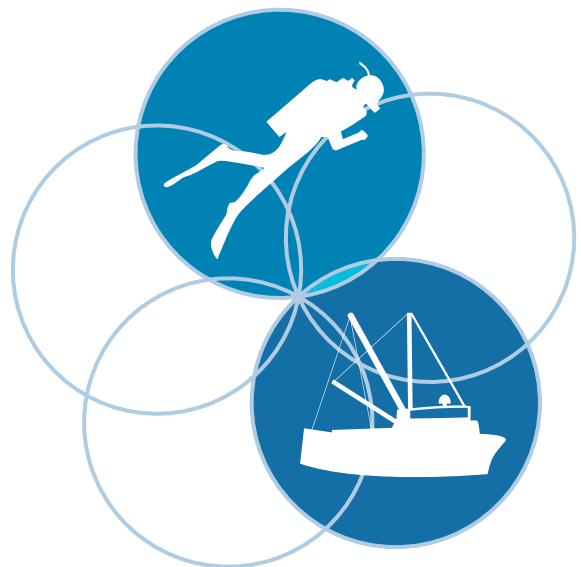


State of the **CALIFORNIA** Central Coast

Reflecting on the First Five Years
of MPA Monitoring, Management,
and Partnership

Symposium Program

WEDNESDAY, FEBRUARY 27 TO FRIDAY, MARCH 1, 2013
MONTEREY, CALIFORNIA





Welcome Letter from Secretary Laird

Welcome to the State of the California Central Coast Symposium. I am honored to join you as we reflect on the milestones reached in the five years since the Central Coast marine protected areas (MPAs) were implemented, and continue the momentum as we work to create a healthy marine ecosystem for California's Central Coast.

First reports are that the Central Coast MPAs are on track. Monitoring is showing—through increasing size and abundance of marine species—that MPAs are an effective tool to protect ocean health and rebuild depleted marine life populations.

The success of the Central Coast MPAs is a testament to the importance of community engagement. By working together, state and local governments, managers, scientists, fishermen, and local citizens have created a detailed picture of ocean conditions on the Central Coast, and established a benchmark against which future changes can be measured.

Congratulations to all who lent their voices to the process. It was your hard work and dedication that brought us to this point. California has now built a marine protection process where science leads the way.

I ask you to continue your energetic support as we adaptively manage the first statewide open-ocean system of MPAs in the country.

A handwritten signature in blue ink that reads "John Laird". The signature is fluid and cursive, with the first name "John" and last name "Laird" clearly distinguishable.

John Laird

California Secretary for Natural Resources

Acknowledgments

This symposium is the result of hard work and collaboration among many partners, colleagues and friends. We thank everyone for their dedication and effort!

We particularly acknowledge the members of the Steering Group and Symposium Committee. Over the past year members of these groups have worked tirelessly to design and plan this symposium:

Symposium Steering Group (alphabetically)

- **Bob Farrell,**
Law Enforcement Division, California Department of Fish and Wildlife
- **Tom Mason,**
Marine Region, California Department of Fish and Wildlife
- **Sonke Mastrup,**
California Fish and Game Commission
- **Becky Ota,**
Marine Region, California Department of Fish and Wildlife
- **Holly Rindge,**
California Ocean Science Trust
- **Craig Shuman,**
California Fish and Game Commission
- **Tony Warrington,**
Law Enforcement Division, California Department of Fish and Wildlife
- **Steve Wertz,**
Marine Region, California Department of Fish and Wildlife
- **Elizabeth Whiteman,**
California Ocean Science Trust

Symposium Committee (alphabetically)

- **Dennis Long,**
Monterey Bay and Channel Islands Sanctuary Foundation
- **Heather Reiff,**
COMPASS
- **Tom Mason,**
Marine Region, California Department of Fish and Wildlife
- **Holly Rindge,**
California Ocean Science Trust
- **Emily Saarman,**
Partnership for Interdisciplinary Study of Coastal Oceans (PISCO)
- **Craig Shuman,**
California Fish and Game Commission



Welcome to the State of the California Central Coast Symposium!

The California Ocean Science Trust's MPA Monitoring Enterprise, California Department of Fish and Wildlife, California Fish and Game Commission, and the California Ocean Protection Council warmly welcome you to a unique public symposium focused on the monitoring and management of California's Central Coast regional network of marine protected areas (MPAs).

This symposium opens up new channels to build partnerships and connect science with decision-makers and stakeholders. It is designed to provide a broad array of attendees, including resource-managers, policy-makers, scientists and stakeholders, an opportunity to share information, reflect on lessons learned, and catalyze further discussion on the implementation of the statewide MPA network.

The symposium includes:

- Presentations to share the results of MPA monitoring and deepen our understanding of current ocean conditions in the Central Coast region
- Panel discussions, presentations and posters to explore new tools in the 'toolbox' for science-informed decision-making
- Discussions among stakeholders, decision-makers, managers and scientists to build partnerships, share perspectives and develop new approaches for MPA implementation

We hope you will connect with colleagues, form new partnerships and collaborations, and share information so that we can build a collective understanding of the Central Coast, scientific monitoring results, and options as we look ahead to adaptive management of the regional and statewide network of MPAs.

We are excited to welcome you to this symposium!

The Convening Members,

*California Ocean Science Trust and MPA Monitoring Enterprise
California Department of Fish and Wildlife
California Fish and Game Commission
California Ocean Protection Council*



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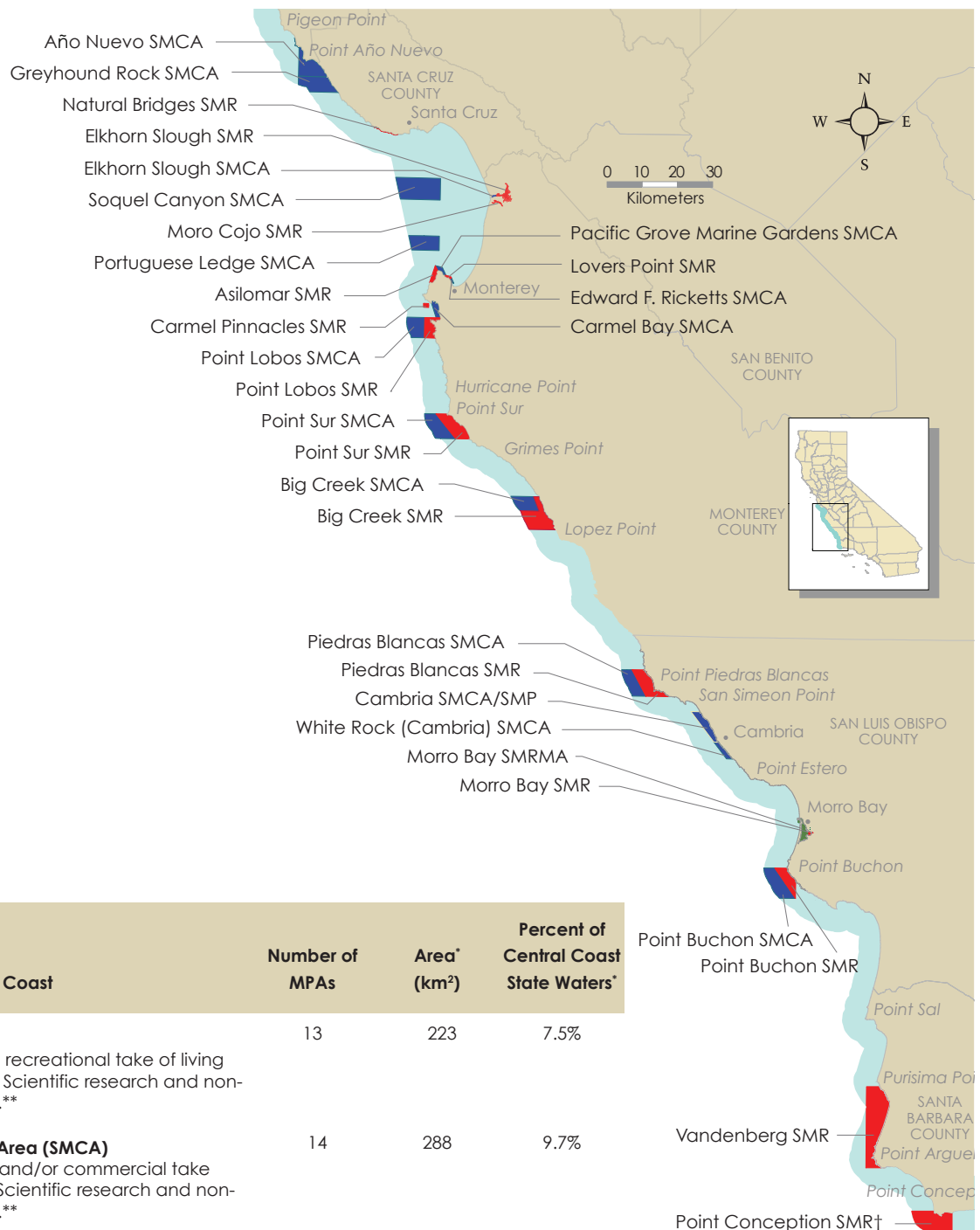
Page 26: kelp: Lyn Gianni

Page 26: cliffs: Rick Starr



CALIFORNIA'S CENTRAL COAST MPA NETWORK

In April 2007, the California Fish and Game Commission voted unanimously to adopt 29 new and revised MPAs in the Central Coast region for implementation in September 2007; the first of our four regional MPA networks that collectively form the statewide system. The designated Central Coast region extends from Pigeon Point (San Mateo County) to Point Conception (Santa Barbara County), encompassing state waters seaward of the mean high tide line to the offshore extent of state waters.



| MPA Classifications in the Central Coast | Number of MPAs | Area* (km ²) | Percent of Central Coast State Waters* |
|---|----------------|--------------------------|--|
| <div style="display: inline-block; width: 15px; height: 10px; background-color: red; border: 1px solid black;"></div> State Marine Reserve (SMR) An area where all commercial and recreational take of living or geologic resources is prohibited. Scientific research and non-consumptive uses may be allowed.** | 13 | 223 | 7.5% |
| <div style="display: inline-block; width: 15px; height: 10px; background-color: blue; border: 1px solid black;"></div> State Marine Conservation Area (SMCA) An area where select recreational and/or commercial take activities are allowed to continue. Scientific research and non-consumptive uses may be allowed.** | 14 | 288 | 9.7% |
| <div style="display: inline-block; width: 15px; height: 10px; background-color: green; border: 1px solid black;"></div> SMCA/State Marine Park (SMP) An SMP is an area where select recreational take activities are allowed. Scientific research and non-consumptive uses may be allowed.** Cambria SMCA has dual designation as an SMP.*** | 1 | 16 | 0.6% |
| <div style="display: inline-block; width: 15px; height: 10px; background-color: brown; border: 1px solid black;"></div> State Marine Recreational Management Area (SMRMA) A non-terrestrial marine or estuarine area designated to provide for recreational hunting opportunities to continue while providing MPA-like protections subtidally. Scientific research and non-consumptive uses may be allowed.** | 1 | 8 | 0.3% |
| Total for Central Coast Region* | 29 | 535 | 18.1% |

California State Waters

† Point Conception SMR is not included in the Central Coast region. It is located in the South Coast region.

* Numbers for area and percent represent rounded values.

** Research within MPAs is allowed pursuant to obtaining a California Department of Fish and Wildlife issued Scientific Collecting Permit.

*** SMCA/SMP: The California Fish and Game Commission designated Cambria SMCA, which was subsequently also adopted as Cambria SMP by the State Park and Recreation Commission (August 2010) with the same boundaries and no change to regulations. Therefore, this marine protected area has dual designations, as reflected in the table.

Introduction

The marine and coastal waters of California's Central Coast region are among the most biologically productive and unique in the world. From giant kelp forests to shallow estuaries to the mile deep Monterey Submarine Canyon, these habitats are home to a diversity of marine mammals, sea turtles, sea birds, fishes and many other marine flora and fauna. Coastal communities are closely linked to the region's productive waters and depend on healthy resources for fisheries and coastal tourism.

The California Marine Life Protection Act (MLPA, Chapter 10.5 of the California Fish & Game Code, §2850-2863) was passed by the California legislature in 1999 and directed the state to reevaluate and redesign California's system of marine protected areas. Through a public-private partnership called the MLPA Initiative, California began a collaborative multi-year public process to plan the new network of MPAs.

To ensure that local needs were addressed in the planning process, California's coastline was divided into four coastal regions. Citizens appointed to a regional stakeholder group designed the regional MPA network with evaluations by scientists and guidance from an expert policy panel. In 2007, the Central Coast became the first region in which a network of 29 MPAs was implemented (see map).

More information about the Central Coast regional MPA network including boundaries and regulations is provided in the booklet 'Guide to the Central California Marine Protected Areas' available in your symposium information packet, and is available online at <http://www.dfg.ca.gov/mlpa>.

Sharing Monitoring Results

Scientific monitoring is essential to evaluate the effects of MPAs and inform ocean management. The first step is to establish a benchmark of ocean conditions and human activities at the time of implementation, against which future changes can be measured.

With the support of the California Ocean Protection Council and California Sea Grant, baseline MPA monitoring was launched in 2007 in the Central Coast. Researchers from academic institutions and government agencies, as well as individuals from citizen science organizations and fishermen involved in collaborative fisheries projects, conducted surveys of kelp forests, nearshore fish populations, rocky intertidal habitats and deep-water habitats. Socioeconomic data were also collected, allowing us to paint a broad picture of the condition of Central Coast marine ecosystems, including how humans interact with them.

A new summary report shares the results from these initial steps of monitoring in the Central Coast. The report provides rigorous scientific information about the ecological and socioeconomic conditions in the region from 2007 to 2012, and any initial changes that may have occurred since the MPAs were established in 2007. It also shares findings from key partners to build understanding of the Central Coast setting and interpret baseline monitoring results:

State of the California Central Coast: Results from Baseline Monitoring of Marine Protected Areas 2007-2012, California Ocean Science Trust and California Department of Fish and Wildlife, California, USA. February 2013.

This summary report is included in your symposium information packet. It is also available in a digital, interactive format that includes additional figures, links to the underlying data, and videos on the OceanSpaces website (www.oceanspaces.org). This report will be updated on OceanSpaces as additional results become available.

About the Symposium

September 2012 marked the 5-year anniversary of the Central Coast MPAs. This pivotal moment presents an opportunity for resource-managers, policy-makers, scientists, and stakeholders to:

- Learn about the results from baseline MPA monitoring
- Share results from their own research with scientists, stakeholders, resource managers and policy makers
- Discuss perspectives on MLPA implementation and adaptive management

This public symposium offers everyone an opportunity to connect to share information, better understand the Central Coast MPAs and look ahead to informing adaptive management of the regional MPA network.

Information presented at the symposium will be considered by the Department of Fish and Wildlife as they develop adaptive management recommendations to be shared with the Fish and Game Commission in late 2013. The symposium is being filmed and the presentations and discussions will be available following the symposium online at www.oceanspaces.org. In addition the convening organizations will develop and share symposium proceedings. These proceedings will be available on the OceanSpaces website and will inform the recommended five-year management review of the MPA network.



SYMPOSIUM INFORMATION & EVENTS

We are pleased to host this symposium in Monterey.
General Information is included here as well as full detail of
the social events on Wednesday and Thursday evenings.

General Information

Registration Desk

The registration desk is located in the Mezzanine Lobby. It will open each morning at 8:00AM. The registration desk will be staffed for the duration of the symposium; if you require any assistance during the conference, please ask at the registration desk.

Morning Breaks / Afternoon Breaks / Lunch

Light refreshments and beverages will be provided during morning and afternoon breaks. Lunch will not be provided. Several dining options are available within a couple blocks of the Marriott Hotel along Calle Principal and Alvarado Street. Please reference your symposium materials for a convenient map with nearby dining options.

Wi-Fi

Free Wi-Fi access is available in the main hotel lobby, Characters Sports Bar & Grill, Three Flags Café, and the foyer on the Mezzanine level. Wi-Fi access in the symposium meeting room can be purchased from the Marriott at the hotel front desk at a cost of \$20 / person / day.

Cell Phones

Please make sure to have your cell phone's ringer turned off while in the symposium meeting rooms.

Symposium Filming

The entire symposium will be filmed and made available after the conference on www.oceanspaces.org. Video of the symposium is intended for educational purposes only.

Press

All media representatives should check in at the Registration Desk upon arrival. The Registration Desk will contact the symposium press officers for press inquiries.

Social Events

WEDNESDAY, FEBRUARY 27,
5:00–6:30PM

Social Mixer

Please join us in the Ferrante Bay View Room (tenth floor) in the Marriott Hotel for an interactive poster session, light appetizers, and a no-host bar from 5:00PM to 6:30PM.

Attendees will have the opportunity to review posters from, and engage with, the day's presenters, while meeting and mingling with decision-makers, stakeholders, managers, and scientists.

THURSDAY FEBRUARY 28,
6:00–9:00PM

Monterey Bay Aquarium Reception & Open House

All registered symposium attendees are invited to attend a unique event at the Monterey Bay Aquarium. The evening will begin with welcoming remarks from Julie Packard, Executive Director of the Monterey Bay Aquarium and John Laird, California Secretary for Natural Resources. The event will continue with the premiere of a short film by renowned local filmmaker Kip Evans featuring marine wildlife in the MPAs of the Central Coast.

Guests are then invited to attend a reception marking the five-year anniversary of the Central Coast MPA network with a strolling dinner in the Aquarium's Oceans Edge exhibit. Look for your complimentary entry ticket in your registration packet.



SYMPOSIUM SCHEDULE

This section includes biographies for our plenary speakers, a convenient at-a-glance schedule and a full detailed agenda for the symposium.

We are pleased to offer participants an opportunity to learn about Central Coast baseline monitoring results, share findings from their own research, and discuss perspectives on marine protected area (MPA) governance and management with resource managers, policy makers, scientists and stakeholders. Building relationships between science and management, proceedings from this symposium will help inform and guide management decisions for the region's network of MPAs.

Plenary Speakers



John Laird,
*California Secretary for
Natural Resources*

John Laird was appointed California Secretary for Natural Resources by Governor Jerry Brown on Jan. 5, 2011. He has spent 35 years in public service, including 23 years as an elected official.

The son of teachers and raised in Vallejo, Laird graduated with honors in politics from the University of California Santa Cruz in 1972. He then served on the district staff of U.S. Representative Jerome Waldie, and as a budget analyst for the Santa Cruz County Administrator.

In 1981, Laird was elected to the Santa Cruz City Council, and served nine years until term limits ended his council service in 1990. He was a two-term mayor from 1983 to 1984 and from 1987 to 1988. During his local government service, he served as a board member for local transit, transportation, water planning, and regional government agencies. Laird was the executive director of the Santa Cruz AIDS Project from 1991 to 1994 and an elected member of the Cabrillo College Board of Trustees from 1994 to 2002.

In 2002, Laird was elected to represent the 27th Assembly District in the California Assembly, which includes portions of Santa Cruz, Monterey and Santa Clara Counties. He was re-elected in 2004 and again in 2006, when he received more than 70 percent of the vote. At the beginning of his second term, Laird joined the Assembly leadership team when Assembly Speaker Fabian Núñez named him chair of the Budget Committee, a position to which he was reappointed by Assembly Speaker Karen Bass in 2008.

While serving the maximum three terms in the Assembly, Laird authored 82 bills that were signed into law. These bills established the landmark Sierra Nevada Conservancy, restored community college health services, expanded and clarified state civil rights protections, reformed the state mandates system, and significantly expanded water conservation.

Laird was a member of the State Integrated Waste Management Board from 2008 to 2009. Most recently, he taught state environmental policy at University of California Santa Cruz.

Laird has been a long-time resident of Santa Cruz with his spouse John Flores. He has traveled extensively, is fluent in Spanish, enjoys conducting family history research, and is a life-long Chicago Cubs fan.



The Honorable
Fred Keeley

Fred Keeley is the elected Treasurer of the County of Santa Cruz, California. In that capacity, which he has held since January of 2005, Mr. Keeley manages a public sector investment portfolio that has an average daily balance of \$650 million. Mr. Keeley also manages the offices of two other divisions: tax and collections.

From 2003 to 2005, Mr. Keeley was the Executive Director of the Planning and Conservation League, and the PCL Foundation. These two forty-year-old organizations are among the state's leading environmental and planning non-profits.

In 1996, Mr. Keeley was elected to represent the Monterey Bay area in the California State Assembly. Mr. Keeley served as Speaker pro Tempore under three Speakers, a record for length of service in California. In the Assembly, Mr. Keeley was the author of the Marine Life Management Act, and principal co-author of the Marine Life Protection Act. Mr. Keeley also authored the two largest park and environmental protection bonds in the nation's history, approved by the voters in 2000 and 2002. Mr. Keeley authored the California Ocean Science Trust Act, and presently serves on the Cal-OST board, representing the University of California and the California State University systems. Mr. Keeley served in the Assembly until he completed the maximum number of terms allowed under California's term limit law.

From 1988 until his election to the state Assembly, Mr. Keeley was an elected member of the Santa Cruz County Board of Supervisors. In that capacity, Mr. Keeley also served on the Santa Cruz County Regional Transportation Commission, the Santa Cruz Metropolitan Transit District Board, and the Association of Monterey Bay Area Governments.

Mr. Keeley serves on the boards of: The California Ocean Science Trust; the National Marine Sanctuary Foundation in Washington, D.C.; the Semprevirens Fund; and, teaches at San Jose State University and the Panetta Institute for Public Policy at California State University, Monterey Bay.

Mr. Keeley lives in Santa Cruz, California, with his lovely cat, Olivia.

Schedule At-a-Glance

- Symposium Events
- Free Time
- Social Events

DAY 1 WEDNESDAY, FEBRUARY 27

| | | | |
|---------|-------|--|--|
| 8:00AM | 8:00 | Registration | |
| | | | |
| | | | |
| | | | |
| 9:00AM | 9:00 | Welcome | |
| | 9:05 | Welcoming Remarks | |
| | 9:25 | Opening Remarks | |
| | | | |
| | | | |
| | 9:40 | Setting the Scene: Introducing MPAs in the Central Coast region | |
| 10:00AM | | | |
| | | | |
| | 10:25 | Break | |
| | | | |
| | 10:45 | Setting the Scene: Building relationships between science & management | |
| 11:00AM | | | |
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| | | | |
| | | | |
| 12:00PM | 12:00 | Lunch | |
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DAY 2 THURSDAY, FEBRUARY 28

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|--|-------|--|--|
| | 8:00 | Registration | |
| | | | |
| | 8:30 | Welcome and Introduction to Day 2 | |
| | 8:40 | Providing Context for the Results from the Central Coast MPA Baseline Program | |
| | 9:25 | Stretch Break | |
| | 9:35 | Understanding the Land-Sea Interface: Exploring connections between terrestrial, freshwater and marine environments | |
| | | | |
| | 10:35 | Break | |
| | | | |
| | 11:00 | Predicting and Measuring Ecosystem Responses to MPAs | |
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| | | | |
| | 12:15 | Lunch | |
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DAY 3 FRIDAY, MARCH 1

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|--|-------|--|--|
| | 8:00 | Registration | |
| | | | |
| | 8:30 | Welcome and Introduction to Day 3 | |
| | 8:40 | Engaging Communities in Support of Effective MPA Management | |
| | | | |
| | 9:30 | Perspectives on MLPA Implementation and Governance | |
| | | | |
| | | | |
| | 10:30 | Break | |
| | | | |
| | 10:45 | Moving Forward: Opportunities for effective MPA network implementation | |
| | | | |
| | | | |
| | | | |
| | 12:15 | Reflections and Next Steps | |
| | 12:30 | Adjourn | |

Day 1 Agenda

Wednesday, February 27

We will set the scene of the Central Coast MPAs and share ecological and socioeconomic results gathered through the baseline MPA monitoring program. Baseline results help establish a benchmark of ocean conditions in the region and explore any initial changes since MPA implementation. Invited speakers will also explore new tools and approaches for integrating the best available scientific information into coastal and marine management. Sharing data and information across audiences is a key step to effectively integrate science into decision-making and inform adaptive management.

- Master of Ceremonies: **Skyli McAfee**, Executive Director, California Ocean Science Trust

8:00 REGISTRATION

9:00 Welcome

- **Michael Sutton**, President, California Fish and Game Commission
- **Charlton Bonham**, Director, California Department of Fish and Wildlife

9:05 Welcoming Remarks

- **Jason Burnett**, Mayor, Carmel City introducing Secretary Laird
- **John Laird**, California Secretary for Natural Resources, California Natural Resources Agency

9:25 Opening Remarks

- **Paul E. Michel**, Superintendent, Monterey Bay National Marine Sanctuary introducing Mr. Keeley
- **The Honorable Fred Keeley**, Treasurer, County of Santa Cruz, California

9:40 Setting the Scene: Introducing MPAs in the Central Coast region

SESSION DESCRIPTION: During this first session of the symposium, the Department of Fish and Wildlife will set the stage for presentations, conversations, and discussions over the next three days by providing background information related to the Central Coast MPA network's design, implementation and enforcement.

Hosted by **Charlton Bonham**, Director, California Department of Fish and Wildlife

PRESENTATIONS:

- 9:40 **Paulo Serpa**, Research Analyst, California Department of Fish and Wildlife: Overview of Central Coast Marine Protected Areas Network Design and Implementation
- 9:55 **Christine Pattison**, Environmental Scientist, California Department of Fish and Wildlife: DFW MPA Outreach and Education Efforts in the Central Coast
- 10:10 **Captain Don Kelly**, California Department of Fish and Wildlife Law Enforcement Division: Central Coast Marine Enforcement Overview

10:25 BREAK



10:45 Setting the Scene: Building relationships between science & management

SESSION DESCRIPTION: The last decade has seen a surge in calls for better integration of the best available scientific information into coastal and marine management. Despite this, incorporating science into policy is no simple matter. The Marine Life Protection Act and the MPA planning process provide a foundation for advancing science-informed adaptive management of California's ocean waters. This session will explore new tools and approaches within the worlds of science and management that can build a bridge between these arenas and advance the adaptive management of the Central Coast MPAs.

Hosted by **Elizabeth Whiteman**, Director, MPA Monitoring Enterprise, California Ocean Science Trust

PRESENTATIONS:

- 10:45 **Amy Hudson-Weaver**, Marine Conservation Program Coordinator, Sociedad de Historia Natural Niparajá A.C.: Bridging Data and Information with Stakeholders, Collaborative Fisheries Research in Baja
- 11:00 **Susan Allen**, Director, Pew Environment Group: Our Ocean: Integrating Science in the Oregon Territorial Sea Plan and Marine Reserve Process
- 11:15 **Tess Freidenburg**, Senior Scientist, California Ocean Science Trust: Advancing MPA Monitoring to Support Adaptive Management

ADDITIONAL PANELISTS:

- **Sonke Mastrup**, Executive Director, California Fish and Game Commission
- **William J. Douros**, West Coast Regional Director, NOAA Office of National Marine Sanctuaries

12:00 LUNCH

* The asterisk indicates the symposium presenter.

1:00 Introduction to Afternoon Sessions

- **Cat Kuhlman**, Executive Director, California Ocean Protection Council

1:10 Results from the Central Coast MPA Baseline Program: Establishing a benchmark of ecosystem condition & exploring initial changes

Hosted by **Tom Mason**, Environmental Scientist, California Department of Fish and Wildlife

PRESENTATIONS:

- 1:10 **Pete Raimondi**: Characterization of and Initial Changes in Intertidal Communities in MPA's Along the Central California Coastline
- 1:25 **Mark Carr**: Characterization of and Initial Changes in Kelp Forest Communities in MPA's along the Central Coast of California
- 1:40 **Jan Freiwald**: Citizen Scientist Kelp Forest Monitoring: Results from marine protected area (MPA) baseline surveys along California's Central Coast
- 1:55 **Rick Starr*** and **Dean Wendt**: Collaborative Surveys of Nearshore Fishes In and Around Central Coast MPAs
- 2:10 **Mike Prall**: Monitoring Deep-Water Assemblages Inside and Outside MPAs Using an ROV
- 2:25 **Rick Starr*** and **Mary Yoklavich**: Baseline Surveys of Deep-Water Demersal Communities In and Near Central Coast MPAs

2:45 BREAK

3:00 Results from the Central Coast MPA Baseline Program (continued): Establishing a benchmark and exploring initial changes in human uses

Hosted by **Tom Mason**, Environmental Scientist, California Department of Fish and Wildlife

PRESENTATIONS:

- 3:00 **Cheryl Chen**: California Central Coast Commercial and CPFV Fisheries: Establishing a baseline and exploring initial changes in spatial use patterns and economic trends
- 3:15 **Terry Tillman**: Central Coast Marine Protected Area (CCMPA), Review and Analysis of Commercial Fishing Activity and Revenue Realization in Pre CCMPA and Post CCMPA Time Periods
- 3:30 **Debbie Aseltine-Neilson**: Patterns of Recreational Fishing in the Central Coast Region Before and After MPA Implementation

3:45 A Photographic Perspective of the Central Coast region

- **Marc Shargel**: Hints of Baselines Long Past: A photographic look

4:00 Research & Monitoring Results from Around the Region: A poster session preview

Hosted by **Clare O'Reilly**, Project Manager, California Ocean Protection Council and **Erin Meyer**, Associate Scientist, California Ocean Science Trust

PRESENTATIONS:

- 4:00 **Steve Lonhart***, **Chad King** and **Mark Carr**: Assessing Species Richness Within Kelp Forests Along Big Sur
- 4:04 **Cheryl Barnes***, **Rick Starr**, **Dean Wendt**, **Nathan Hall**, and **Katharine Schmidt**: Collaborative Fisheries Research: A transition from data-poor to data-rich management
- 4:08 **Karah Ammann***, **Pete Raimondi**, **Melissa Miner**, and **Christy Bell**: Two Decades of Monitoring the Owl Limpet (*Lottia gigantea*) Along the Central Coast
- 4:12 **Christy Bell***, **Pete Raimondi** and **Melissa Miner**: Black Abalone Surveys on the Central Coast—An Overview of 20 Years of Monitoring Data
- 4:16 **Brad Hunt***, **Laura Kasa** and **Lauren Dockendorf**: Outreach on Marine Protected Areas: Tools and lessons learned
- 4:20 **Don Canestro***, **Suzanne Olyarnik** and **Mark Readdie**: University of California Natural Reserves and Marine Protected Areas: Intersection and mutualism
- 4:24 **Hugo Selbie***, **Jordan Gass**, **Charles Wahle** and **Mimi D'Iorio**: Enhancing the U.S. Marine Protected Area Inventory

4:30 Research & Monitoring Results from Around the Region: New web tools for sharing information

Hosted by **Clare O'Reilly**, Project Manager, California Ocean Protection Council and **Erin Meyer**, Associate Scientist, California Ocean Science Trust

PRESENTATIONS:

- 4:30 **John Hunt*** and **Jon Marshack**: California Water Quality Monitoring Council's Central Coast Focus for Ocean Health Monitoring
- 4:35 **Jason Adelaars*** and **Leslie Rosenfeld**: Geospatial Analyses of Oceanographic and Atmospheric Parameters off the Central California Coast
- 4:40 **Rani Gaddam***, **Melissa Miner** and **Pete Raimondi**: Pacific Rocky Intertidal Monitoring: Trends and synthesis along the Central Coast and beyond
- 4:45 **Tony Hale**: Linking Monitoring Data, Results and Community Engagement: OceanSpaces.org

4:50 Closing Remarks

- **Skyli McAfee**, Executive Director, California Ocean Science Trust

5:00 Social Mixer

Ferrantes Bay View Room (tenth floor), Marriott Hotel

This lively social mixer combines a poster session with a cocktail reception and music. Attendees will have the opportunity to review posters of and engage with the day's presenters, while meeting and mingling with decision-makers, stakeholders, managers, and scientists.

Day 2 Agenda

Thursday, February 28

Day 2 provides an opportunity for agencies, organizations and groups that conduct ocean monitoring and research in the Central Coast to share their work. We solicited abstracts on a broad array of topics to build an understanding of ocean conditions in the Central Coast inside and outside the MPAs, and the ways in which we use and manage our ocean resources. All abstracts submitted were peer-reviewed to ensure that the information presented is scientifically rigorous, relevant, and reflective of symposium themes.

- Master of Ceremonies: **Craig Shuman**, Marine Advisor, California Fish and Game Commission

8:00 REGISTRATION

8:30 Welcome and Introduction to Day 2

- **Zeke Grader**, Executive Director, Pacific Coast Federation of Fishermen's Associations

8:40 Providing Context for the Results from the Central Coast MPA Baseline Program

Hosted by **Adam Frimodig**, Environmental Scientist, California Department of Fish and Wildlife

PRESENTATIONS:

- 8:40 **Francisco Chavez**: The Oceanography of the Central Coast of California and Its Variability
- 8:55 **Rikk Kvitek**: Completion Of and Lessons From the 6000 km² California Seafloor Mapping Project: Why it was done, how it was done, what we learned, and how the data are being used
- 9:10 **Bob Farrell**: Exploring Patterns of Enforcement and Compliance with MPA Rules and Regulations

9:25 STRETCH BREAK

9:35 Understanding the Land-Sea Interface: Exploring connections between terrestrial, freshwater and marine environments

Hosted by **Tess Freidenburg**, Senior Scientist, MPA Monitoring Enterprise, California Ocean Science Trust

PRESENTATIONS:

- 9:35 **Dan Robinette***, **Julie Howar** and **James Jahncke**: Baseline Seabird Monitoring Within the Southern CCSR and Implications for Future MPA Management
- 9:50 **Gerard McChesney***, **Phillip Capitolo**, **Harry Carter** and **Richard Golightly**: Breeding Distribution and Population Trends of Brandt's Cormorants and Common Murres in the CCSR
- 10:05 **Karen Worcester**: Assessing Freshwater Discharge Quality to Central Coast MPAs and Nearshore Areas
- 10:20 **Keith Merkel*** and **Annie Gillespie**: Active Community Involvement Enhances Stewardship of Eelgrass (*Zostera marina*) in Morro Bay MPAs



10:35 BREAK

11:00 Predicting and Measuring Ecosystem Responses to MPAs

Hosted by **Adam Frimodig**, Environmental Scientist, California Department of Fish and Wildlife

PRESENTATIONS:

- 11:00 **Erin Loury***, **Rick Starr**, **Shannon Bros**, **David Ebert** and **Gregor Cailliet**: Trophic Ecology of the Gopher Rockfish Inside and Outside of Central California MPAs (2007-2009)
- 11:15 **Ashley Knight***, **James Lindholm**, **Andrew DeVogelaere** and **Fred Watson** : Filling the Gaps: Increasing the footprint of state MPA baseline benchmarks through collaboration
- 11:30 **J. Wilson White***, **Louis Botsford**, **Elizabeth Moffitt**, **Lewis Barnett** and **Marissa Basket**: Expected Population Responses to the Implementation of MPAs on California's Central Coast
- 11:45 **Kerry Nickols***, **Louis Botsford**, **J. Wilson White**, **Daniel Malone**, **Mark Carr**, **Lewis Barnett**, **Marissa Baskett** and **Alan Hastings**: Interpretation of Population Observations from the First 5 Years of MPA Monitoring in Central California
- 12:00 **Jay Carroll*** and **John Steinbeck**: Effects of A De Facto Marine Protected Area on Decadal Trends in Nearshore Fish Abundance

12:15 LUNCH

* The asterisk indicates the symposium presenter.

1:25 Beyond MPAs: Building an understanding of how our oceans are changing

Hosted by **Tess Freidenburg**, *Senior Scientist, MPA Monitoring Enterprise, California Ocean Science Trust*

PRESENTATIONS:

- 1:25 **Fiorenza Micheli***, **Barry James**, **Charles Boch**, **Giulio De Leo**, **Antonio Espinoza**, **Ashley Greenley**, **Steve Litvin**, **Stephen Monismith**, **Marisa Rossetto**, **Andrea Saenz-Arroyo**, **Leonardo Vazquez** and **C. Brock Woodson**: Marine Reserves Reveal and Mitigate Ecological Impacts of Coastal Hypoxia and Acidification
- 1:40 **David Lohse**: Monitoring Vertical Distribution of Intertidal Species: lessons for detecting global climate change
- 1:55 **William Sydeman***, **Sarah Ann Thompson**, **Marisol Garcia-Reyes** and **Mati Kahru**: Ocean-climate Indicators of Environmental Conditions for North-Central California, 1990–2010
- 2:10 **Jerrold Norton*** and **Janet Mason**: Interannual and Spatial Variability in Central California Kelp Forests
- 2:25 **Katherine Schmidt***, **Rick Starr**, **Scott Hamilton** and **Gregor Cailliet**: Comparing the Life History of the Blue Rockfish, *Sebastes mystinus*, Before and After Overfishing
- 2:40 **Scott Toews**: Using Structural Complexity Measures to Describe Habitat Distribution in the Nearshore Rocky Subtidal

2:55 BREAK

3:15 Exploring the Human Dimension of MPAs

Hosted by **Adam Frimodig**, *Environmental Scientist, California Department of Fish and Wildlife*

PRESENTATIONS:

- 3:15 **Ann Wasser*** and **John Pearse**: Monitoring the Rocky Intertidal of Central Coast MPAs Through LiMPETS
- 3:30 **Jason Scorse**: Assessing the Socioeconomic Value of MPAs
- 3:45 **Melissa Foley*** and **Corina Marks**: Can Models Predict the Cumulative Effect of Multiple Human Activities on Ecosystem Condition?
- 4:00 **Steve Shimek*** and **one hundred volunteers**: MPA Watch—Human Activity Monitoring in the Central Coast MPAs and Controls
- 4:15 **Paul Hobi**: What Makes Grassroots Outreach and Education Efforts on California's MPAs Effective?

4:30 Summary of Day

- **Clare O'Reilly**, *Project Manager, California Ocean Protection Council*

6:00 Monterey Bay Aquarium Reception & Open House

Monterey Bay Aquarium

All registered symposium attendees are invited to attend a unique event at the Monterey Bay Aquarium. The evening will begin with welcoming remarks from Julie Packard, Executive Director of the Monterey Bay Aquarium and John Laird, California Secretary for Natural Resources. The event will continue with the premiere of a short film by renowned local filmmaker Kip Evans featuring marine wildlife in the MPAs of the Central Coast. Guests are then invited to attend a reception marking the five-year anniversary of the Central Coast MPA network with a strolling dinner in the Aquarium's Oceans Edge exhibit. Look for your complimentary entry ticket in your registration packet.

Day 3 Agenda

Friday, March 1

We invite you to join the convening organizations together with key partners, including state, federal, tribal and local government representatives, NGOs, regional organizations and many other stakeholders, as we discuss lessons learned from the Central Coast and look forward to ongoing MPA implementation. Speakers and panelists will identify and discuss challenges and opportunities for effective MPA governance, management, community engagement, and partnerships.

- Master of Ceremonies: **Bob Farrell**, Assistant Chief, California Department of Fish and Wildlife Law Enforcement Division

8:00 REGISTRATION

8:30 Welcome and Introduction to Day 3: MPA Governance in the Central Coast and Statewide Network: Past, present, and future

- **Cat Kuhlman**, Executive Director, California Ocean Protection Council

8:40 Engaging Communities in Support of Effective MPA Management

SESSION DESCRIPTION: California's Central Coast was the first region in the state to implement a network of MPAs. What tools, approaches and strategies have been successful in engaging communities with their local MPAs and providing information useful for MPA management? From citizen science to new applications of technology, panelists will discuss lessons learned and identify opportunities for deeper engagement moving forward.

Hosted by **Calla Allison**, Director of Community Partnerships, Marine Life Protection Act Initiative

PANELISTS:

- **Amy Dean**, Education Manager, LiMPETs and the Gulf of the Farallones National Marine Sanctuary Association
- **Peter Nelson**, Executive Director, Collaborative Fisheries Research West
- **Jan Freiwald**, Director, Reef Check California
- **Sarah Sikich**, Coastal Resources Director, Heal the Bay
- **Dennis Long**, Executive Director, Monterey Bay Sanctuary Foundation

9:30 Perspectives on MLPA Implementation and Governance

SESSION DESCRIPTION: This session will focus on MPA network implementation and governance in the context of the Marine Life Protection Act. Presenters and panelists will discuss the roles and responsibilities of government and partners and discuss challenges and opportunities at local, regional, state, and federal scales.

Hosted by **Sonke Mastrup**, Executive Director, California Fish and Game Commission

PRESENTATION:

- **Steve Wertz**, Senior Environmental Scientist Supervisor, California Department of Fish and Wildlife: Management of Marine Protected Areas: Challenges and opportunities.

PANELISTS:

- **Aaron Robertson**, Chief Deputy Director, California Department of Parks and Recreation
- **Lisa Wooninck**, Policy Coordinator, West Coast Region of the Office of National Marine Sanctuaries
- **Sam Cohen**, Government Affairs and Legal Officer, Santa Ynez Band of Chumash Indians
- **Clare O'Reilly**, Project Manager, California Ocean Protection Council

10:30 BREAK

10:45 Moving Forward: Opportunities for effective MPA network implementation

SESSION DESCRIPTION: The completion of a coastal network of MPAs in California was only the first step to achieving the goals of the MLPA. Adaptive management, long-term funding, day-to-day management and enforcement are just a few of the core management areas that require an effective and efficient governance structure to succeed. What can be learned from the implementation of MPAs in California and MPAs around the world? What opportunities exist to leverage resources to improve governance and ensure a stable and sustainable management program? Representatives from State management agencies, the philanthropic community, tribal governments, and the private sector will explore the economic, social, and operational tools that can be utilized to effectively govern the State's MPA network now, and into the future.

Hosted by **Cat Kuhlman**, Executive Director, California Ocean Protection Council

PRESENTATIONS:

- **Tegan Hoffmann**, Principal, Blue Earth Consultants: Key Elements and Innovations for Effective MPA Network Implementation

PANELISTS:

- **Charlton H. Bonham**, Director, California Department of Fish and Wildlife
- **Sonke Mastrup**, Executive Director, California Fish and Game Commission
- **Jon Bishop**, Chief Deputy Director, State Water Resources Control Board
- **Hawk Rosales**, Executive Director, InterTribal Sinkiyone Wilderness Council
- **Mike Weber**, Program Officer for Oceans, Coasts and Fisheries, Resources Legacy Fund Foundation

12:15 Reflections and Next Steps

- **Cat Kuhlman**, Executive Director, California Ocean Protection Council

12:30 ADJOURN



ABSTRACTS

Many agencies, organizations and groups conduct ocean monitoring and research in the Central Coast. This section provides abstracts for all symposium presentations, including the projects that were part of baseline MPA monitoring in the region, as well as abstracts solicited through a broad 'call for abstracts'. Together, these abstracts and the accompanying presentations provide a comprehensive look at the Central Coast region; providing new scientific insights into ocean conditions, describing new approaches to monitoring and management, and sharing information about ongoing programs in the region.

Day 1 Abstracts

WEDNESDAY: 1:10PM–2:45PM

Results from the Central Coast MPA Baseline Program: Establishing a benchmark of ecosystem condition & exploring initial changes

TIME: 1:10PM

Characterization of and Initial Changes in Intertidal Communities in MPA's Along the Central California Coastline

Pete Raimondi, University of California, Santa Cruz

ABSTRACT: The rocky intertidal monitoring group at UC Santa Cruz (PISCO/MARINE) conducted comprehensive surveys to characterize the intertidal communities along the central coast of California along with assessing initial changes in MPA sites in the same region. These surveys started in 2007 and were based on the ongoing monitoring programs developed and maintained at UCSC using MARINE / PISCO protocols (see <http://www.eeb.ucsc.edu/pacificrockyintertidal/index.html> for descriptions of protocols and data visualization). Our results indicate that rocky intertidal communities in this region group into distinct types that are related in part to location along the coast (i.e. latitude) but also to wave climate, water temperature and slope and rugosity of the substrate. For the period 2007–2011 there was no clear indication that the biological communities in MPA's, as a whole, benefited from the change in level of legal protection. However, for certain species, including the endangered species, the black abalone, and the owl limpet, *Lottia gigantea*, there was evidence of a positive MPA effect. For rocky intertidal systems in the central coast, targeted and comprehensive MPA monitoring ended in 2011; the lack of on-going monitoring may impede further assessment of the efficacy of MPA's as a management and conservation tool.

TIME: 1:25PM

Characterization of and Initial Changes In Kelp Forest Communities in MPA's Along the Central Coast of California

Mark Carr, University of California, Santa Cruz

ABSTRACT: To characterize the communities of and initial changes in fishes, invertebrates and algae that constitute kelp forests along the coast of central California, SCUBA divers conducted surveys over the period from 2007 through 2011 in twelve of the central coast marine protected areas (MPAs) and associated reference sites outside MPAs. Sampling design and protocols used to estimate species densities and size distributions of fishes were those developed by PISCO long-term kelp forest monitoring

program. Kelp forests with similar biological communities clustered geographically along the coast, associated with differences in rock type, relief and rugosity, exposure to waves, site depth and kelp density. Geographic patterns of the invertebrate assemblage corresponded most closely to geographic patterns of the overall kelp forest communities. These patterns are important for understanding differences in species responses among MPAs and designing long-term monitoring studies. Indeed, many species exhibited differences in their changes in density and size through time among the different MPAs. Despite this variability, there was a general pattern of increases in density of many fished species within the MPAs compared to outside. However, these initial patterns likely require more time to attribute these changes to MPAs.

TIME: 1:40PM

Citizen scientist Kelp Forest Monitoring: Results from marine protected area (MPA) baseline surveys along California's Central Coast

Jan Freiwald, Reef Check California

ABSTRACT: To contribute to a benchmark of ecological conditions at the time of MPA establishment and to investigate initial changes in response to MPA implementation, Reef Check California (RCCA) citizen scientists have been monitoring kelp forests inside and outside of MPAs in central California since 2006. They conducted 139 diver surveys at 18 sites, monitoring 73 economically and ecologically important species of fish, invertebrates and algae. During the baseline monitoring period (2007–08), RCCA identified distinct kelp forest communities along the western Monterey Peninsula and within Carmel Bay. Whereas, blue rockfish are the dominant large fish species in both communities, densities of opaleye, senoritas, purple urchins and the understory kelp *Pterygophera* were distinctively different between the two bays. RCCA's surveys documented higher fish densities in the Lover's Point State Marine Reserve (SMR) compared to nearby sites open to fishing and recorded larger individuals at Point Lobos SMR compared to fished sites in Carmel Bay. These results are supported by a comparison of RCCA data to historical studies. In Carmel Bay (previously not protected) we found declines in rockfish densities since the 1970s whereas in the former Hopkins Marine Reserve many fished species have not declined over this period. These results, from six years of monitoring, have established a benchmark against which future MPA performance can be measured and demonstrated some early MPA effects. At the same time, RCCA has developed a citizen science based protocol and built capacity for a participatory monitoring system that is poised to provide future long-term monitoring.

TIME: 1:55PM

*Collaborative surveys of Nearshore Fishes
In and Around Central Coast MPAs*

* **Rick Starr**¹ and **Dean Wendt**²

¹ California Sea Grant Program, Moss Landing Marine Laboratories; ² Center for Coastal Marine Sciences, Cal Poly San Luis Obispo

ABSTRACT: The California Collaborative Fisheries Research Program, a partnership of fishermen, non-governmental organizations, and agency and academic scientists, developed protocols for monitoring MPAs using hook-and-line and trap fishing gear. In the summer and fall from 2007–2012 we conducted a total of 218 hook-and-line and 90 trap fishing surveys. We worked with 16 Commercial Passenger Fishing Vessels and 5 commercial trap-fishing vessels to survey 5 MPAs in central California. More than 665 different volunteers devoted 21,950 hours of their time during hook-and-line surveys to help catch, tag, and release more than 40,500 fishes from 46 different species. Trap surveys consisted of 4,165 hours of fishing time, resulting in the catch of more than 4,300 fishes from 18 different species. During these surveys, all caught fishes were identified, measured, tagged with external T-bar anchor tags, and released at location of capture. The species caught were similar among marine protected areas, however densities differed among sites. Catch and biomass rates for most species were higher in marine protected areas than in reference sites, indicating habitat differences existed prior to the establishment of the MPAs. Results of the surveys are statistically rigorous and enable us to detect changes through time in density and length of species in individual MPAs.

TIME: 2:10PM

*Monitoring Deep-water Assemblages Inside
and Outside MPAs Using an ROV*

Mike Prall, California Department of Fish and Wildlife

ABSTRACT: In 2008 and 2009, the California Department of Fish and Wildlife (DFW) documented fish abundance inside four Central Coast MPA index sites and comparable fished areas using a remotely operated vehicle (ROV). The ROV conducted transects using forward looking video across rocky reef habitats from 20–100 m (65–325 feet) deep. In 2007, transects were carried out aboard DFW's P/V Steelhead to select study sites and to gather initial data. From 2008 to 2009, surveys performed aboard the F/V Donna Kathleen, completed over 102 kilometers (63 miles) of video transects from which 9,985 segments (25 m²) were processed for fish density. From these transects,

38 species of fish were identified from 18,147 fish observations. Of these, 8,577 were young of year rockfish (YOY). The remaining 9,570 fish observed consisted of 18 species of rockfish (*Sebastes*) and 5 surfperch (*Embiotocidae*) species accounting for 83% and 7.8% of the observations respectively. The greenlings (lingcod, kelp greenling and painted greenling) were also common in lower numbers throughout most sites. Blue rockfish (*Sebastes mystinus*), halfbanded rockfish (*Sebastes semicinctus*), and olive rockfish (*Sebastes serranoides*) comprised 38%, 11% and 9% of non YOY fish observed. Rosy rockfish (*Sebastes rosaceus*) made up 8% and was more abundant in transects deeper than 35 m (115 feet). Fish length was determined to the nearest 10 cm for all fish observed. These surveys establish a benchmark estimate of fish density for comparison with future surveys.

TIME: 2:25PM

*Baseline Surveys of Deep-Water Demersal
Communities In and Near Central Coast MPAs*

* **Rick Starr**¹ and **Mary Yoklavich**²

¹ California Sea Grant Program, Moss Landing Marine Laboratories; ² NOAA Southwest Fisheries Science Center, Santa Cruz

ABSTRACT: In 2007 and 2008 we collected baseline ecological data in the deep portions of eight of the central California MPAs and associated Reference sites. In 2007, we used the manned submersible Delta to survey all fishes and structure-forming invertebrates (e.g., deepsea coral communities) in 164,000 m² of seafloor habitats from 24–365 m deep in Monterey Bay and along the Big Sur coast. During 337 quantitative transects, we observed nearly 66,000 fishes from 110 taxa, and 158,000 aggregating and 14,000 structure-forming invertebrates from 70 taxa. In 2008, we repeated surveys at the same locations. On 372 submersible transects ranging from 19–333 m deep we observed 68,000 fishes from 123 taxa and more than 152,000 aggregating and 25,000 structure-forming invertebrates from 101 taxa. This comprehensive baseline can be used in the future to critically evaluate the effectiveness of the new MPAs by assessing changes in the diversity, density, and size composition of species using seafloor habitats in the new MPAs.

WEDNESDAY: 3:00PM–3:45PM

Results from the Central Coast MPA Baseline Program (continued): Establishing a benchmark and exploring initial changes in human uses

TIME: 3:00PM

California Central Coast Commercial and CPFV Fisheries: Establishing a baseline and exploring initial changes in spatial use patterns and economic trends

Cheryl Chen, *Ecotrust*

ABSTRACT: Establishing a baseline characterization of the commercial and CPFV fishing fleet in the California Central Coast provides a benchmark of economic conditions and spatial fishing patterns against which future MPA impacts and benefits can be measured. Furthermore, assessing historical trends along with initial changes in economic conditions and spatial fishing patterns that followed MPA implementation will help inform how MPAs and other driving factors interplay to influence observed changes. The primary goal of this project was to collect up-to-date information on historical trends, current economic conditions, and the spatial distribution and relative economic value of key commercial and CPFV fisheries in the Central Coast Region.

This study provides three sets of primary findings:

- A spatial and economic baseline characterization of select commercial and CPFV fisheries in the California Central Coast Region;
- An assessment of initial spatial and economic changes following MPA implementation; and
- An investigation of the role of MPAs and other major driving factors in observed spatial and economic changes

To provide these findings our research team analyzed CDFW commercial landings data from 1992–2011, CPFV logbook data from 2000–2011, utilized spatial fishing pattern data collected by Ecotrust in 2005, and conducted interviews with commercial and CPFV fishermen in the region. Our research team conducted extensive community outreach in the region and developed and deployed an interactive, web browser-based interview instrument called Open OceanMap to collect data on spatial fishing patterns and related socioeconomic information.

TIME: 3:15PM

Central Coast Marine Protected Area (CCMPA), Review and Analysis of Commercial Fishing Activity and Revenue Realization in Pre CCMPA and Post CCMPA Time Periods

Terry Tillman, *California Department of Fish and Wildlife*

ABSTRACT: We examined the relative changes in commercial fishing activity in before-and-after comparisons of fisher participation and ex-vessel revenue with respect to the CCMPA implementation. A hypothesis of no change in fishing activity was tested using conventional statistical

methods on commercial fish landings and ex-vessel revenue data from years 2000 through 2011. Annual aggregate revenue from commercial fishing activities, and revenue distribution among fishers, significantly changed between the pre CCMPA and post CCMPA time-frames. Overall annual aggregate revenue for affected fishers increased in the post CCMPA period, with average aggregate annual revenue increasing from \$53.4 million to \$59.7 million ex-vessel (2010\$) between the two time-frames. The greatest revenue increase occurred in relatively few individuals, 16 fishers or 1.3% of the affected fishers, while 54.4% of the affected fishers experienced decreased annual revenues in the post CCMPA period. Observed differences in the revenue distributions between the pre and post periods could not be explained by inherent variation within the group of affected fishermen, and were statistically significant at the 95 percent confidence level.

TIME: 3:30PM

Patterns of Recreational Fishing in the Central Coast Region Before and After MPA Implementation

Debbie Aselline-Neilson, *California Department of Fish and Wildlife*

ABSTRACT: Effort and catch for two modes of recreational fishing (private/rental boats [PR] and commercial passenger fishing vessels [CPFV]) were examined before and after the Central Coast region marine protected areas (MPA) became effective. Catch and effort for PR anglers decreased between 2007 and 2008, but by 2011, these had reached the highest levels observed during the 7-year study period. Numbers of rockfish-lingcod-cabezon, California halibut, crabs, and sanddabs in 2011 were the highest within the study period, and salmon catches were comparable to those recorded in 2006 and 2007. Examination of angler data from sampled PR sites suggested that changes in effort occurred primarily in Santa Cruz and Monterey counties. Location information from sampled anglers indicated that most PR fishing occurred outside of MPA boundaries both before and after their implementation. For CPFVs operating in this region, the number of vessels and total number of trips and anglers showed similar trends, generally decreasing to a low in 2009 but then increasing during the remainder of the 12-year study period. During these trips, anglers predominantly caught rockfish. Salmon, albacore tuna, and California halibut also were taken at the beginning. However, with the salmon closures in 2008 and 2009, CPFVs diversified their trip targets and anglers began catching more sanddabs, Pacific mackerel, Dungeness crab, and Humboldt squid. Differences were observed in how CPFVs in northern and southern ports responded to the many changes that occurred between 2000 and 2011, including changes in rockfish and salmon regulations, and the implementation of the MPAs.

WEDNESDAY: 3:45PM–4:00PM

A Photographic Perspective of the Central Coast Region

TIME: 3:45PM

Hints of Baselines Long Past: A photographic look

Marc Shargel, *Living Sea Images*

ABSTRACT: After our Central California MPAs were established, the first thing scientists wanted to know was their “baseline” condition. As we know, baselines vary and shift depending on the date of their assessment. While our MPAs became effective in 2007, the images that form my own personal baseline are fixed in 1978, the year I began diving the Central Coast. What could we learn from baseline impressions of marine life described by my Japanese predecessors, who gathered abalone near Point Lobos one hundred years ago, or from the 1870s fishermen of “Chinese Camp” in Pacific Grove? Drawing on historical resources including archival photographs and first-hand accounts from those who dove and fished the Central Coast decades ago, we can begin to assemble a mental image of an ocean past whose baseline is lost in time. This “look back” must, necessarily, be qualitative and anecdotal. The available “data” exist largely in the form of archival photographs and stories told by observers. While images and stories cannot reach statistical significance, their illustrative and emotional significance is beyond that of any science.

WEDNESDAY: 4:00PM–4:30PM

Research & Monitoring Results from Around the Region: A Poster Session Preview

TIME: 4:00PM

Assessing Species Richness Within Kelp Forests Along Big Sur

***Steve Lonhart¹, Chad King¹, and Mark Carr²**

¹NOAA Monterey Bay National Marine Sanctuary;

²University of California, Santa Cruz

ABSTRACT: Monterey Bay National Marine Sanctuary staff and researchers from the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) at UC Santa Cruz have collaborated with an objective of characterizing the subtidal, nearshore marine resources and habitats in Big Sur kelp forests. Divers conduct species richness surveys within shallow subtidal (<20 m) sites, swimming transects through entire kelp beds. All observed fish, invertebrate, and algal species are recorded by taxonomic experts during non-destructive sampling. Divers also record substratum type, slope, relief, and exposure. Since 2003 68 sites between Carmel River and San Carpoforo Creek have been surveyed. Algal diversity ranged from 10-20 species, invertebrates 41-81 species, and fishes 9-24 species. Community composition was highly variable among sites, even at adjacent sites separated by <1 km. Kelp canopy cover, initially used as a proxy for rocky reef, was a poor surrogate; divers

often encountered diverse and species-rich communities in areas lacking kelp cover, even though there was suitable substrate for kelp. These surveys represent the most extensive characterization of kelp forest communities within Big Sur, and complement density and percent cover data collected for a subset of species targeted by PISCO divers. This is the only program collecting species richness data within kelp forests of the central coast study region, filling need overlooked by species-specific sampling programs.

TIME: 4:04PM

Collaborative Fisheries Research: A transition from data-poor to data-rich management

***Cheryl Barnes¹, Rick Starr¹, Dean Wendt², Nathan Hall², and Katharine Schmidt¹**

¹Moss Landing Marine Laboratories; ²Cal Poly San Luis Obispo

ABSTRACT: From 2007 to 2011, California Collaborative Fisheries Research Program (CCFRP) scientists collected data regarding species compositions, sizes, and catch rates of fishes inside four MPAs. Nearby areas open to fishing were also surveyed as reference sites, against which MPA data were compared. Through five years of monitoring, we have conducted 179 hook-and-line surveys to identify, measure, and release caught fishes. A total of 582 volunteers have spent 4,855 hours using standardized methods, resulting in the catch of 32,858 fishes from 42 different species. Of those caught, 26,722 were tagged to gain information about movement patterns and survivorship through recapture. To date, species compositions, CPUE, and biomass estimates have demonstrated great similarity between MPA and associated reference sites. Additionally, differences in lengths between protected and unprotected areas at the end of the sampling period are very similar to those observed prior to reserve establishment. CCFRP data collected from inside the Point Lobos State Marine Reserve (est. 1973), however, indicate larger sizes and higher densities of 8 out of the 11 most abundant species, indicating a need for longer temporal scales to adequately evaluate MPA performance. While continuing to expand our dataset in order to meet these scaling requirements, we plan to incorporate existing information into new fishery models with the purpose of conducting a management strategy evaluation. By examining model function through time and under various control rules, we can project the long-term costs and benefits of various management actions, with reference to stock sustainability and fishery profit.

TIME: 4:08PM

*Two Decades of Monitoring the Owl Limpet (*Lottia gigantea*) Along the Central Coast*

***Karah Ammann, Pete Raimondi, Melissa Miner and Christy Bell**, University of California, Santa Cruz

ABSTRACT: The Multi-agency Rocky Intertidal Network (MARINE) conducts long-term, spatially extensive monitoring along the western coast of North America. One species targeted by MARINE is the owl limpet, *Lottia gigantea*. Owl limpets are protandrous hermaphrodites (older males change to females); thus harvest by humans, who preferentially take the largest limpets, can result in skewed gender ratios and decreased reproduction. Monitoring began in the Central Coast Study Region (CCSR) in 1992 with additional plots established in 2007 after the MPAs went into effect. MARINE groups monitor abundance and size structure of *L. gigantea* in 1 meter radius permanent circular plots throughout their range, including 18 sites within the CCSR. Examining the size structure of populations over time has shown large recruitment pulses occurring on a periodic basis (typically several years between pulses). These recruitment events are often synchronous across several sites and can be followed for many years within a site. Identifying patterns in the occurrence of these recruitment pulses among sites, and their persistence within sites, can shed light on conditions that are favorable for successful recruitment and survival. Large-scale, long-term monitoring of *L. gigantea* both within and outside of MPAs gives us the ability to separate patterns due to human impact from those that are a result of natural variation.

TIME: 4:12PM

Black Abalone Surveys on the Central Coast—An Overview of 20 Years of Monitoring Data

***Christy Bell, Pete Raimondi, and Melissa Miner**, University of California, Santa Cruz

ABSTRACT: Black abalone (*Haliotis cracherodii*) have experienced mass mortalities along the coast of California and are now protected under the US Endangered Species Act. As part of a long term monitoring program called MARINE (Multi-Agency Rocky Intertidal Network), we have documented their decline due to poaching and the disease, "withering syndrome". Since 1992 we have monitored abalone abundance and size structure in permanent plots at 27 sites along the central coast. Recent surveys of 326 areas at 54 sites allowed us to estimate the population size and determine the amount of suitable black abalone habitat along the California mainland. The last extant large and healthy populations exist in the Monterey Bay National Marine Sanctuary. In diseased areas we find almost no recruitment and the average density of mature abalone is below the level for reproductive success. Our data on recruitment and habitat alteration post-disease suggest that their recovery in such areas is likely to be very slow without intervention. Recent studies also imply that the surviving individuals in southern California may be disproportionately susceptible to sea otter predation, should otters

reoccupy that area. Our data have been used by the National Marine Fisheries Service to designate critical habitat and to aid the recovery of black abalone. Population and community consequences of the loss of this important species could not be assessed without a spatially expansive long-term monitoring program.

TIME: 4:16PM

Outreach on Marine Protected Areas: Tools and lessons learned

***Brad Hunt, Laura Kasa and Lauren Dockendorf**, Save Our Shores, Santa Cruz, CA

ABSTRACT: Save Our Shores (SOS) is a 34 year old grassroots organization based in Santa Cruz that works to educate the public on their impact on the ocean. Since 1999, SOS has been working with local boaters to educate them on their impact and providing supplies and solutions to decrease pollution and improve the Central Coast's ocean ecosystem. SOS also reaches out to the general public and provides similar education. SOS has had a unique opportunity to talk to both audiences about Marine Protected Areas and we have learned a lot along the way. We will provide learning tools for how best to provide outreach to the local community on MPAs and how best to educate the general public about the science of MPAs. SOS has years of experience in public education and we hope that our knowledge will help other jurisdictions to educate the public on the importance of MPAs.

TIME: 4:20PM

University of California Natural Reserves and Marine Protected Areas: Intersection and mutualism

***Don Canestro¹, Suzanne Olyarnik², and Mark Readdie³**

¹UC Ken Norris Rancho Marino Reserve; ²Bodega Marine Reserve; ³Landel-Hills Big Creek Reserve

ABSTRACT: The University of California's Natural Reserve System (UCNRS) mission of contributing to the understanding of the Earth and its natural systems by supporting university-level teaching, research and public service at protected areas throughout California closely aligns with the Marine Life Protection Act's Marine Protected Areas overall goals, especially improving "...educational, and study opportunities and marine ecosystems that are subject to minimal human disturbances, and to manage these uses in a manner consistent with protecting biodiversity". By facilitating research and educating university students and others about MPAs UCNRS reserves have contributed to the better understanding of MPAs. In addition UC Reserve staff is able to monitor use of adjacent MPAs. For this presentation we will discuss the history of California MPAs and their association with UC Reserves (Año Nuevo, Big Creek and Bodega), and ongoing research and education work done in MPAs adjacent to UC Natural Reserves (Año Nuevo, Bodega, Big Creek, and Rancho Marino).

TIME: 4:24PM

Enhancing the U.S. Marine Protected Area Inventory

***Hugo Selbie, Jordan Gass, Charles Wahle, and Mimi D'Iorio,**
NOAA Marine Protected Areas Center, Monterey, CA

ABSTRACT: To reflect the best information on MPA boundaries, resources and management, NOAA's MPA Center created a database to characterize spatial and management elements of MPAs in U.S. oceans and the Great Lakes. The MPA Inventory database incorporates over 1,700 MPAs along with geospatial boundaries provided by the managing agencies. The MPA Inventory's traditional role has been to describe patterns of protection at national and regional levels. However, events in recent years have shown the need for information on living marine resources present in MPAs, and how those resources are protected. To address current MPA questions, we have recently completed an enhancement of the MPA Inventory to add information on presence of ecological, physical and cultural resources found in MPAs, and protections for those resources. This effort has recently been concluded and we are now investigating the ways to interpret and analyze this information to inform ocean managers about topics as varied as climate change, carbon sinks, and marine debris. This presentation will focus on these enhancements, and detail the results of analyses we have conducted with this additional layer of information.

WEDNESDAY: 4:30PM–4:45PM

Research & Monitoring Results from Around the Region: New web tools for sharing information

TIME: 4:30PM

California Water Quality Monitoring Council's Central Coast Focus for Ocean Health Monitoring

***John Hunt¹ and Jon Marshack²**

¹Bay Foundation of Morro Bay and University of California at Davis; ²State Water Resources Control Board

ABSTRACT: Numerous programs collect water quality data throughout California. These data must be turned into useable information to help decision makers and stakeholders protect aquatic resources and public health. Existing monitoring programs have been developed at different times to address different monitoring objectives, site-specific issues, or regulatory mandates. The California Water Quality Monitoring Council was recently created by the State Legislature to maximize the efficiency and effectiveness of existing water quality data collection and dissemination, and to ensure that the resulting information is available to decision makers and the public. To develop the coordination necessary to allow many programs to contribute comparable data for integrated, policy-relevant assessments, the Council has developed a web-based system that relies on theme-based work groups to provide monitoring programs with tools to make their data widely available through the Council's My Water Quality web portal. The Council's Ocean Health work group has decided to

focus on the central coast as the first step in developing its web portal. This presentation will describe the Council's approach, demonstrate existing My Water Quality web pages, discuss the current state of water quality monitoring on the central coast, and provide an update on the Ocean Health work group's progress in making the most effective use of data collected along our shoreline.

TIME: 4:35PM

Geospatial Analyses of Oceanographic and Atmospheric Parameters Off the Central California Coast

***Jason Adelaars and Leslie Rosenfeld,**
CeNCOOS, Monterey Bay Aquarium Research Institute

ABSTRACT: 2–4 year time series of ocean surface winds, currents, temperature and color were analyzed to elucidate seasonal variability within the coastal MPAs of Central CA. Currents and winds were evaluated in terms of cross-shore and alongshore components. This project was intended as a demonstration of the feasibility and desirability of having the Central and Northern CA Ocean Observing System make available remotely sensed and model time series data in formats compatible with geospatial software. These dynamic datasets, including winds from a numerical model, surface currents measured by HF radar, and sea surface temperature and color measured from satellites, were chosen because multiyear time series during the Central Coast MPA evaluation period were available, geographic coverage included all of the MPAs, and the spatial resolution (1–6 km), while not as fine as many geological and ecological datasets, was fine enough to distinguish among MPAs. Converting highly temporally variable oceanographic data such as these into formats executable in GIS software commonly used by ecologists and ecosystem managers, could potentially expand their incorporation into marine management decisions.

TIME: 4:40PM

Pacific Rocky Intertidal Monitoring: Trends and synthesis along the Central Coast and beyond

***Rani Gaddam, Melissa Miner and Pete Raimondi,**
University of California, Santa Cruz

ABSTRACT: The Pacific Rocky Intertidal Monitoring Program is a product of over three decades of research at nearly 200 rocky intertidal monitoring sites ranging from Southeast Alaska to Mexico. Long-Term Monitoring Surveys developed by a consortium of organizations collectively called "MARINE" (Multi-Agency Rocky Intertidal Network) use fixed plots to document changes in percent cover and species abundance. Biodiversity Surveys done by a single group at UC Santa Cruz provide detailed information about biodiversity and community structure. The synthesis of this research has resulted in the *pacificrockyintertidal.org* website. By early 2013 we will have completed site pages for the 40 sites located within the Central Coast Study Region (CCSR), which include site descriptions and photos,

trend graphs, and species lists. Through the Interactive Map and Graphing Tool, users can also create customized map displays and graphs. Our monitoring program is the largest, and longest-running of its kind. This long-term information enables us to: 1) Assess impacts due to natural and human induced disturbance, 2) Detect shifts in community structure, and 3) Provide context for focused experimental work.

TIME: 4:45PM

[Linking Monitoring Data, Results and Community Engagement: OceanSpaces.org](https://oceanspaces.org)

Tony Hale, *California Ocean Science Trust*

ABSTRACT: Fishermen, scientists, policymakers and other stakeholders are deeply interested in scientific monitoring that is yielding new knowledge about California's marine protected areas (MPAs) and ocean health. When the MPA Monitoring Enterprise was charged with managing the state's MPA monitoring programs, we considered new ways to engage a diverse audience and enable individuals to create and share new knowledge. Are there new technologies that could lend greater transparency, salience and context to the data? How can consumers and producers of the data be brought closer together for their mutual benefit? How can technology help connect stakeholders with science and lend greater support to science at the management table? Out of these needs, OceanSpaces was born. This online community features open-source communication tools to promote outreach and engagement. One fascinating outcome to emerge from this community effort is an online version of the State of the California Central Coast summary report. This document, as presented on OceanSpaces, is neither a conventional web page nor a downloadable document but rather an ebook that offers an enriched reading experience and a deeper understanding of monitoring results. When turning the pages of the ebook, the viewer is invited to watch videos, view additional figures, download the underlying data, and connect with the community members whose efforts defined the summary report.



Day 2 Abstracts

THURSDAY: 8:40AM–9:30AM

Providing Context for Results from the Central Coast MPA Baseline Program

TIME: 8:40AM

The Oceanography of the Central Coast of California and Its Variability

Francisco Chavez, Monterey Bay Aquarium Research Institute

ABSTRACT: This paper briefly describes the mean oceanographic setting of the central California coast and then examines inter-annual to multi-decadal variability. The Pacific Ocean off western North America is a classic eastern boundary system. In spring and summer, seasonal northwesterly winds drive a coastal upwelling circulation characterized by equatorward flow of near-surface coastal upwelling jets with associated eddies and fronts that extend offshore. The upwelling results in increased biological productivity at all trophic levels. The system is susceptible to large variations in physics and biology associated with large-scale phenomena such as El Niño and the Pacific Decadal Oscillation. These impacts occur coherently along the US west coast. The concern that man-induced accumulation of CO₂ in the atmosphere could also impact climate and marine ecosystems has now come front and center. The presentation reviews how natural climate variability has affected the central coast of California in the past and what the emerging anthropogenic impacts might be.

TIME: 8:55AM

Completion Of and Lessons From the 6000 km² California Seafloor Mapping Project: Why it was done, how it was done, what we learned, and how the data are being used

Rikk Kvitek, California State University, Monterey Bay

ABSTRACT: Ecosystem Based Management (EBM) has been championed in the United States and California for over a decade as the pursuit and use of deeper ecosystem understanding to drive effective adaptive management solutions for the sustainable use of environmental goods and services. But it is difficult to understand, let alone agree upon and manage what you cannot see. Recent advances in our ability to collect and utilize spatially explicit data for the visualization of California's marine ecosystems have sprung from and lead to surprising insights that are making EBM both possible and personal. Here I use the ambitious, multi-institutional California Seafloor Mapping Project (CSMP) as a case in point for how transformational technology and data are altering for the better the way the public, agencies, businesses and scientists see, manage and interact with the marine environment. The goal of

the CSMP has been to enable EBM, and now Coastal and Marine Spatial Planning, through the comprehensive high resolution mapping of all California state waters along its 1350 km coastline. Stunning imagery, basic and applied scientific collaborations and breakthroughs, enhanced public environmental literacy, critical work force development, innovative resource utilization, and effective policy and management decisions are all now flowing from this strategic investment in state-of-the-art marine environmental data.

TIME: 9:10AM

Exploring Patterns of Enforcement and Compliance with MPA Rules and Regulations

Bob Farrell, California Department of Fish and Wildlife

ABSTRACT: The California Department of Fish and Wildlife (DFW) is the primary agency responsible for enforcing MPA regulations. There are approximately thirty-six enforcement personnel assigned to positions in the Central Coast region that may respond to MPA violations. In the Central Coast region, enforcement officers generally report a relatively high level of compliance, although violations occur when the public may be unaware of the MPA boundaries and regulations. CDFW-Law Enforcement Division (LED) collects data from the entire state concerning violations. Currently the LED does not differentiate MPA violations from the general category of marine related violations. Based on analysis of the data available we concluded that from September 2007 to March 2012, 377 marine-related citations (tickets) were issued in the Central Coast containing 495 individual violations. Approximately 47 (9.5%) of these violations can be associated with specific MPAs. These 47 MPA-related violations occurred in nine of the 29 MPAs along the Central Coast with 30 violations occurring in State Marine Reserves, 15 in State Marine Conservation Areas, and two in State Marine Recreational Management Areas. While only a small number of people knowingly violate regulations, even a single poaching event can have a significant effect on determining the effectiveness of an MPA.

THURSDAY: 9:35AM–10:35AM

Understanding the Land-Sea Interface: Exploring connections between terrestrial, freshwater and marine environments

TIME: 9:35AM

Baseline Seabird Monitoring Within the Southern Central Coast Study Region and Implications for Future MPA Management

***Dan Robinette, Julie Howar and James Jahncke,**
PRBO Conservation Science

ABSTRACT: MPAs can benefit seabirds by reducing fisheries bycatch, decreasing disturbance to breeding and roosting sites, and reducing competition for prey resources. Our goal was to create a baseline of how seabirds use near-shore and coastal habitats within the CCSR. From 2007 to 2010, we focused on measuring breeding population size, reproductive success, and foraging rates inside and outside of the Vandenberg SMR. In 2011 and 2012, we began measuring rates of human-caused disturbance and added 3 MPAs to our monitoring plan: Piedras Blancas SMR, Cambria SMCA, and Point Buchon SMR. The Vandenberg and Point Buchon SMRs currently protect large breeding populations of all 5 focal species, while the Piedras Blancas SMR protects large populations of 3 focal species. Additionally, disturbance rates were highest at 3 control sites, illustrating how most human activity currently occurs outside the MPAs. Foraging rates were highest at control sites, especially those in the lees of coastal promontories where fish recruitment is likely enhanced by larval retention. The seabirds we studied prey mostly on young age classes (<20cm) of sub-tidal fishes and published research from the Vandenberg area shows that seabird foraging distributions reflect variability in fish recruitment. Our results suggest that monitoring seabirds can help resource managers understand local patterns of recruitment and establish realistic expectations for how quickly fish populations should change within individual MPAs.

TIME: 9:50AM

Breeding Distribution and Population Trends of Brandt's Cormorants and Common Murres in the Central Coast Study Region

***Gerard McChesney¹, Phillip Capitolo², Harry Carter³, and
Richard Golightly⁴**

¹U.S. Fish and Wildlife Service, San Francisco Bay National
Wildlife Refuge Complex; ²University of California, Santa Cruz;
³Carter Biological Consulting; ⁴Humboldt State University

ABSTRACT: Brandt's Cormorants (*Phalacrocorax penicillatus*) and Common Murres (*Uria aalge*) are the two most abundant breeding seabirds in the CCSR. Both nest in dense colonies on islands, seastacks, and mainland cliffs, and forage on small fish and invertebrates. They serve as indicators of ocean conditions and may benefit from MPAs and Special Closures because of sensitivity to prey availability and human disturbance. The cormorant breeds at several

colonies throughout the CCSR while the murre breeds only at the Castle-Hurricane Colony Complex, Monterey County. Colonies have been assessed by aerial photographic surveys since the early 1980s as well as more intensive ground-based studies at the Castle-Hurricane Colony Complex since 1996. For the Brandt's Cormorant, large population centers occur at Año Nuevo Island, Bird Rock (Pebble Beach), Point Lobos State Reserve, Castle-Hurricane Colony Complex, Cape San Martin, Piedras Blancas Island, Morro & Pillar Rocks, and the Point Buchon-Diablo Canyon area. Numbers of breeding pairs increased dramatically between 1999 and 2007. A population crash in 2008-2009 included a large starvation event in spring 2009. South of Point Sur, numbers rebounded by 2010 and increased on average 4.5% per annum in 1989-2011. North of Point Sur, numbers only began recovering in 2011. Common murres suffered dramatic declines in the 1980s primarily from gill-net and oil spill mortality; the Castle-Hurricane colony is slowly recovering.

TIME: 10:05AM

Assessing Freshwater Discharge Quality to Central Coast MPAs and Nearshore Areas

Karen Worcester, Central Coast Water Board

ABSTRACT: Since 2001, the Central Coast Water Board's Ambient Monitoring Program (CCAMP) has been sampling contaminants and flow at all major stream and river mouths from southern San Mateo to northern Ventura counties. Many of these sites are adjacent to Central Coast Marine Protected Areas. These trend sites are visited monthly and are sampled for flow, basic water chemistry, nutrients, and pathogen indicators. This valuable data time series has been used to support several scientific studies on loading effects to the nearshore environment related to marine mammal disease and nutrient discharge. Collaborating researchers have conducted special studies at these sites to evaluate specific pollutants of concern, including pathogens and algal toxins. Data has also been used to assess Marine Protected Areas at greatest risk for impacts associated with pollutant discharges. As a well-established monitoring effort with a routine field presence, CCAMP represents an opportunity for data collaboration between the scientific research community and water quality regulatory programs that can effect change on the ground.

TIME: 10:20AM

*Active Community Involvement Enhances Stewardship of Eelgrass (*Zostera marina*) in Morro Bay MPAs*

Annie Gillespie¹ and *Keith Merkel²

¹Morro Bay National Estuary Program;

²Merkel & Associates Inc.

ABSTRACT: The Morro Bay National Estuary Program conducts biennial intertidal aquatic vegetation mapping throughout the Morro Bay MPAs utilizing classified multi-spectral aerial imagery. The Program relies on community volunteers to assist with the ground verification process that guides the classification scheme. Incorporation of volunteers into the mapping and monitoring process has built community interest in the protection of intertidal habitat in Morro Bay. Recent mapping efforts (2007- 2010) have revealed a significant decline in eelgrass, *Zostera marina*. While Morro Bay supported nearly 350 acres of eelgrass in 2007, by summer of 2012 it was estimated that fewer than 100 acres remained. Analysis of climatology, water quality and topographic data hasn't revealed a single dominant cause for the decline. Alarmed community groups have taken interest in the decline, encouraging replanting over prolonged study of causal factors. Community interest prompted an expansion of planned mitigation replanting in Morro Bay, with two local groups donating funds to double the scope of the replanting effort. Volunteers will play an active role in monitoring the success of pilot replanting areas.

THURSDAY: 11:00AM—12:15PM

Predicting and Measuring Ecosystem Responses to MPAs

TIME: 11:00AM

Trophic Ecology of the Gopher Rockfish Inside and Outside of Central California MPAs (2007-2009)

*Erin Loury, Rick Starr, Shannon Bros, David Ebert, and Gregor Cailliet, Moss Landing Marine Laboratories

ABSTRACT: Marine protected areas (MPAs) can potentially alter food web dynamics by increasing the density of predatory fishes within their borders. Such increases in density can cause generalist predators to contract the scope of their diet. This study investigated the effects of increased conspecific fish density on the diet of gopher rockfish (*Sebastes carnatus*) at a 35-year-old MPA at Point Lobos and four newly established central California MPAs at Año Nuevo, Point Lobos, Piedras Blancas, and Point Buchon. Analyses were conducted for 707 stomachs collected from 2007-2009. Diets did not differ inside versus outside the old Point Lobos MPA in terms of prey richness, evenness, composition, or trophic level, but individual specialization was greater for fish outside the MPA. No consistent differences in these metrics were observed inside versus outside the four new MPAs, but prey composition and evenness did differ significantly among geographic locations. Diets at Año

Nuevo, the most northern and shallow location, consisted predominantly of crabs, while diets from southern, deeper locations were dominated by brittle stars. The case study of the old Point Lobos MPA indicates that fish feeding may not change in an MPA after several decades. Differences in prey observed among geographic locations suggest variation in the community composition among central California's new MPAs, which may influence the effect of each MPA on food web dynamics over time.

TIME: 11:15AM

Filling the Gaps: Increasing the footprint of state MPA baseline benchmarks through collaboration

*Ashley Knight¹, James Lindholm¹, Andrew DeVogelaere² and Fred Watson³

¹Institute for Applied Marine Ecology (IfAME); ²Monterey Bay National Marine Sanctuary; ³California State University, Monterey Bay

ABSTRACT: Through a collaborative partnership formed in 2007 between the Institute for Applied Marine Ecology (IfAME) at CSU Monterey Bay and the Monterey Bay National Marine Sanctuary (MBNMS), transect surveys using a towed video camera were conducted inside and adjacent to the Piedras Blancas State Marine Conservation Area (PBSMCA). The primary goal of these transects was to characterize demersal communities along the continental shelf in areas of interest to the MBNMS and, where possible, in state MPAs. Over three years (2007, 2008, 2011), video imagery was collected across a total length of 50.5km at depths of 30–120m. A majority of this imagery was collected prior to multi-beam sonar mapping of the area and the initial transects revealed rocky reef habitats of varying relief and interspersed with soft sediments. We observed a total of 5,964 individual fishes, including over 16 species of rockfish (*Sebastes* spp.) and several genera of Pleuronectiform flatfishes. Structure-forming invertebrates included sponges and gorgonians in rocky areas and sea whips and pens in soft bottom areas. To account for the variability in taxonomic resolution attainable with the oblique-facing camera, we describe the distribution fishes across these habitats at three separate taxonomic levels. These data provide a snapshot of the fish community at the PBSMCA immediately following designation and lay the groundwork for a new approach to long-term monitoring below SCUBA depths.

TIME: 11:30AM

Expected Population Responses to the Implementation of MPAs on California's Central Coast

***J. Wilson White¹, Louis Botsford², Elizabeth Moffitt³, Lewis Barnett¹, and Marissa Baskett¹**

¹University of North Carolina Wilmington; ²University of California, Davis; ³University of Washington

ABSTRACT: The long-term responses of species to MPAs in central California were evaluated in the MLPA implementation process, but to evaluate monitoring results after implementation we need to understand the transient (short-term) effects of a sudden decline in fishing mortality, rather than the long-term effects. The expected results from monitoring will vary depending on where and when the samples are taken. We describe advances in understanding the responses expected from the implementation of MPAs. After MPA implementation, abundance can decrease or increase, but it can also oscillate through several cycles before increasing or decreasing. These oscillations are stronger with heavier fishing, older ages at maturity, lower natural mortality rates, and lower larval connectivity. We showed that comparisons of biological indicators inside and outside MPAs depend on whether they are before/after or inside/outside comparisons, with the former being more effective. We also evaluated the effects of known levels of variability in recruitment on our ability to discern these differences. Here we apply these findings to the monitoring of the Central Coast MPAs.

TIME: 11:45AM

Interpretation of Population Observations from the First 5 Years of MPA Monitoring in Central California

***Kerry Nickols¹, *Louis Botsford¹, J. Wilson White², Daniel Malone³, Mark Carr³, Lewis Barnett¹, Marissa L. Baskett¹, and Alan Hastings¹**

¹University of California, Davis; ²University of North Carolina, Wilmington; ³University of California, Santa Cruz

ABSTRACT: Responses of fished populations to MPAs can be interpreted in terms of 1) the changes in size frequency distributions or 2) the change in aggregate measures such as abundance or biomass; in either case one should focus on sizes taken in the fishery. Rockfish populations in Central California MPAs have shown little increase in either abundance or mean size since MPA implementation in 2007. However, long-term increases due to MPAs may be obscured in the short term due to a variety of factors. We used population models parameterized for several rockfish species to investigate the factors affecting short-term post-MPA dynamics. We found that positive effects of MPAs on rockfish abundance may be occluded by variability in larval recruitment or the ontogenetic migration of older fish to deeper water. The expected increase in abundance or size is also dependent on the fishing mortality rate before MPA implementation, which is largely unknown. However,

even in best-case scenarios, observations made after 4-7 years would only be on the cusp of reliably detecting MPA effects, particularly for long-lived species such as rockfishes.

TIME: 12:00PM

Effects of A De Facto Marine Protected Area on Decadal Trends in Nearshore Fish Abundance

***Jay Carroll and John Steinbeck, Tenera Environmental Inc.**

ABSTRACT: Biologists have been monitoring the abundance of shallow-water fishes near the Diablo Canyon Power Plant in San Luis Obispo County since 1977 using subtidal visual transects. The studies were designed to monitor impacts from the DCPD thermal discharge, which began full 2-unit operation in 1986. In addition to serving this primary purpose, the monitoring data has been useful for documenting other long-term changes, including apparent declines in cabezon and grass rockfish in the 1990s that were concurrent with sharp increases in the live-fish fishery in the Morro Bay-Port San Luis area. The events of September 11, 2001 lead to the immediate establishment of a no-entry security zone around DCPD that precluded all commercial and recreational fishing along this 2-mile stretch of rocky coastline. We have been able to track the recovery of some fishery species within this de facto marine protected area that has now been in place for over 10 years. With the establishment of the nearby Point Buchon State Marine Reserve in 2007, it may be possible to infer the trajectory of expected densities of some fish species over time in that reserve by comparison with DCPD historical baseline data.

THURSDAY: 1:25PM–2:55PM

Beyond MPAs: Building an understanding of how our oceans are changing

TIME: 1:25PM

Marine Reserves Reveal and Mitigate Ecological Impacts of Coastal Hypoxia and Acidification

***Fiorenza Micheli¹, Barry James², Charles Boch¹, Giulio De Leo¹, Antonio Espinoza³, Ashley Greenley¹, Steve Litvin¹, Stephen Monismith⁴, Marisa Rossetto⁵, Andrea Saenz-Arroyo⁶, Leonardo Vazquez⁶, and C. Brock Woodson⁷**

¹Hopkins Marine Station, Stanford University; ²Monterey Bay Aquarium Research Institute; ³Cooperativa Pesquera Buzos y Pescadores, Mexico; ⁴Stanford University; ⁵Politecnico di Milano; ⁶Comunidad y Biodiversidad A.C.; ⁷University of Georgia, Atlanta

ABSTRACT: Marine protected areas (MPAs) of Monterey Bay, central California, USA, and Baja California, Mexico, are affected by low oxygen, low pH events that, in Baja California, resulted in mass mortality of economically important benthic invertebrates. At both locations, nearshore moorings and oceanographic sensors were deployed within kelp forests to conduct combined physical and biological monitoring and experiments. Coastal oceanographic and

ecological monitoring, recruitment studies, and population models indicated that protection in MPAs conferred greater resilience of populations affected by the mortality events. In particular, local protection provided resilience through greater resistance and faster recovery of protected populations. Moreover, this benefit extended to adjacent unprotected areas through larval spillover across the reserve edges. These results provide empirical evidence that MPAs can help combat the deleterious effects of coastal hypoxia and acidification on important marine resources and ecosystems. The presence of MPAs allowed for an examination of responses to climatic impacts separately from and in combination with local impacts of fishing, highlighting that MPAs of central California and other areas of the California Current region play a crucially important role in both understanding and mitigating the effects of climatic variability on nearshore ecosystems.

TIME: 1:40PM

Monitoring Vertical Distributions of Intertidal Species: Lessons for detecting global climate change

David Lohse, *University of California, Santa Cruz*

ABSTRACT: One of the predicted consequences of global climate change, rising sea level, is expected to impact the vertical distribution of intertidal species along the shore. Since 2000, the vertical distribution of the several intertidal species has been monitored at several sites in the vicinity of Monterey Bay. These surveys utilize a series of permanent vertical transect lines to document both the region of the shore where each species is spatially common (i.e. zonation patterns), as well as their upper and lower distributional limits. The results show that over the last decade distributions have shifted from tens of centimeters to several meters along the transects. This suggests that over the short term, the natural variation of species' vertical distributions could mask the longer term effects of rising sea level. The effects of local topography will also be discussed.

TIME: 1:55PM

Ocean-Climate Indicators Of Environmental Conditions For North-Central California, 1990–2010

***William Sydeman¹, Sarah Ann Thompson¹, Marisol Garcia-Reyes¹ and Mati Kahru²**

¹*Farallon Institute for Advanced Ecosystem Research;*

²*Scripps Institution of Oceanography*

ABSTRACT: We develop and explore ocean-climate indicators ("OCI") of the temporal environmental variability known to affect fish, invertebrates, and wildlife of the north-central California Current over 21 years, 1990–2011. To develop multivariate OCI, we selected, compiled and analyzed 16 well-known atmospheric and oceanographic indicators that represent key basin-scale drivers and regional attributes of the coastal environment. We implemented seasonally-based multivariate OCI using principal component (EOF) analysis. Over the study period, the ENSO cycle apparently

weakened resulting in fewer and less intense El Niño events. Sub-arctic influences increased with a strengthening of the North Pacific Gyre Oscillation (NPGO) and cooling of the Pacific Decadal Oscillation (PDO). Corresponding to these changes, the Northern Oscillation Index (NOI) strengthened leading to enhanced upwelling-favorable wind stress as well as air and ocean surface temperature cooling. Phytoplankton biomass, proxied by satellite remote-sensing of chl-a, increased from 1995–2010. Our results support a hypothesis of recent upwelling intensification and enhanced lower but not upper trophic level productivity.

TIME: 2:10PM

Interannual and Spatial Variability in Central California Kelp Forests

***Jerrold Norton and Janet Mason**,
NMFS/NOAA Southwest Fisheries Science Center

ABSTRACT: Interannual variation in kelp forest (*M. pyrifera*, *N. luetkeana*) extent and density and its dependence on the physical environment was examined. During the 2002–2005 period California Department of Fish and Game aerial surveys and Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) stipe density surveys are available. Interannual kelp patterns during 2002–2005 were similar from Pt. Sur to Pt. Arena and from Pt. Estero to the northern Santa Barbara Channel. In the north, the four-year pattern was characterized by highest stipe density and most extensive canopy coverage in 2002, while south of Pt. Estero, 2002 had the lowest stipe density and lowest canopy coverage. Only stipe concentration data are available for the 2007–2010 period, during which 2008 and 2009 had higher stipe concentrations than 2007 and 2010, and 2010 had the weakest kelp development. This pattern was consistent from Pt. Pinos to Santa Cruz Island. Large-scale spatial variability in nutrient supply appears important in determining these kelp patterns. Analysis of marine protected area effects must consider the interannual and spatial variability of the associated kelp forests.

TIME: 2:25PM

*Comparing the Life History of the Blue Rockfish, *Sebastes mystinus*, Before and After Overfishing*

***Katherine Schmidt, Rick Starr, Scott Hamilton and Gregor Cailliet**, *Moss Landing Marine Laboratories*

ABSTRACT: Fisheries have had a large impact on nearshore central California coast marine ecosystems. Recent studies have shown that overfishing, in addition to reducing a stock and disproportionately removing the larger, older fish, may also have lasting effects on populations by enacting changes in the life history characteristics of the fish. That humans can alter the biology of fishes by fishing them is encapsulated in the theory of fisheries-induced evolution. Blue Rockfish, *Sebastes mystinus*, are important members of the nearshore rocky reef community and the nearshore recreational hook-and-line fishery in central California. The population reached a low of 10% of their unfished biomass

in 1994, following some large recreational fishing removals in the 1970s and 1980s. To examine any potential life history changes, *S. mystinus* were collected in the areas of Half Moon Bay, Monterey, and Morro Bay, California aboard recreational charters from 2010 through 2012 to determine their current maturation, growth rate, and fecundity per female. These data were compared to life history values that were established before the era of the large removals and that were also collected in the same areas of central California. Through these comparisons, large differences were observed in important life history characteristics of *S. mystinus* in these areas. Implications of the differences between the current and historical values will be discussed in view of fisheries-induced evolution.

TIME: 2:40

Using Structural Complexity Measures to Describe Habitat Distribution in the Nearshore Rocky Subtidal

Scott Toews, California Ocean Protection Council and California State University, Monterey Bay

ABSTRACT: The physical complexity of the seafloor can play an important role in the distribution of benthic organisms such as algal communities. However, the interactions between the physical landscape and distribution of benthic organisms are not well understood. In this study we described the role of habitat complexity (three dimensional structure of the seafloor) and habitat composition (abundance and distribution of benthic organisms), among four nearshore sites along the Monterey Peninsula. Habitat complexity was estimated from seafloor mapping data using TPI, VRM, and slope. Habitat composition was estimated from photoquadrats, calculating percent cover of four habitat classes (red, articulated coralline, and laminaral algae, and biogenic cover). We used a GLM comparison approach to describe the linkage between the physical and biological variables. Spatial statistics and GIS were used to analyze and visualize the relationship between the subtidal landscape variables. Spatial dependence was significant and included in all models. Red and articulated coralline algal habitats were best described by TPI and VRM, and TPI respectively. Laminaral and biogenic habitat were not linked to the physical parameters. This approach can provide estimates of habitat in nearshore ecosystems using complexity measures from seafloor mapping data available for the coastal waters of California. This may allow managers to estimate habitat availability using physical qualities of nearshore areas.

THURSDAY: 3:15PM–4:30PM

Exploring the Human Dimension of MPAs

3:15PM

Monitoring the Rocky Intertidal of Central Coast MPAs Through LiMPETS

***Ann Wasser**¹ and **John Pearse**²

¹LiMPETS, Pacific Grove Museum of Natural History;

²University of California, Santa Cruz

ABSTRACT: LiMPETS (Long-term Monitoring Program and Experiential Training of Students) monitors the rocky intertidal at some of the Central Coast MPAs. Data are collected, mainly by high school students, on the abundance of selected species and entered into an online database accessible to the public (<http://limpetsmonitoring.org/>). We report here data on two species that are harvested recreationally, the owl limpet *Lottia gigantea* and the sea mussel *Mytilus californianus*, at sites within and outside Natural Bridges State Marine Reserve. Owl limpets were larger at sites within the future MPA in 2003 than sites outside, and continue to be so when monitored in 2011/12. The distribution of sea mussels in transects across the intertidal, from high to low zones, remained nearly unchanged at all sites over the past decade of monitoring, except for decreases at lower tidal levels. Moreover, the abundance of sea mussels on flat benches at the sites has remained nearly unchanged for over 30 years. Continuation of LiMPETS monitoring at these and other sites on the central coast will contribute to the understanding of the effectiveness of MPAs in protecting these diverse intertidal communities.

TIME: 3:30PM

Assessing the Socioeconomic Value of MPAs

Jason Scorse, Center for the Blue Economy

ABSTRACT: While there is reason to support marine conservation for its intrinsic value, the primary purpose of MPAs is to increase socioeconomic value to California residents (and to a lesser extent, visitors from outside the state). However, to date, there have been few serious efforts to measure the socioeconomic contributions of MPAs to the California economy. This situation needs to be addressed as many stakeholders are rightfully interested in understanding exactly what socioeconomic benefits MPAs provide for the state, as well as the distributional consequences, as there are often winners and losers in any major conservation effort. This paper presents a framework for assessing the socioeconomic contributions of MPAs, based on the demonstrable changes to natural systems that can be attributed to the protections afforded under the MPA system. First, statistical techniques are discussed that will help identify causal links between MPAs and changes in ocean conditions, using the "difference-in-difference" technique. This is followed by an overview of how these ecosystem changes can influence a wide range of human values, both "market" and "non-market". To date, little attention has been paid to non-market values, even though this is

where most of the socioeconomic benefits of MPAs are derived, particularly through recreational values, wildlife viewing, and existence values. The objective of this paper is make sure that the California policymaking community has a clear idea of how the comprehensive socioeconomic benefits of MPAs can be assessed, including the limitations, challenges, and data requirements.

TIME: 3:45PM

Can Models Predict the Cumulative Effect of Multiple Human Activities on Ecosystem Condition?

* **Melissa Foley**¹ and **Corina Marks**^{1,2}

¹Center for Ocean Solutions, Stanford University;

²California State University, Monterey Bay

ABSTRACT: Human activities can alter marine and coastal habitats, particularly where multiple activities overlap. Estimating the cumulative impact of activities, however, is difficult to quantify. A recent model for the California Current related activity impact to habitat vulnerability and produced a map of cumulative impact scores. To examine the applicability of this model to management decisions, we conducted a groundtruthing study for two habitats: kelp forest and rocky intertidal. We analyzed existing ecological monitoring data collected along the central California coast, including MLPA monitoring data, to examine the relationship between impact intensity, cumulative impact score, and ecosystem indicators. Our results show that sites with similar abundances of indicator species have a similar suite of human uses, and the abundance of individual indicator species was negatively correlated with impact intensity. Our results suggest that human impacts play a role in structuring marine communities along the central coast. The results of this pilot study suggest that this model could be used to evaluate the potential ecological impacts associated with increasing use in the coastal ocean.

TIME: 4:00PM

MPA Watch—Human Activity Monitoring in Central Coast MPAs and Controls

* **Steve Shimek** and **a hundred volunteers**, *The Otter Project*

ABSTRACT: MPA Watch is a citizen science monitoring program that trains volunteers to observe and collect data about coastal and marine resource use inside and outside marine protected areas (MPAs) using standardized protocols and categorizing observed human uses into a discrete set of activities. Trained MPA Watch citizen scientists collect and report reliable information to help better understand how the public uses coastal areas and to inform management and monitoring of MPAs. The Central Coast MPA Watch Program monitors MPAs from Año Nuevo to Pt. Buchon for nearshore and beach activities. The Otter Project envisioned the MPA Watch program in 2009 and field tested the program in 2010. As of September 2012, we have 20 months of data from 2500 surveys provided by over 100 volunteers. Very general results indicate that consumptive activities occur in every area including the most strictly controlled State Parks. The frequency of illegal human "take" activities is approximately 14% to 73% less in MPAs than in corresponding control areas. In addition, The Otter Project partners with LightHawk (www.lighthawk.org) to overfly MPAs in order to map offshore uses.

TIME: 4:15PM

What Makes Grassroots Outreach and Education Efforts on California's MPAs Effective?

Paul Hobi, *Ocean Conservancy*

ABSTRACT: Across California's coast, grassroots NGOs, community groups, state agencies and aquaria have taken the initiative to steward and raise awareness of nearby MPAs. After implementation of each study region of the MLPA, NGOs have been able to respond quickly to educate their constituents on the new protections. These groups have played a key role in developing effective, audience-specific materials such as maps, permanent signage, and handouts in English and Spanish, and they work every day to educate coastal residents and visitors on California's MPAs. Their strategies are far from a one-size-fits-all approach. Knowledge of specific communities being targeted leads to customized materials and outreach strategies, which make these efforts vital to raising awareness of new protections. This presentation will showcase select outreach and education programs and materials from the South, North Central, and Central Coast in order to better understand exactly what makes community-based outreach effective. Outreach strategies generally fall into two distinct categories: reaching out to new audiences; and integrating MPA messaging into existing programs with built-in audiences. In both instances, intimate community-based knowledge has generally led to success. In order to identify lessons for future outreach, the presenter will discuss the specifics of both approaches, and how to gauge their effectiveness.

