

## STAFF SUMMARY FOR DECEMBER 7-8, 2016

**12. SOUTH COAST MARINE PROTECTED AREA****Today's Item****Information** **Action** 

Receive informational presentations on south coast marine protected areas (MPA) with an overview of upcoming south coast 5-year State of the Region report scheduled for Apr 2017, and highlights from 10 years of monitoring at Channel Islands MPAs.

**Summary of Previous/Future Actions**

- N. Channel Islands state MPAs adopted by FGC 2003
- South coast MPAs adopted by FGC Dec 15-16, 2010; Santa Barbara
- **Today's presentations on south coast MPAs Dec 7-8, 2016; San Diego**
- Report on 5-year baseline monitoring period Apr 26-27, 2017; Los Angeles

**Background**

In Dec 2010, FGC adopted MPAs in the south coast region, the third of four regions to complete an MPA planning process consistent with the Marine Life Protection Act (MLPA) (Exhibit 1). Baseline monitoring data was collected in the first 5 years to document conditions at implementation and inform future adaptive management. The south coast MPA baseline monitoring period was from 2012-2016; partners (California Ocean Protection Council, California Ocean Science Trust (OST), DFW, and California Sea Grant) are preparing to report the results of the 5-year baseline monitoring period, which is scheduled for the Apr 2017 FGC meeting (see timeline in Exhibit 2 and sample results in Exhibit 3).

Several years prior to south coast MPA adoption, 13 MPAs were designed in the Northern Channel Islands (NCI) in Southern California through a separate planning process that predated MPA planning under MLPA. These MPAs were established in state waters of NCI through FGC action in 2003, followed by extension into federal waters in 2007.

From a management and policy standpoint, FGC considers the Northern Channel Islands as a part of the greater south coast MPA network. FGC made this policy decision in 2010 in recognition of biological connectivity between the islands and the mainland coast, and for consistency with the MLPA goal to manage MPAs as a network.

Monitoring of Northern Channel Island MPAs has occurred as a unit since their inception, and has provided insight into possible MPA network functioning. In 2008, initial results from the first five years of monitoring were presented in a Channel Islands Symposium held in partnership between DFW, UCSB, and Channel Islands National Marine Sanctuaries (<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=31325>); and 2013 marked 10 years of monitoring data (Exhibit 4). In mid-2015, FGC approved a request to invite Dr. Jennifer Caselle, from University of California at Santa Barbara, to present on the results of MPA monitoring at the Channel Islands. Today, following DFW and OST presentations on the upcoming south coast baseline report, Dr. Jennifer Caselle will present an overview of monitoring results from 10+ years of monitoring at NCI, which will in turn contribute to the broader south coast MPA monitoring information.

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**Significant Public Comments (N/A)**

**Recommendation (N/A)**

**Exhibits**

1. [DFW Brochure: California Marine Protected Areas Southern California: Point Conception to California-Mexico Border, updated Mar 2016](#)
2. [Timeline of South Coast MPA Baseline Monitoring Period: 2012-2017](#)
3. [Baseline Highlights from California's South Coast Kelp and Rock Ecosystems](#)
4. [Channel Islands Brochure: A Decade of Protection: 10 Years of Change at the Channel Islands](#)

**Motion/Direction (N/A)**

## What are Marine Protected Areas?

Marine protected areas (MPAs) are marine or estuarine waters set aside primarily to protect or conserve marine life and its associated habitat. MPAs have varying levels of protections and allowed activities, with special regulations in addition to the general fishing regulations.

## Types of MPAs

California uses three main MPA classifications: State Marine Reserve (SMR), State Marine Conservation Area (SMCA), and State Marine Park (SMP). No SMPs exist in Southern California, however this region does include two special closures.

## Southern California MPAs

Major revisions and additions to Southern California MPAs went into effect on January 1, 2012. The 50 MPAs encompass close to 355 square miles (just over 15 percent) of state waters in the Southern California region. Of those, about 275 square miles are designated as “no-take” SMCAs and SMRs. Southern California MPAs are part of a statewide network of MPAs that extends all along the California coastline.

## Fishing may be restricted, but what other activities are permitted in an MPA?

Unless specifically prohibited, non-consumptive activities such as diving, surfing, swimming and boating are allowed within MPAs, as long as take restrictions are followed. General fishing regulations may be found online at [wildlife.ca.gov/Ocean-Sport-Regs](http://wildlife.ca.gov/Ocean-Sport-Regs). It's a good idea to review the regulations before visiting an MPA.

For more information, visit [wildlife.ca.gov/MPAs](http://wildlife.ca.gov/MPAs), email [AskMPA@wildlife.ca.gov](mailto:AskMPA@wildlife.ca.gov), or visit one of the following Southern California CDFW offices:



**Santa Barbara**  
1933 Cliff Drive, Suite 9

**Los Alamitos**  
4665 Lampson Avenue, Suite C

**San Diego**  
3883 Ruffin Road

In 1999, California's Marine Life Protection Act was passed into law with a clear mandate: to re-evaluate all existing marine protected areas (MPAs) and potentially design new MPAs with input from a broad array of stakeholders. The California Department of Fish and Wildlife was integral to this effort. The MPAs in this brochure were designed, in part, to:

- Protect and sustain marine life, habitats and ecosystems
- Provide opportunities to learn from and enjoy marine areas subject to reduced human disturbance

For more information, visit the California Marine Protected Area website at

[wildlife.ca.gov/MPAs](http://wildlife.ca.gov/MPAs)

For general fishing regulations that are in effect in addition to MPA regulations, visit [wildlife.ca.gov/Ocean-Sport-Regs](http://wildlife.ca.gov/Ocean-Sport-Regs)



**Help stop poaching and polluting.**  
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(1-888-334-2258)



**Sustainable Fish and Wildlife Resources**



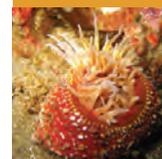
MPA Mobile Website

Alternate communication formats of this document are available upon request. If reasonable accommodation is needed, call CDFW at (707) 964-5026. The California Relay Service for the deaf or hearing-impaired can be used from TDD phones at (800) 735-2929.

# California Marine Protected Areas



**Southern California:**  
Point Conception to  
California-Mexico Border



CDFW photos



Coastline near Gaviota  
photo by D. Stein



# Southern California Marine Protected Areas

California's coast and ocean are among our most treasured resources. The productivity, wildness, and beauty found here is central to California's identity, heritage, and economy. Southern California marine protected areas (MPAs) were designed by local stakeholders with guidance and feedback from scientists, managing agencies, experts, policymakers, and the general public, to achieve the goals set forth in California's Marine Life Protection Act (MLPA). MPAs conserve biological diversity and protect a variety of marine habitats, communities, and ecosystems for their intrinsic value, while allowing for some human use of marine resources under recreational and/or commercial fishing regulations. By protecting sensitive ocean and coastal habitat, marine life flourishes and, in turn, creates a healthier system overall.

## *Southern California's Marine Protected Areas*

California uses a combination of protected areas with varying levels of protection and allowed activities to meet MLPA conservation and natural heritage goals:

**State Marine Reserve (SMR):** An MPA where injury, damage, take, or possession of any living, geological, or cultural marine resource is prohibited.

**No-Take State Marine Conservation Area (No-Take SMCA):** An MPA where injury, damage, take, or possession any living, geological, or cultural marine resource is prohibited, EXCEPT for take incidental to permitted activities such as infrastructure maintenance, sand renourishment, etc.

**State Marine Conservation Area (SMCA):** An MPA where injury, damage, take, or possession any living, geological, or cultural marine resource is prohibited EXCEPT for species expressly allowed for recreational and/or commercial take (species and gear exceptions vary by location).

**Special Closure:** An area that prohibits or restricts access and/or boating activities in waters adjacent to sea bird nesting or marine mammal haulout sites. May overlap other marine protected areas.

## *MPA Marine Life and Habitats*

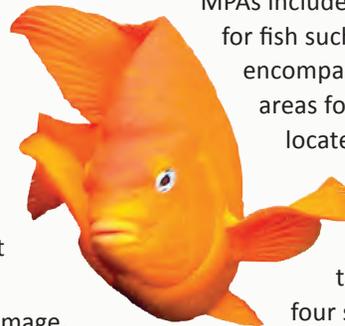
The Southern California MPA network spans the ocean waters relatively close to shore within the California Bight, from Point Conception to the California-Mexico border. In this area, cold, temperate waters from the north mix with warmer waters from the south, forming a complex system of currents and environmental conditions. Habitats and marine life are amazingly diverse here. Southern California MPAs include a variety of habitat types, from sandy beaches to rocky reefs to deep submarine canyons. Some MPAs include kelp forests that provide shelter and hunting grounds for fish such as basses, sheephead and seaperch; others encompass tidal estuaries or lagoons that serve as nursery areas for young fish, crab, and shrimp. Some MPAs are located miles offshore, in the state and federal waters surrounding islands. MPAs allow for more natural interactions between popular, heavily-fished species and species that fishermen normally don't target. In total, this area is home to 481 species of fish, four species of sea turtles, 195 species of birds, seven species of seals and sea lions, and more than 5,000 species of invertebrates.

## *More Information*

The California Department of Fish and Wildlife maintains several websites with extensive information about Southern California MPAs:

- California MPA website: [wildlife.ca.gov/MPAs](http://wildlife.ca.gov/MPAs)
- Mobile-device friendly MPA website: [wildlife.ca.gov/m/MPA](http://wildlife.ca.gov/m/MPA)
- Boaters: To view or print MPAs on nautical charts or other background "basemaps," visit **MarineBIOS**, CDFW's interactive online marine and coastal map viewer, at: [wildlife.ca.gov/MarineBIOS](http://wildlife.ca.gov/MarineBIOS)

Questions? Email [AskMPA@wildlife.ca.gov](mailto:AskMPA@wildlife.ca.gov)

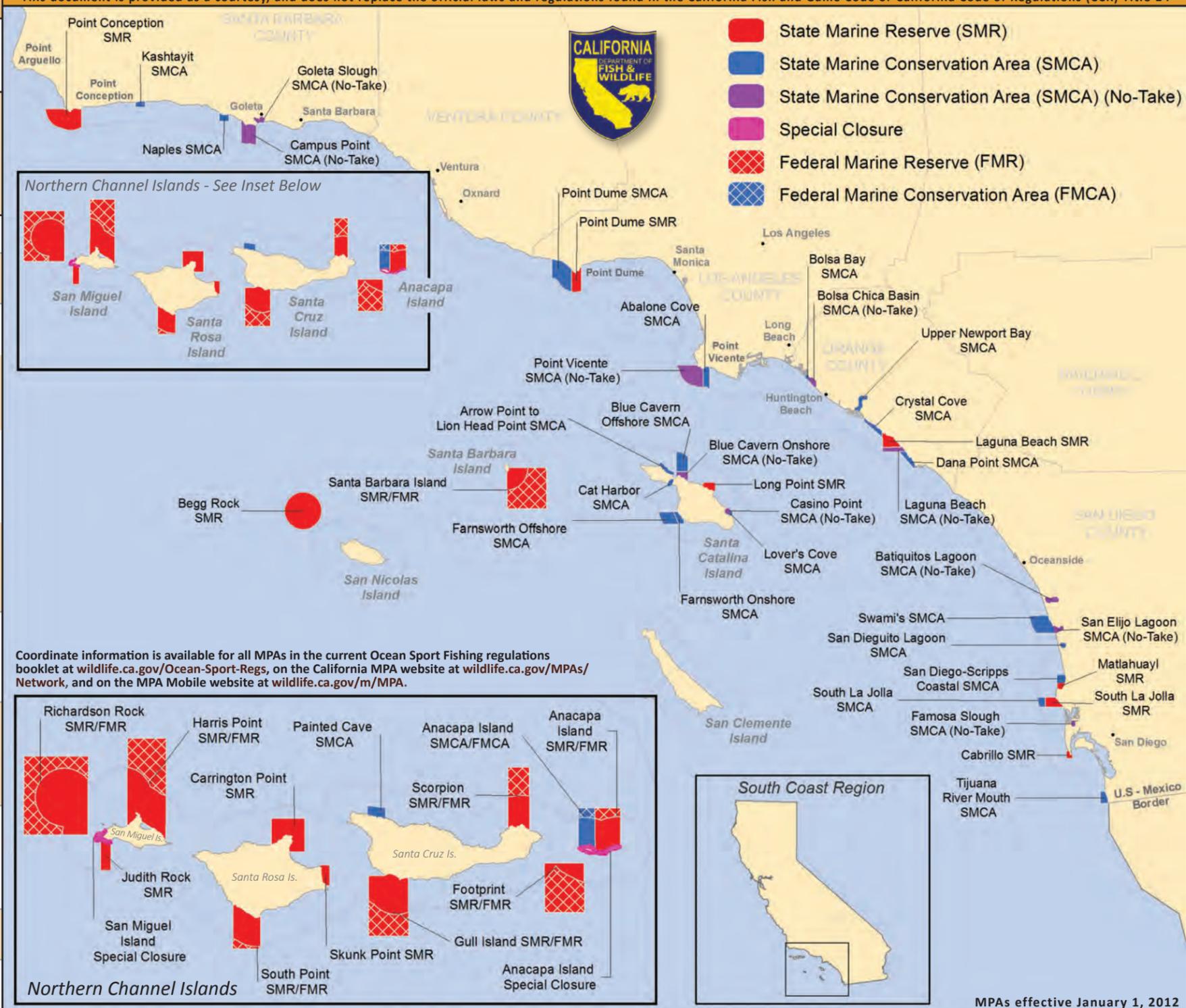


# Southern California Marine Protected Areas

## Mainland MPA Regulations

## Island MPA Regulations

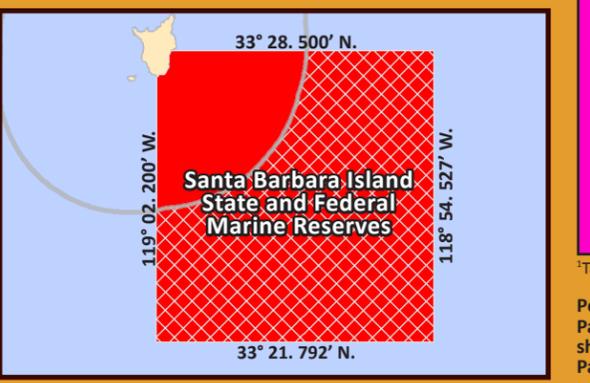
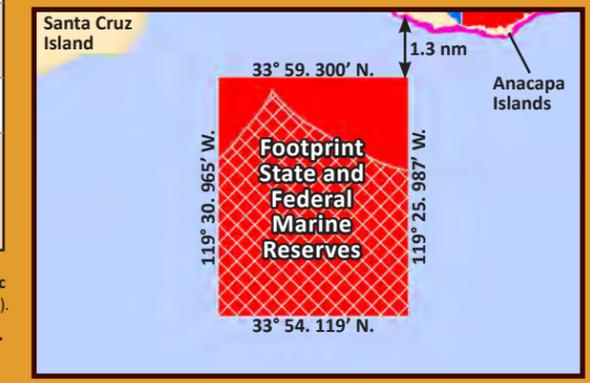
This document is provided as a courtesy, and does not replace the official laws and regulations found in the California Fish and Game Code or California Code of Regulations (CCR) Title 14



SMR	Name	Permitted/Prohibited Activities
	Point Conception, Point Dume, Laguna Beach, Matlahuayl, South La Jolla, Cabrillo	It is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource.
No-Take SMCA	Campus Point, Goleta Slough, Point Vicente, Bolsa Chica Basin, Laguna Beach, Batiquitos Lagoon <sup>2</sup> , San Elijo Lagoon, Famosa Slough	It is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource. Take incidental to certain permitted activities may be allowed. Other restrictions may apply. See CCR T14 §632(b) for details.
	<b>It is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource, EXCEPT:</b>	
	Kashtayit <sup>1</sup>	Recreational take of finfish, giant kelp by hand, and invertebrates except rock scallops and mussels is allowed.
	Naples <sup>1</sup>	Recreational take of white seabass and pelagic finfish by spearfishing is allowed. Commercial take of giant kelp is allowed.
	Point Dume <sup>1</sup>	Recreational take of white seabass and pelagic finfish by spearfishing is allowed. Commercial take of coastal pelagic species by round haul net, brail gear, and light boat; and swordfish by harpoon is allowed.
	Abalone Cove <sup>1</sup>	Recreational take of market squid by hand-held dip net, and white seabass and pelagic finfish by spearfishing is allowed. Commercial take of coastal pelagic species by round haul net, brail gear, and light boat; and swordfish by harpoon is allowed.
	Bolsa Bay <sup>1</sup>	Recreational take of finfish by hook-and-line from shore in designated areas is allowed. Entry permitted only on established trails, paths or other designated areas. Closed from 8 p.m. to 6 a.m. Boating, swimming, wading and diving prohibited.
	Upper Newport Bay <sup>1</sup>	Recreational take of finfish by hook-and-line from shore only is allowed. Shoreline access limited to established trails, paths, or other designated areas. Restrictions exist for boating and swimming. See CCR T14 §632(b) for details.
SMCA	Crystal Cove <sup>1</sup>	Recreational take of finfish by hook-and-line or spearfishing and take of spiny lobster and sea urchin is allowed. Commercial take of sea urchin; spiny lobster by trap, and coastal pelagic species by round haul net, brail gear, and light boat is allowed. Take of living marine resources from tidepools is prohibited.
	Dana Point <sup>1</sup>	Recreational take of finfish by hook-and-line or spearfishing, and lobster and urchin is allowed. Commercial take of lobster by trap, sea urchin, and coastal pelagic species by round haul net, brail gear, and light boat is allowed. Take of living marine resources from tidepools is prohibited.
	Swami's <sup>1</sup>	Recreational take by hook-and-line from shore, and white seabass and pelagic finfish by spearfishing is allowed.
	San Dieguito Lagoon <sup>1,2</sup>	Recreational take of finfish by hook-and-line from shore is allowed. Boating, swimming, wading and diving are prohibited. Closed from 8 p.m. to 5 a.m.
	San Diego-Scripps Coastal <sup>1</sup>	Recreational take of coastal pelagic species except market squid, by hook-and-line only is allowed.
	South La Jolla	Recreational take of pelagic finfish by hook-and-line only is allowed.
	Tijuana River Mouth <sup>1</sup>	Recreational take of coastal pelagic species except market squid, by hand-held dipnet only is allowed. Commercial take of coastal pelagic species except market squid, by round haul net is allowed.

SMR	Name	Permitted/Prohibited Activities
	Richardson Rock, Harris Point, Judith Rock, Carrington Pt, Skunk Pt, South Pt, Gull Island, Scorpion, Anacapa Island, Begg Rock, Footprint, Santa Barbara Island, Long Point	It is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource.  <i>NOTE: Boundary coordinates for Santa Barbara Island SMR and Footprint SMR are provided in the inset maps below</i>
No-Take SMCA	Blue Cavern Onshore <sup>1</sup> Catalina Island	It is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource. Also, no anchoring or mooring within the former Catalina Marine Science Center Marine Life Refuge. See CCR T14 §632(b) for details.
	Casino Pt <sup>1</sup> Catalina Island	It is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource. Feeding of fish for marine life viewing is permitted. See CCR T14 §632(b) for details.
	<b>It is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource, EXCEPT:</b>	
	Painted Cave Santa Cruz Island	Recreational take of lobster and pelagic finfish is allowed.
	Anacapa Island	Recreational take of lobster and pelagic finfish is allowed. Commercial take of lobster is allowed.
	Arrow Pt to Lion Head Pt Catalina Island	Recreational take of marine plants and finfish is allowed. Take of invertebrates is prohibited.
	Blue Cavern Offshore Catalina Island	Recreational take of market squid by hand-held dip net, pelagic finfish by hook-and-line or by spearfishing, and white seabass by spearfishing is allowed. Commercial take of pelagic finfish by hook-and-line, and swordfish by harpoon is allowed.
SMCA	Lover's Cove <sup>1</sup> Catalina Island	Recreational take by hook-and-line from Cabrillo Mole only is allowed. Feeding of fish for marine life viewing is allowed.
	Farnsworth Onshore Catalina Island	Recreational take of market squid by hand-held dip net; white seabass and pelagic finfish by spearfishing; and marlin, tuna and dorado by trolling is allowed. Commercial take of coastal pelagic species by round haul net, brail gear, and light boat; swordfish by harpoon is allowed.
	Farnsworth Offshore Catalina Island	Recreational take of market squid by hand-held dip net; white seabass by spearfishing; pelagic finfish by hook-and-line or spearfishing, and marlin, tuna and dorado by trolling is allowed. Commercial take of coastal pelagic species by round haul net, brail gear, and light boat; and swordfish by harpoon is allowed.
	Cat Harbor <sup>1</sup> Catalina Island	Recreational take of lobster and sea urchin, squid by hook-and-line, and finfish by hook-and-line or spearfishing is allowed. Commercial take of sea cucumber by diving only, and lobster and sea urchin is allowed.
Special Closure	San Miguel Island	<ul style="list-style-type: none"> <li>300 yd. closure except:                             <ul style="list-style-type: none"> <li>Mar 15-Apr 30 and Oct 1-Dec 15 closure reduced to 100 yd.</li> <li>Boats operated by commercial sea urchin divers may enter certain areas only between Mar 15-Apr 30 and Oct 1-Dec 15.</li> </ul> </li> <li>Additional restrictions exist for boating speed limits, noise, anchoring, landing, and access to offshore rocks and islands. See CCR T14 §632(b) for details.</li> </ul>
	Anacapa Island	<ul style="list-style-type: none"> <li>No net or trap may be set in waters less than 20 ft deep off Anacapa Island.</li> <li>20 fm (120 ft) brown pelican fledgeling area closed Jan 1-Oct 31. No person except employees of CDFW or NPS shall enter this area during closure. See CCR T14 §632(b) for details.</li> </ul>

Coordinate information is available for all MPAs in the current Ocean Sport Fishing regulations booklet at [wildlife.ca.gov/Ocean-Sport-Regs](http://wildlife.ca.gov/Ocean-Sport-Regs), on the California MPA website at [wildlife.ca.gov/MPAs/Network](http://wildlife.ca.gov/MPAs/Network), and on the MPA Mobile website at [wildlife.ca.gov/m/MPA](http://wildlife.ca.gov/m/MPA).



<sup>1</sup>Take incidental to certain permitted activities is allowed. See CCR T14 §632(b) for details.  
<sup>2</sup>PLEASE NOTE: These areas overlap State Ecological Reserves. Current rules restrict all public access to the shoreline to protect sensitive habitat, as authorized under CCR T14 §630(a)(10).

<sup>1</sup>Take incidental to certain permitted activities is allowed. See CCR T14 §632(b) for details.

Finfish: Any species of bony fish or cartilaginous fish (sharks, skates and rays).  
 Coastal Pelagic Species: northern anchovy, Pacific sardine, Pacific mackerel, jack mackerel, and market squid.

Pelagic Finfish: northern anchovy, barracudas, billfishes, dorado (dolphinfish), Pacific herring, jack mackerel, Pacific mackerel, salmon, Pacific sardine, blue shark, salmon shark, shortfin mako shark, thresher shark, swordfish, tunas, Pacific bonito, and yellowtail. No commercial take of marlin is allowed.

# South Coast MPA Baseline Monitoring Period: 2012 - 2017



## Location

The South Coast network of marine protected areas (MPAs) extends from Point Conception to the California-Mexico border, including state waters around the Channel Islands. Implemented in 2012, it includes 50 MPAs and 2 special closures and encompasses about 15% of state waters.

## Coordination

California Ocean Science Trust, California Department of Fish and Wildlife, California Ocean Protection Council, and California Sea Grant are working together to design, implement, and support the South Coast MPA Baseline Program.

## Collaboration

During the baseline period, researchers, citizen scientists, managers, and others are collaborating to establish a benchmark against which future MPA performance can be measured.

2012

2013

2014

2015

2016

2017

### South Coast MPA Baseline Program

The South Coast MPA Baseline Program is focused on ecological and socioeconomic monitoring inside and outside of the region's MPAs. The program began in late 2011 and includes 9 monitoring projects and 1 integration project. Through these projects, scientists, fishermen, and citizen science groups are working together to rigorously and cost-effectively establish a benchmark of ecosystem condition and human uses, and examine initial changes in the region.

Researchers in the Baseline Program wrapped up data collection in 2014 and began analyzing their results and developing technical reports. Findings from this work, including technical reports, are available on OceanSpaces.org. Data collected in the Baseline Program will be available in mid-2015.

### Building Partnerships

The South Coast benchmark will draw broadly on existing research and local knowledge in the South Coast, beyond the projects in the Baseline Program.

We are exploring opportunities to collaborate with other regional research and monitoring efforts in areas such as citizen science, water quality, oceanographic conditions, and fisheries management.

### Sharing Results

The results of South Coast MPA monitoring activities, partnerships-based projects, and other findings will be integrated to develop a benchmark of baseline conditions in the region.

Findings will be available to everyone through a variety of outlets, including OceanSpaces.org, community meetings, blogs, public reports, academic publications, and conferences.

### Adaptive Management

The benchmark of South Coast baseline conditions will provide a foundation for science-informed decisions in the region.

It will inform adaptive management of the South Coast MPA network of MPAs and can inform fisheries, ocean acidification and hypoxia and water quality management.

Stay informed about South Coast MPA monitoring by visiting <http://oceanspaces.org/monitoring/regions/south-coast>.

To receive updates, follow The OceanSpaces South Coast monitoring community at

<http://oceanspaces.org/community/south-coast-baseline-program-collaborators>.



# Baseline Highlights from California's South Coast Kelp and Shallow Rock Ecosystems

## Monitoring Life Under the Canopy



### About This Snapshot Report

This report highlights some key scientific findings from the kelp and shallow rock monitoring projects, two of ten baseline projects in California's South Coast region.<sup>1</sup> These projects evaluated the initial conditions of kelp and shallow rock ecosystems at the time of marine protected area (MPA) implementation. Included facts and figures are derived from the projects' peer-reviewed technical reports,<sup>2,3</sup> which can be found, along with the associated data, at [OceanSpaces.org](http://OceanSpaces.org).

Snapshot Report Vol 2



## LIFE UNDER THE CANOPY

Shallow rocky reefs in the South Coast region are **diverse and highly productive ecosystems**, hosting a variety of fish and invertebrate species as well as many marine birds and mammals. **Large, canopy-forming kelps colonize rocks in some areas**, while other areas lack a canopy and are instead dominated by understory algae or bare rock.

Rocky reefs and the kelp beds that attach to them support a range of human activities. **Important recreational and commercial fisheries**, including California spiny lobster, red sea urchins, California Sheephead, Kelp Bass, and a number of rockfish species, are dependent on healthy kelp forests. These **iconic California ecosystems are also a prime destination for recreational users**, including scuba divers and snorkelers.

Kelp forests **thrive in the cool, nutrient rich waters** brought to the surface by coastal upwelling. Upwelling occurs when winds from the north drive surface water away from shore, drawing deeper water upward to take its place. Kelp forests are **sensitive to changes in environmental conditions**, including decreased water quality and rising temperatures. Such changes are often associated with land-based pollution, climate change, and El Niño events.

## Confirming and Expanding Knowledge

The two kelp and shallow rock baseline projects **enhanced the monitoring efforts of well-established programs in the region**. One project was a collaboration between Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO)<sup>4</sup> and Vantuna Research Group (VRG),<sup>5</sup> and the other was led by Reef Check California (RCCA).<sup>6</sup> Both projects built upon previous assessments in the region, enabling the entire South Coast to be sampled in 2011 and 2012, including each rocky reef MPA and comparable reference area. In these projects, researchers studied kelp and shallow rock ecosystems from the surface down to 30 meters. Researchers **confirmed previously identified patterns of regional fish species distributions**, and **substantially improved our understanding of algal and invertebrate species distributions** throughout the South Coast region.<sup>2,3</sup> To learn more, see the distribution maps on the following pages.



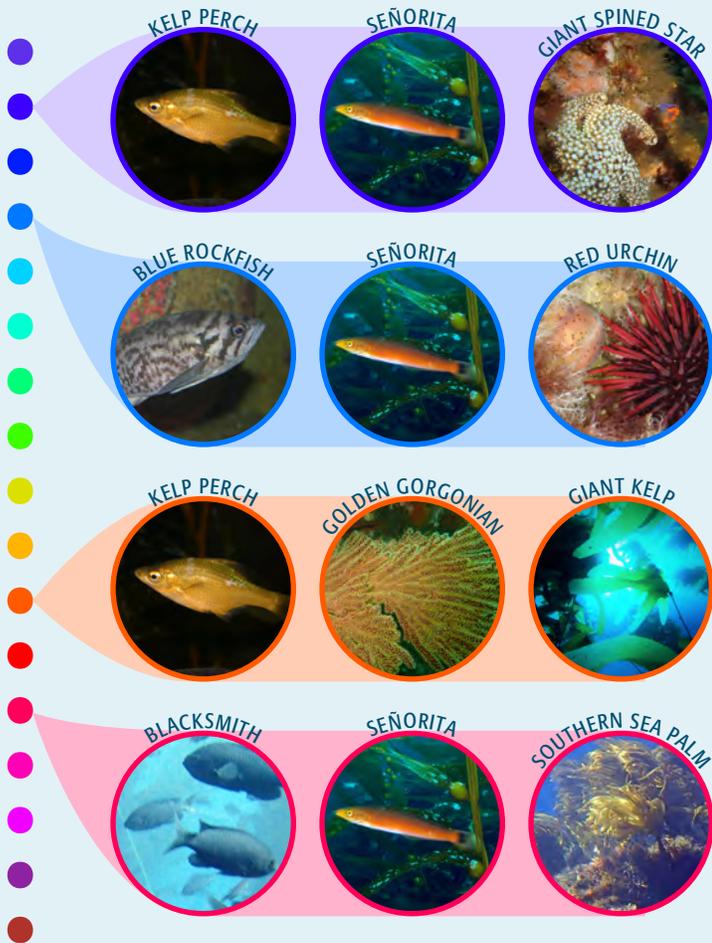
**122 rocky reefs**  
IN THE **SOUTH COAST**

**82%** of south coast MPAs  
contain rocky reefs

**226 volunteer divers certified**      **254 SURVEYS**



### 17 Kelp Forest Community Clusters

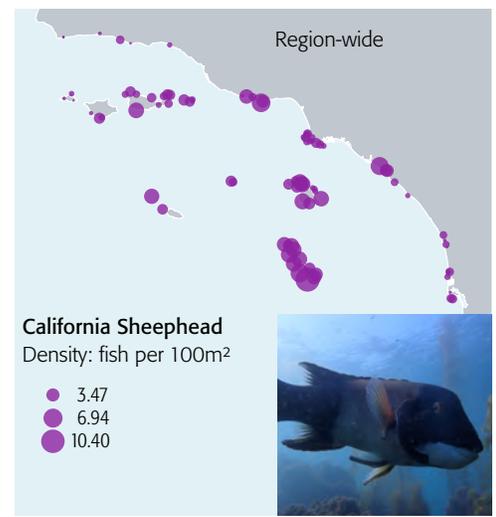
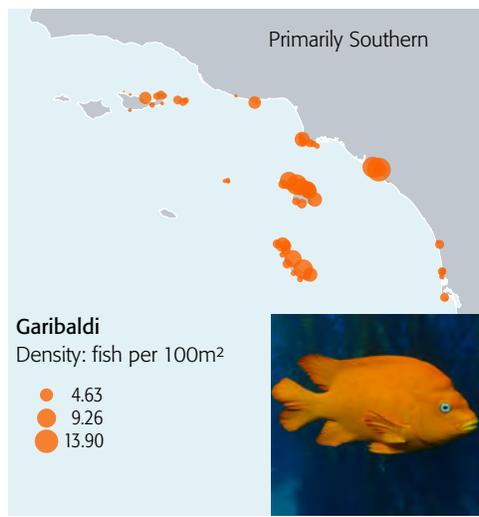
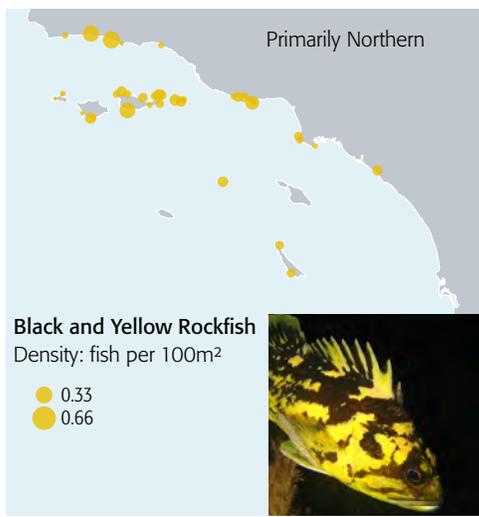


### Unique Kelp Forest Community “Clusters”

The PISCO/VRG program demonstrated that reefs across the South Coast region group into 17 kelp forest community “clusters,” each with its own unique combination of fish, invertebrate, and algae species.<sup>2</sup> This high degree of community structure was shaped by a variety of physical factors. The **strong water temperature gradient** in the South Coast, driven by the convergence of cool currents from the north and warm currents from the south, is a well-known driver of species distributions. Differences between **mainland and rocky island reefs** also shape community structure. Mainland reefs tend to be flatter (have less relief), are farther from shore than island reefs, and have more sediment inputs. Data collected by RCCA divers also show that, on a local scale, communities were **influenced by site depth and substrate characteristics**, including relief and proportions of sand and boulder cover.<sup>3</sup> A detailed understanding of how kelp and shallow rock communities differ across the region can inform the selection of long-term monitoring sites, since MPAs in different parts of the region contain different kelp forest communities.

Map of the South Coast region, including major warm and cool currents (red and blue arrows, respectively) and kelp forest community “clusters” (colored dots). Each color represents a different kelp forest community cluster. Some common species are shown for a few selected clusters. This figure was adapted from the PISCO/VRG project’s technical report.<sup>2</sup>

Photos: Sarah Finstad, Jim Kirklin, Steve Lonhart, Jonathan Williams

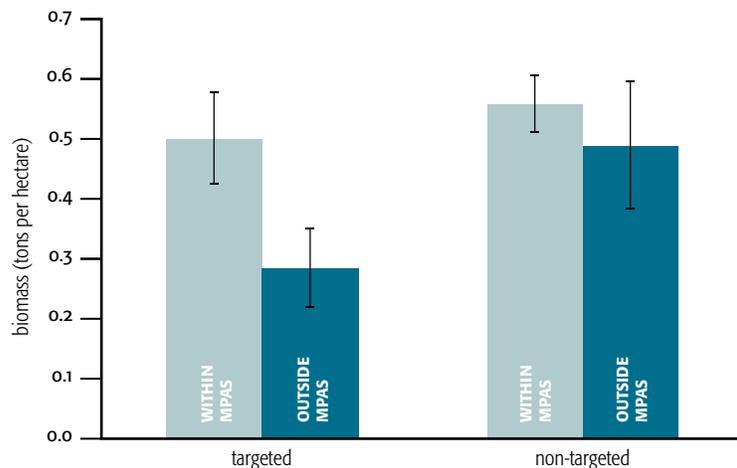


## Regional Fish Distribution

Both fish and invertebrate species tended to show one of three general distributional trends: 1) primarily northern (colder waters), 2) primarily southern (warmer waters), or 3) region-wide. This information will be especially important in tracking emerging invertebrate fisheries and future shifts in species distributions due to climate change. These figures were adapted from the PISCO/VRG project's technical report.<sup>2</sup> Photos: Sarah Finstad, Colleen Wisniewski

## Targeted Species Responding to Older MPAs

Twelve MPAs were implemented at the Northern Channel Islands (NCI) in 2003, prior to the establishment of other South Coast MPAs in 2012 through the Marine Life Protection Act. Ten of the twelve are State Marine Reserves, which restrict all take. **The biomass of fish species targeted by commercial and recreational fishing has increased** throughout the NCI region since 2003. Researchers detected biomass increases both inside and outside of NCI MPAs, but the **rate of change was much greater inside NCI MPAs**. The average size of individual Kelp Bass and California Sheephead was significantly larger inside NCI MPAs than outside. The abundance of targeted invertebrate species, including spiny lobster, warty sea cucumber, and red sea urchin, was higher inside NCI MPAs. Non-targeted fish species also showed increases in biomass, but at similar rates inside and outside NCI MPAs.<sup>2,7</sup> While monitoring has not yet been conducted long enough to evaluate trends in the recently implemented MPAs (2012), these findings suggest that changes similar to those seen in NCI MPAs may occur over comparable timescales.



Ten-year average biomass for targeted and non-targeted fish species, inside (light blue color bars) and outside **Northern Channel Islands MPAs** (dark blue color bars) from 2003-2012. This figure was adapted from the PISCO/VRG project's technical report.<sup>2</sup> Error bars represent +/- 1 standard error.

## Kelp Forests Supporting Lucrative Fisheries

Researchers analyzed South Coast fishing data from 1980-2009, which showed that the region's kelp forests and rocky reefs supported the **largest recreational fishing industry on the West Coast and 10% of the State's commercial fishing revenue**. During that time period, recreational fishermen in South Coast kelp and shallow rock habitats primarily landed finfish from the mainland, while commercial fishermen primarily landed invertebrates such as red urchin, rock crab, and spiny lobster.<sup>2</sup> Due to the concentration of the commercial sector on invertebrates, PISCO and VRG have adapted their methods to include estimates of biomass for invertebrate species, such as spiny lobster, red urchin, and Kellet's whelk.

While these fisheries sectors targeted different species groups, they extracted approximately the same amount of biomass, although fishing pressure was not uniform throughout the region. With the exception of Point Loma, which supports a highly productive lobster fishery, commercial fishermen focused their efforts at the outer Channel Islands.<sup>2</sup>

## Highly Variable Ecosystems

Researchers explored baseline data, the NCI dataset, and other historical datasets for geographic patterns of species abundance over different timescales. Analyses revealed no consistent region-wide abundance trends for any species, and both studies concluded that **high variability from year to year and site to site is the norm** in these ecosystems in the South Coast.<sup>2,3</sup> Researchers noted that differences across the region are expected because it is so large. A primary driver of this pattern is the effect of oceanographic conditions on recruitment (individuals successfully joining a population) in a given year. For example, years with strong spring upwelling conditions are “good” for rockfish recruitment, which prefer colder water, and “bad” for kelp bass recruitment, which prefer warmer water.



## Ample Opportunities for Citizen Science

With its warm waters and user-friendly shorelines, the South Coast is a popular destination for local and visiting scuba divers. RCCA has mobilized this volunteer base to monitor rocky reefs in the region since 2006. RCCA trained or recertified 226 volunteer divers and had over 50% volunteer retention during the baseline monitoring period—a major programmatic success. They attribute this retention to the increased volunteer engagement when contributing to baseline MPA monitoring. RCCA invests heavily in its volunteers, and increased retention from improved volunteer engagement is important to the program’s long-term viability.<sup>3</sup> Citizen science programs that produce scientifically robust data will continue to be an important component of MPA monitoring in the future.

## Connecting MPA Monitoring to Water Quality

At the time of MPA establishment, impaired water quality was considered a unique challenge for South Coast MPAs. To address this issue, PISCO and VRG partnered with the Southern California Coastal Water Research Project (SCCWRP) to begin to assess the relative effects of pollution on reefs. For the first time, **major point sources of pollution were identified and mapped**. These sources of pollution corresponded with major population centers and overlapped spatially with areas of high fishing pressure. Details of the SCCWRP effort and associated products can be found in the Bight '13 report.<sup>8</sup>



## About South Coast MPA Baseline Monitoring

California Ocean Science Trust, California Department of Fish and Wildlife (CDFW), California Ocean Protection Council (OPC), and California Sea Grant coordinated and collaborated in implementation of baseline monitoring, which was funded by OPC. Results from this work will inform CDFW management recommendations to the California Fish and Game Commission from the first five years of MPA implementation in the region, anticipated in 2017. MPA monitoring results can also inform the management of fisheries, water quality, coastal development, and climate change.

## Footnotes

1. To learn more about the kelp and shallow rock baseline monitoring projects, visit <http://oceanspaces.org/sc-kelp-pisco-vrg> and <http://oceanspaces.org/sc-kelp-reefcheckca>
2. Daniel J. Pondella, Jennifer E. Caselle, Jeremy T. Claisse, Jonathan P. Williams, Kathryn Davis, Chelsea M. Williams and Laurel A. Zahn. 2015. Baseline Characterization of the Shallow Rocky Reef and Kelp Forest Ecosystems of the South Coast Study Region. California Sea Grant. San Diego, CA 310pp. <https://goo.gl/KXRpy8>
3. Jan Freiwald, Colleen Wisniewski. 2015. Reef Check California: Citizen Scientist monitoring of rocky reefs and kelp forests: Creating a baseline for California's South Coast. California Sea Grant. San Diego, CA 244pp. <https://goo.gl/N7aV5d>
4. Partnership for Interdisciplinary Study of Coastal Oceans <http://oceanspaces.org/pisco>
5. Vantuna Research Group <http://oceanspaces.org/vantuna>
6. Reef Check California <http://oceanspaces.org/reef-check>
7. Jennifer E. Caselle, Andrew Rassweiler, Scott L. Hamilton, and Robert R. Warner. 2015. Recovery trajectories of kelp forest animals are rapid yet spatially variable across a network of temperate marine protected areas. Scientific Reports. 5. doi:10.1038/srep14102
8. Dan Pondella, Ken Schiff, Rebecca Schaffner, Amanda Zellmer, and Julia Coates. 2016. Southern California Bight 2013 Regional Monitoring Program: Volume II, Rocky Reefs. <http://goo.gl/eFRTKK>



# A DECADE OF PROTECTION 10 YEARS OF CHANGE AT THE CHANNEL ISLANDS

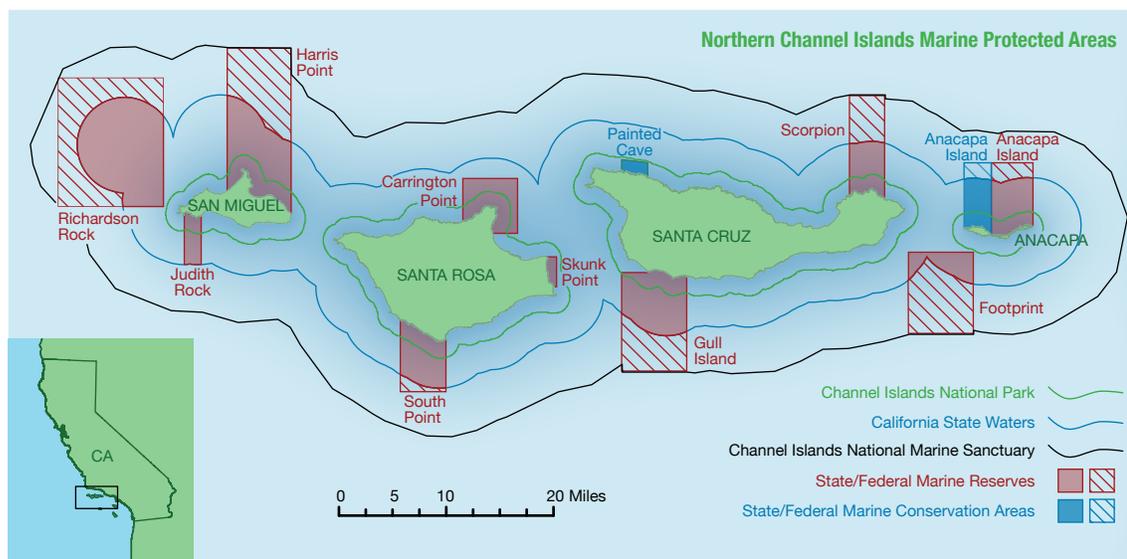
## BACKGROUND

In 2003, California established thirteen marine protected areas (MPAs) in state waters around the northern Channel Islands, off the coast of Southern California. In 2007, the National Oceanic and Atmospheric Administration extended these MPAs into federal waters of the Channel Islands National Marine Sanctuary. These areas, most of which are no-take marine reserves, were designed to help restore biodiversity and ecosystem health by protecting local marine life and habitats. To evaluate whether the MPAs are meeting their ecological goals, scientists from the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) have been monitoring these rocky reef and kelp forest communities for over a decade.

In 2008, PISCO scientists found that after five years of protection, fish species targeted by fishermen had both greater density (numbers of fish per area) and biomass (total weight per area) inside MPAs compared to outside "reference" sites. Though these and other results from the five-year review were promising indicators that MPAs are beneficial to marine life, studies of other long-term protected places suggested the full effects of these protected areas were likely to take decades to develop.

2013 marked the ten-year anniversary of the Channel Islands' MPAs. We now have the opportunity to explore longer-term trends and better understand the effects of these areas on California's ocean health.

This report updates the previous analyses comparing patterns inside and outside of MPAs, and also provides, for the first time, an evaluation of ecological changes detected since the MPAs were established.

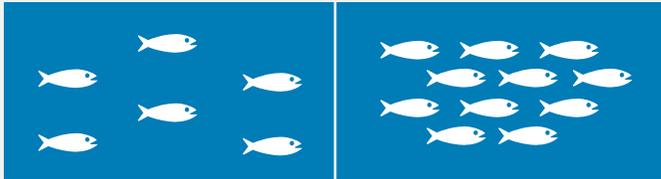


# MARINE PROTECTED AREAS CONTINUE TO SHOW POSITIVE EFFECTS

## MEASURING MPA RESPONSES

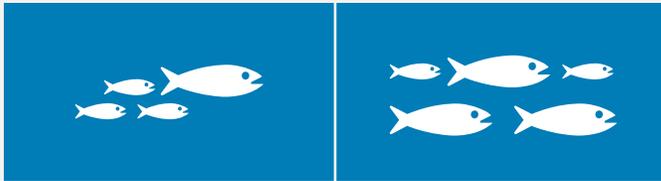
### HIGHER DENSITY = MORE SEA LIFE

Density is the total number of organisms in a given area.



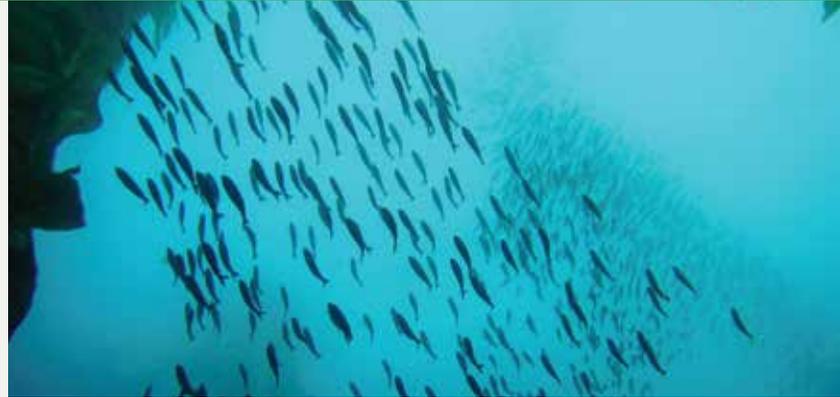
### INCREASES IN BIOMASS = BIGGER AND MORE ABUNDANT SEA LIFE

Biomass is the total weight of organisms in a given area, in terms of both size *and* number of organisms.



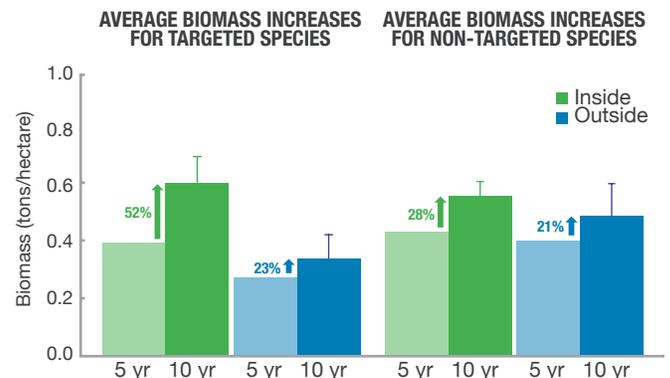
### MORE AND BIGGER SEA LIFE = A HEALTHIER OCEAN

Together, density and biomass measurements help us understand how well fish and invertebrates are doing in an area. Increases in biomass and density can indicate that marine life is responding positively to protection from MPAs.



## 1 Positive effects observed after five years have continued and are even more pronounced after ten years. Fish and invertebrates are bigger and more abundant.

- The average biomass of fish targeted by fishermen, such as rockfish, increased both inside and outside of MPAs since the five-year review, but the increase is much greater inside MPAs where fish are protected.
- The average biomass of fish species not targeted by fishermen also increased since the five-year review both inside and outside MPAs.
- Invertebrate species subject to high fishing pressure, such as California spiny lobster, sea cucumber and red urchin, are more abundant inside reserves. Unfished and lightly fished invertebrate species show no consistent patterns relative to protection; some are more abundant inside and some are more abundant outside MPAs.

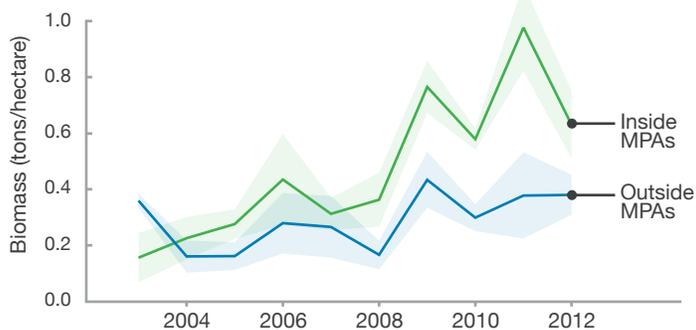




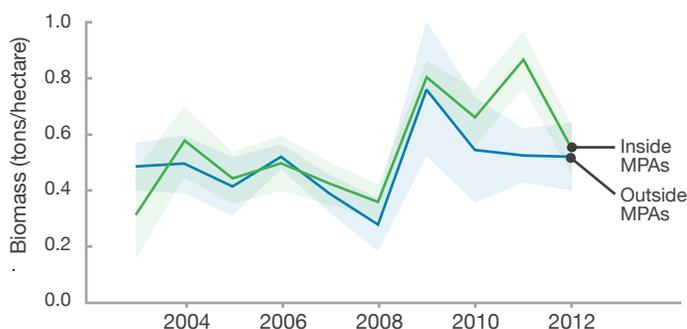
## 2 MPAs foster more and bigger fish in less time.

- Despite large fluctuations in biomass from year to year, the average biomass of targeted fish species is increasing more quickly inside MPAs compared with outside. Non-targeted fish species also increased but there were no clear differences inside or outside MPAs.
- The increase in targeted fish species outside of MPAs suggests that shifting fishing effort has not overtaxed fish species in open areas near MPA boundaries. Scientists are working to understand whether this increase is related to changes in fishing patterns around MPAs, fish spilling over from MPAs to fished areas outside, changes in ocean conditions, or a combination of these factors.

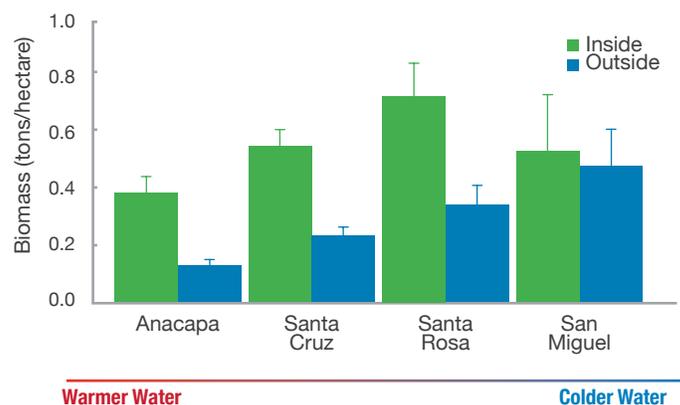
BIOMASS OF TARGETED SPECIES



BIOMASS OF NON-TARGETED SPECIES



BIOMASS OF TARGETED SPECIES SHOWS GREATER RESPONSE IN WARMER WATER.



Warmer Water

Colder Water

## 3 MPA responses can differ across a region.

- The northern Channel Islands lie within a transition zone where cold waters from the north meet warm waters from the south. Distinct groupings of marine life are associated with different parts of this spectrum of water temperatures throughout the islands. These diverse areas can respond differently to the establishment of MPAs.
- Not all MPAs perform the same way. In warmer water surrounding the eastern islands, biomass of targeted species was higher within MPAs compared to areas outside. In contrast, at San Miguel, where MPAs are located in colder waters, biomass of targeted species showed no significant difference between the MPA and outside, unprotected areas. These dissimilar MPA responses could be due to differences in the amount of fishing across the islands combined with differences in growth rates of the animals.



# TEN YEARS LATER

## MPAs ARE WORKING TO RESTORE OCEAN HEALTH

**The Channel Islands MPAs appear to be fulfilling their role as refuges for many fish and invertebrate species.** Heavily targeted species are bigger and more abundant inside these protected areas than in fished areas, and the increases are more pronounced and rapid inside MPAs compared to areas nearby. More sea life within marine reserves and other protected areas will likely result in benefits to areas outside, contributing to overall ocean health. Healthy marine ecosystems can better withstand the pressures of climate change and other stressors such as overfishing and poor water quality.

**Results from the first decade of monitoring at the Channel Islands show the positive effects of marine protected areas and provide a window into the ecological improvements that, over time, we hope to see from the newly established statewide MPA network in California.** Ongoing monitoring of the Channel Islands MPAs and the rest of the state's protected areas will be critical to understanding the performance of the network as a whole.

### CONTACT US



Dr. Jennifer Caselle  
Marine Science Institute  
UC Santa Barbara  
Santa Barbara, CA 93106  
jenn.caselle@ucsb.edu

[www.piscoweb.org](http://www.piscoweb.org)

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