seasons.

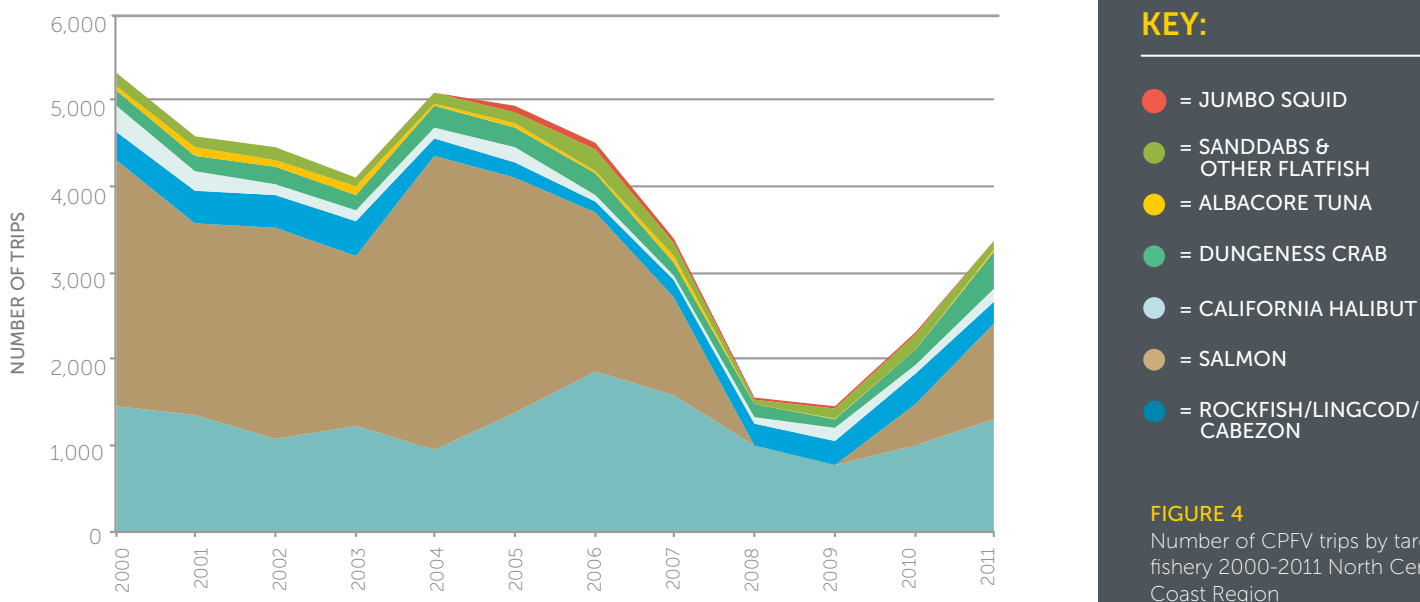






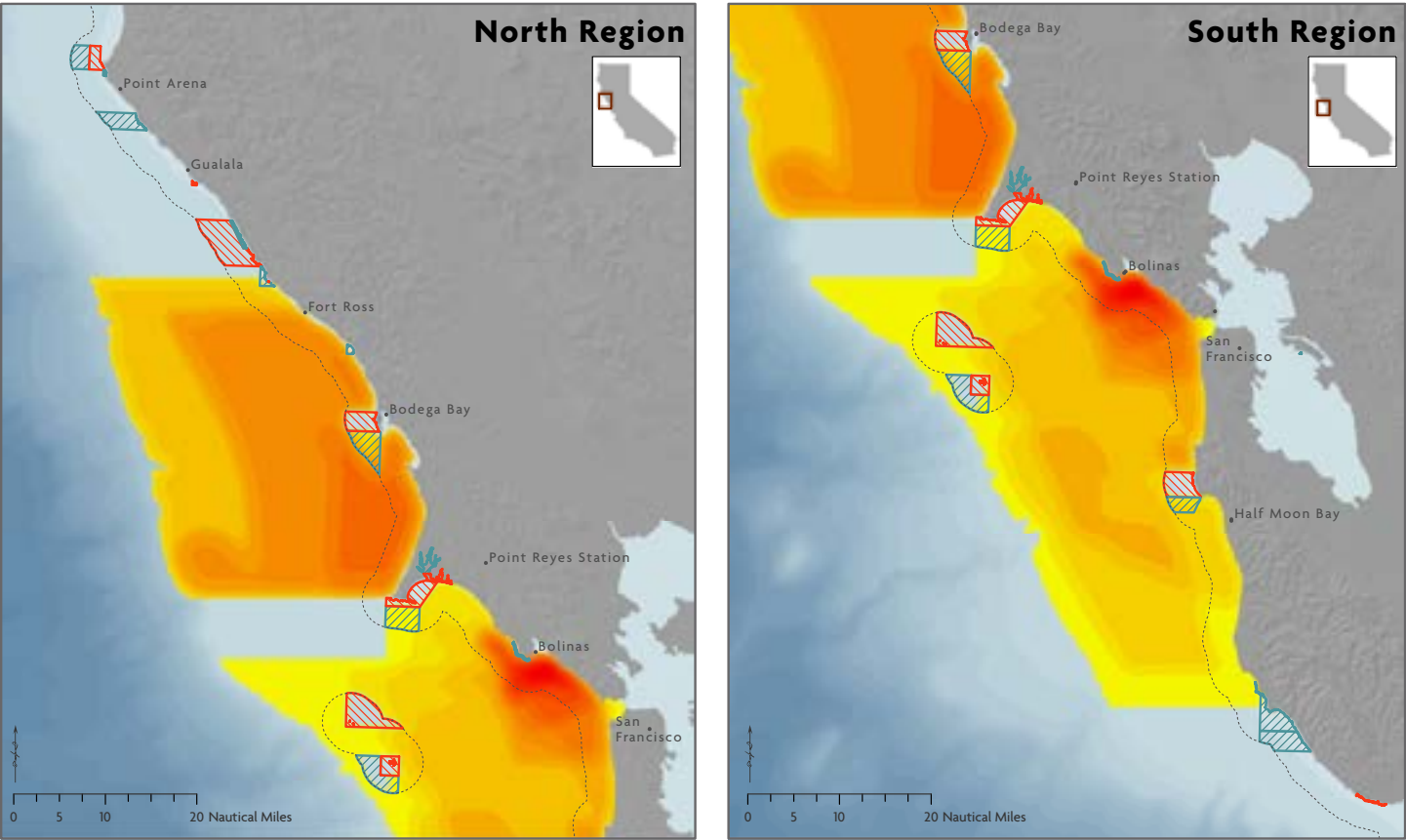
- Approximately 93.3% of CPFV operators interviewed indicated they had been directly impacted by recently established MPAs. Fishermen noted the loss of traditional fishing grounds, travelling further to fish, fishing in areas with worse/less predictable weather, and increased fishing pressure in open fishing areas.
- Approximately 70% of CPFV operators indicated the various MPAs in the Farallon Islands have directly impacted them—specifically in the rockfish fishery.
- Maps and spatial data sets were developed to establish a post MPA baseline on the relative value of CPFV fishing grounds for each fishery at the port and region wide level (*Map 4*). These data can be used along with ecological data collect in and around MPAs to assess the impact of reductions or increases of fishing pressure on marine resources. Furthermore, developing a time series of spatial fishing patterns can help reveal how environmental and regulatory change may be influencing the location and value of fishing grounds.

FIGURE 6



MAP 4

California North Central Coast 2010  
Commercial Passenger Fishing Vessel (CPFV) Fishing Grounds  
ALL PORTS – Salmon



**KEY** Survey Sample Size: 25 | Total Number of Fish Caught (2010): 2,277

MARINE PROTECTED AREAS

-  = State Marine Conservation Area       = State Marine Reserve       = State Marine Recreational Management Area

RELATIVE VALUE OF FISHING GROUNDS



----- = 3NM STATE WATER LINE

Map depicting the relative value of CPFV fishing grounds for the 2010 salmon fishing season at the region wide scale

# RECREATIONAL ABALONE HARVESTING





# INTRODUCTION & METHODS

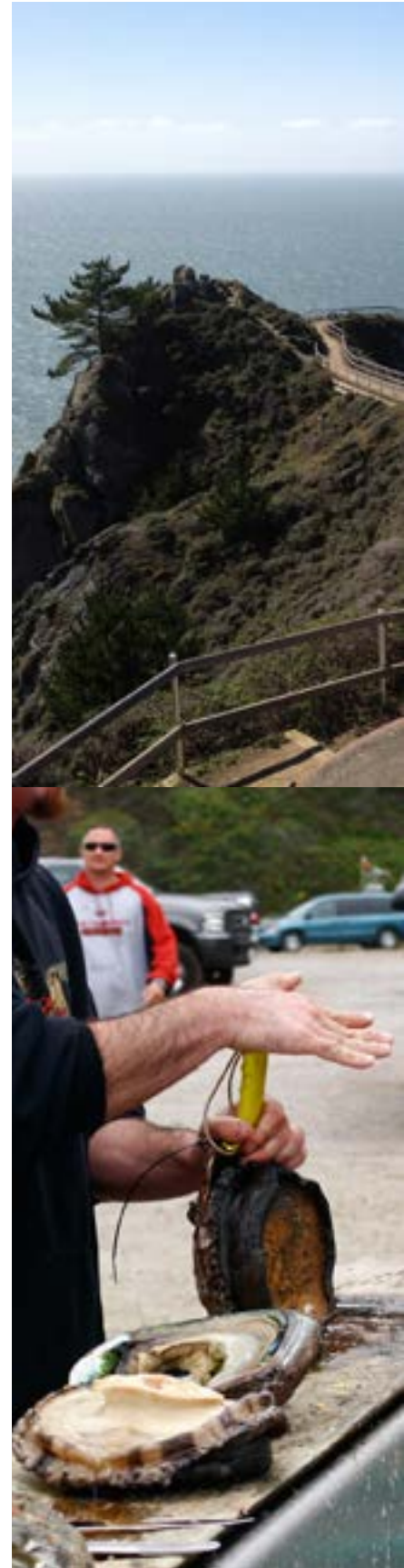
Red abalone (*Haliotis rufescens*) is an important recreational fishery species in the North Central Coast of California. Historically harvested by American Indians and early settlers, this fishery remains integral to the cultural and economic history of the region. The results of this study provides a benchmark of user characteristics, economic contribution, and spatial harvest patterns against which future MPA impacts and benefits can be measured. Our study provides three sets of primary findings:

1. A baseline characterization of spatial harvest patterns at the punch card site and region wide level;
2. An economic baseline characterization of abalone harvesters that includes demographic characteristics, site selection preferences, and annual expenditures associated with recreational abalone harvesting; and
3. An investigation into marine protected areas awareness among recreational abalone harvesters in the region.

Ecotrust collaborated with key leaders in the recreational abalone fishery community to design the project survey instrument and utilized a randomly compiled database of abalone report card purchaser telephone numbers from the California Department of Fish and Wildlife (CDFW). To collect data, Ecotrust conducted phone interviews by randomly selecting individuals from the contact list provided by CDFW. Approximately 656 individuals were contacted; a total of 162 individuals responded and of those respondents 96 harvested abalone in 2010 in the region and completed a full interview.

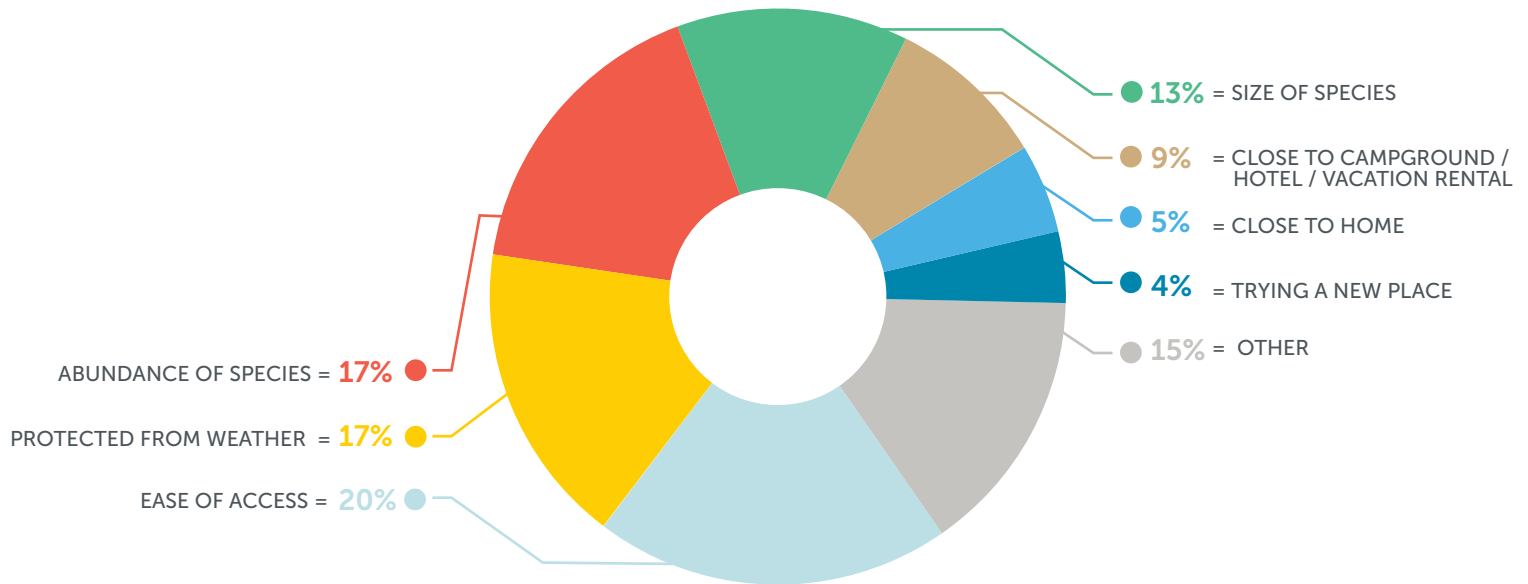
## MAJOR FINDINGS

- The average number of days spent harvesting abalone in 2010 was 5.9 days for abalone diving and 3.7 days for abalone shore picking.
- Approximately 89% of respondents indicated they were aware of the MPAs and largely knew of them through CDFW (37%) or word of mouth/friends (28%).
- Approximately 41% of respondents were aware of the Stewarts Point MPA, Salt Point MPA (36%), and Gerstle Cove MPA (28%).
- Approximately 30% of respondents indicated that they did not return in 2010 to a previously visited site due to the establishment of MPAs.
- The most popular punch card site used by survey respondents was Fort Ross/Reef Campground (25% of respondents) followed by Timber Cove (17% of respondents).
- Ease of access/entry (20% of respondents) was the primary reasons respondents chose to harvest a site followed by protection from weather (17%) and abundance of abalone (17%) (*Figure 7*).
- On average respondents spent \$1,021 in recreational abalone harvesting expenditures each year.
- Spatial data sets and maps were developed displaying the extent and intensity of use of use for abalone punch card sites and region wide (*Map 5*).



**FIGURE 7**

Primary reason for harvesting abalone at a specific site.

**MAP 5**

## California North Central Coast Abalone Fishery Timber Cove Punch Card Site—2010 Dive/Shore Picking Grounds



Survey Sample Size: 28

Weighted by the number of days that the Timber Cove punch card site was used in 2010.

### MARINE PROTECTED AREAS

-  = State Marine Conservation Area
-  = State Marine Reserve

### RELATIVE VALUE OF FISHING GROUNDS

low  high

Map depicting extent and intensity of use at Timber Cove

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# CONCLUSION

**D**uring the years leading up to MPA establishment, the ocean environment, the regulatory environment, and the socioeconomic environment experienced several changes. The California Current System at this time was transitioning from a warm to a cold water regime which affected the availability of certain kinds of fish targeted by anglers. Major changes in regulations occurred for rockfish (season closures initiated in 2000 with the addition of depth closures starting in 2001) and salmon (in particular, closures in 2008 and 2009). Furthermore, a deep recession, which began in December 2007, and higher gas prices impacted people's livelihoods and discretionary monies. All of these factors affected fishing and other human uses in the study area to various degrees and continue to in the post MPA period.

It is difficult to discern the specific effects of MPAs on fishing communities and human uses as they are confounded by a multitude of factors. However, advancing our understanding of how humans utilize, value, and rely upon marine space will be critical to unraveling these interconnections as well as monitoring how MPAs are benefitting or impacting fishing and coastal communities into the future. This information may then be used in adaptive management measures to improve the performance of MPAs towards meeting ecological and socioeconomic goals. Similarly, it is our hope that the data collected/compiled and lessons learned through this project will be applied to future MPA monitoring efforts to build a time series data set on how human uses and the socioeconomic health of fishermen and coastal communities are changing over time. This type of robust longitudinal dataset that provides both socioeconomic characterization and spatial patterns on human uses would provide much needed information to a wide array of marine planning and management applications and help inform socially and economically responsible management measures.







*Questions or comments, please contact*

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