California Ocean Science Trust:

Progress Report

Covering the period October 2012 through September 2014

CALIFORNIA
OCEAN
SCIENCE
TRUST

Ocean Science Trust Team

(as of September 2014)

Elizabeth August, Office Manager

Hayley Carter, Project Scientist

Benet Duncan, Associate Scientist

Laurel Kellner, Communications Coordinator

Yoon Hui Kim, Science Integration Fellow

Emily Knight, Program Manager

Dina Liebowitz, Science Integration Fellow

*Skyli McAfee, Executive Director

*Aaron McGregor, Associate Scientist

Erin Meyer, Associate Scientist

Ryan Meyer, Senior Scientist

*Moose O'Donnell, Senior Scientist

*Nita Puig-Albert, Chief Finance and Administration Officer

Errin Ramanujam, Associate Scientist

Marisa Villarreal, Project Scientist

*Steve Wells, Web Developer

Liz Whiteman, Program Director

Jim Wicker, Program Manager

Lori Zook, Administration Manager

*Departed Ocean Science Trust subsequent to this reporting period.

Ocean Science Trust….

Who We Are

We are a boundary organization. We work across the traditional boundaries between government, science, and communities to build trust and understanding in ocean and coastal science.

Government.

We are linked to the State.

We partner for good governance.

Community.

We find common ground.

We are here because we care.

Science.

We make science useful.

We are students of our own work.

Introduction

There is an overarching goal that inspires what we do: apply scientific knowledge to support California in managing for a healthy, resilient coast and ocean. Over the last couple of years we have focused on gathering our work under the banner of that goal, producing greater alignment across our programs, strengthening our internal and external messaging, and empowering our staff with this renewed vision. In late 2014, we engaged in an effort to review and re-energize our brand. Our new logo and new website, better reflecting who we are, launched in early 2015. Though after the period of this progress report, many of our activities during that time laid the foundation for our new look. Drawing on our day-to-day work as we refreshed our brand, we sharpened how we communicate about our organization and mission, and reaffirmed our deep commitment to partnership with the many agencies, NGOs, tribes, and ocean community members we work with. We invite you to dive into the renewed expression of who we are and what we do at www.oceansciencetrust.org.

Ocean Health as a Unifying Concept

In partnership with the Ocean Protection Council (OPC), we are exploring 'ocean health' as a unifying concept across California's ocean and coastal science-policy landscape. Managing for a healthy, resilient ocean is a theme that is already embedded across the legal mandates, management plans, and policies of state agencies. It is a concept that our ocean and coastal communities—whether they are fishermen or citizen scientists, tribes, local governments or NGOs—have acknowledged they care about. However, until now we have not asked ourselves in any formal way: What does a healthy coast and ocean for California mean exactly? And how do we know we're achieving it?

We began a new conversation across the community. Starting with the Ocean Protection Council Science Advisory Team (OPC-SAT) – California's anointed conduit to the broader scientific community – and state partners, we convened a workshop in June 2014 to explore ocean health as a scientific concept and management goal. Following that, we broadened the dialogue by co-convening with the OPC a workshop that brought together a panel of scientists, decision makers, tribal representatives, and constituents to lead a public discussion about what 'ocean health' means across our diverse coastal communities. Emerging from these discussions was a common theme – there is value in building a shared vision of coast and ocean health for California.

By coming together to recognize and reflect upon how we are working toward shared goals, it is our intention that this effort will catalyze progress toward more holistic and integrated management, supported by science. We are not talking about a new 'ocean health initiative,' but rather that launching this conversation is about better aligning what many of our agencies are already doing, and building new pathways for independent science

to enhance and inform those actions. A shared vision of ocean health offers a foundation on which to establish where we are and where we're going, to celebrate our collective progress, and identify opportunities to collaborate.

California's Future under a Changing Climate

As we consider the guiding principle of ocean health, it reveals the tools we have in hand for ecosystem-based approaches to policy and management, and how essential these are as we face a changing atmospheric and oceanographic climate. To plan, adapt, and mitigate we will have to work across management sectors and scientific disciplines in ways we haven't before. With the implementation of AB32, and adaptation efforts advancing, California is already leading the way. From sea-level rise and ocean acidification, to using our MPAs to track the impacts of climate change, Ocean Science Trust is supporting the State with the science and processes needed to bolster resilience, a key attribute of a healthy coast and ocean.

The Model of Our Science Integration Fellowships

Science Integration Fellowships are an important piece of our efforts to support careers in the growing field of work at the science, policy and management interface. Our fellows are engaged in project-based, collaborative work that draws on their field of expertise, but also provides direct experience with linking science with decision making.

During this period, we recruited four outstanding fellows: Dr. Julia Coates, Dr. Amy Freitag, Dr. Yoon Hui Kim and Dr. Dina Liebowitz. Julia's fellowship was conducted in partnership with the Southern California Coastal Water Research Project (SCCWRP). Based at SCCWRP, she played a pivotal role in linking our work more strongly with the world of water quality science and management. Working both in Oakland and Santa Cruz, Dina is partnering with the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) team at UC Santa Cruz to develop an integrated picture of the North Central Coast from baseline MPA monitoring in the region. Stationed here with us Oakland, Amy strengthened the linkages between citizen science and MPA monitoring. And lastly, Yoon is working directly with the OPC to develop an action plan to implement Safeguarding California – California's climate adaptation plan.

We look forward to continuing to develop the Science Integration Fellowship program as a model for launching successful careers, and advancing important targeted work here at Ocean Science Trust. Our partnership approach, with fellowships that link Ocean Science Trust with SCCWRP and PISCO, was also replicated in 2014 in Oregon, bringing together the Oregon Department of Fish and Wildlife and PISCO to advance Oregon's MPA program.

Linking Science Across Multiple Levels of Government:
The West Coast Ocean Acidification & Hypoxia Science Panel

The impacts of climate change demand that we work together in new ways. In a new collaboration across the science-policy landscape we are convening the West Coast Ocean Acidification & Hypoxia Science Panel (OAH Panel) - an interdisciplinary collaboration of 20 esteemed scientists representing California, Oregon, Washington, and British Columbia. Convened in 2013 at the request of the OPC, the OAH Panel is generating synthesis, cross-discipline products that address decision makers' priority knowledge needs that inhibit action on these complex issues.

Early in the Panel's tenure, the science-policy dialogue was dominated by water quality regulation, management and control. Today the Panel is painting a fuller picture – ocean acidification and hypoxia are among multiple stressors in a changing ocean environment, and planning for a future requires that we bolster ecosystem resilience using management tools from across the natural, living and water quality management realms. The forward looking vision from the OAH Panel that describes new forms of science, policy and management collaboration to address ocean acidification and hypoxia is attracting the attention of agency directors and policy executives at the state, regional, and federal levels of government, and changing the trajectory of West Coast action on these issues.

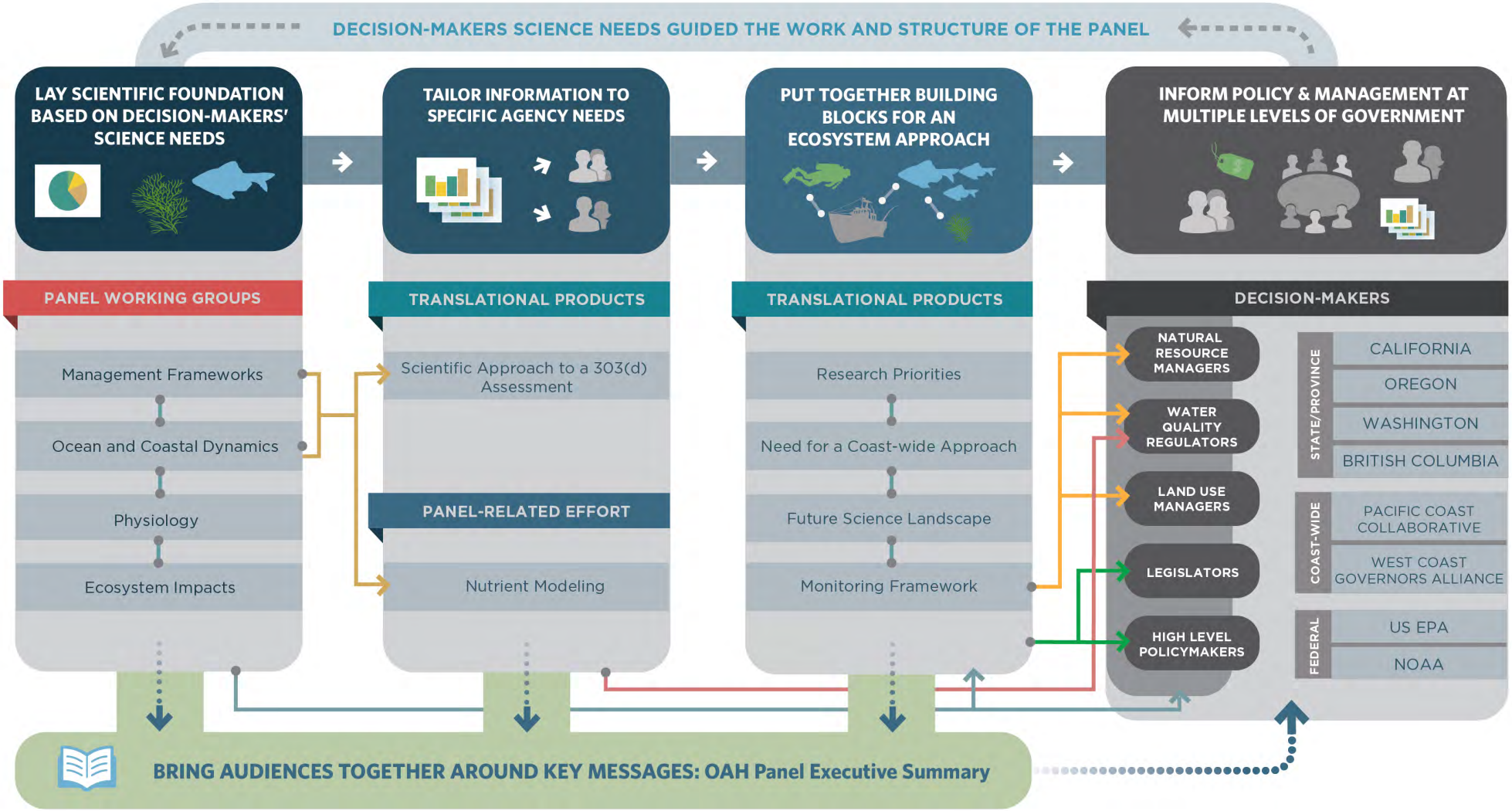
Laying a Scientific Foundation Based on Decision makers' Science Needs

The OAH Panel formed a series of working groups focused on topical themes identified by decision makers. Each is developing a publication or technical white paper that synthesizes the best available science about the drivers and impacts of acidification and hypoxia, as seen through a management lens:

- **Ocean & Coastal Dynamics:** is summarizing oceanographic drivers of ocean acidification and hypoxia at different scales, and illuminating the links between open ocean dynamics and near-shore processes along the West Coast.

- **Physiological Impacts:** is reviewing our knowledge of the links between ocean

Figure 1. OAH Panel Schematic: Elucidating the links between science & decision-making



acidification, hypoxia, and temperature, and the synergistic effects on the physiology of west coast species, including management relevant case studies such as Pacific rockfish, Humboldt squid, and pteropods.

- **Ecosystem Impacts:** is exploring how we can use existing management tools and frameworks to mitigate impacts of ocean acidification and hypoxia and bolster ecosystem resilience now, and in the face of an uncertain future.

- **Management Frameworks[1]:** is looking at the scientific knowledge being generated by the Panel through the lens of specific management processes to better convey decision makers' science needs to advance research and understanding.

Acknowledging that academic publications or technical white papers are not always accessible or useful to decision makers, Ocean Science Trust is also collaborating with panelists to develop a series of translational 'science to policy' products. The topics, format, and scope of these documents are in response to decision makers' specific requests or our analysis of their expressed science needs.

Tailoring Information for Specific Agency Needs

Some of the translational products are targeted at specific management processes where scientific information needs are inhibiting thoughtful management actions. Along the West Coast and at the federal level, our conversations with water quality managers revealed the increasing pressure they face to regulate pH under the guidelines of the Clean Water Act. This led to a request for technical help in evaluating the appropriateness of a 303(d) listing for acidification:

- **Scientific Approaches to Making a 303(d) Assessment for Near Coastal Acidification:** will present considerations and approaches to evaluate if water quality standards are being achieved with existing data. Working with panelists, we aim to complete this product by June 2015.

Putting Together Building Blocks for Considering Ecosystems

Our conversations with policy audiences at the state, regional and federal levels revealed a need for a science-supported vision of how to approach these complex issues in more holistic and integrated ways:

[1]This publication was released subsequent to this reporting period: http://westcoastoah.org/boehm-et-al/

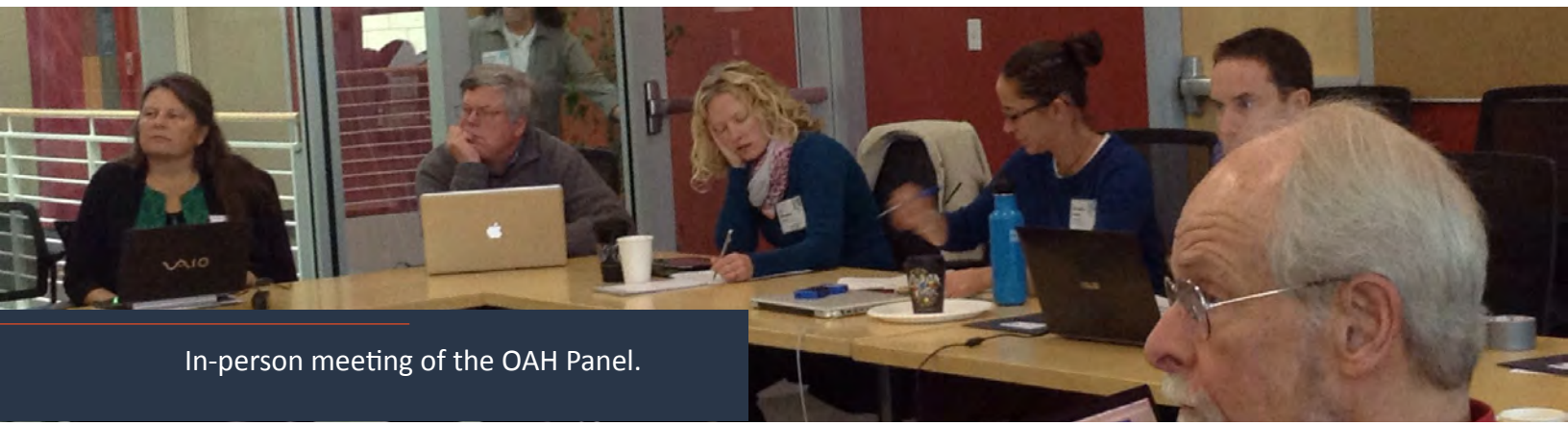
- **Today's Need for a West Coast-Wide Approach:** Requested by the OPC, this product highlights the critical need to collaborate across the West Coast. Since its release, this product has been well received in California and beyond – launching new dialogues with our federal partners that illustrate why the approach of the West Coast is a model for other coastal regions.

- **Envisioning a Future Science Landscape[2]:** Tailored for the President's Council on Environmental Quality, executives in the U.S. Environmental Protection Agency (USEPA) and the National Oceanic Atmospheric Administration (NOAA), and the Pacific Coast Collaborative (PCC), this product establishes the Panel and its forthcoming scientific and translational products as the key source for rigorous, actionable science. A culmination of the Panel's ongoing work and thinking, the document provides a vision for the future interface between science and policy, pathways to that vision, and initial steps along identified research trajectories that provide scientific guidance to policymakers and funders.

Ocean Science Trust has initiated other translational products as a result of decision makers' evolving needs, most notably conceptualizing a monitoring framework. Requested by the PCC and the OPC, the development of this product represents the Panel's growing recognition that monitoring of ecosystem impacts is the vehicle to connect these issues to 'things we care about' as a society, economic dialogues and management decisions. We are also beginning to scope research priorities associated with coastal adaptation as a way to assist decision makers in weighing how best to allocate limited capacity and resources in face of oncoming impacts from ocean acidification, hypoxia and other stressors.

Informing Policy and Management Across Multiple Levels of Government

Already, the scientific insights emerging from the OAH Panel are galvanizing discussions on ways to re-emphasize existing management and policy approaches through a climate change lens. Through our coordination and strategic guidance of the Panel, decision makers are recognizing ocean acidification and hypoxia not just for the challenge they pose, but as opportunities to mobilize cross-jurisdictional partnerships and stakeholders around credible scientific information. To confront impacts on individual species to complex ecosystems,



In-person meeting of the OAH Panel.

[2] This product was released subsequent to this reporting period (February 2015): http://westcoastoah.org/new-release-envisioning-a-future-science-landscape/

ocean acidification is best considered together with other system drivers, such as dissolved oxygen and temperature. The need to consider multiple stressors presents an opportunity to provide more relevant scientific guidance that spans water quality/nutrient management with living marine resource management.

As Ocean Science Trust convenes the OAH Panel into 2015, we are poised for a year of deepening engagement across the landscape of government agencies and policy entities. We are now laying the groundwork for briefings with the PCC, water quality and natural resource managers, regulators, and policymakers in California, Oregon and soon, Washington. In late December 2013, signatories of the PCC, including the governors of California, Oregon, and Washington, and the Premier of British Columbia, sent a letter to President Obama and Prime Minister Harper urging attention to the issues of ocean acidification and hypoxia, referencing the OAH Panel, and requesting a meeting with senior federal leadership. The PCC is presently in discussion to set up a meeting with the lead of the USEPA, which, if landed, will provide an opportunity to share the Panel's messages in a way that can shape federal response.

A variety of commercially important species are threatened by changing ocean chemistry, including (from top) sea urchins, pteropods, and oysters.

Strengthening the Impact of the Ocean Protection Council Science Advisory Team (OPC-SAT)

The OPC-SAT continues to coalesce as a team, embracing their unique role as the State's conduit to the broader scientific community on ocean and coastal issues. The OPC-SAT also stands as an example of California's recognition that scientific knowledge to inform decisions comes in a variety of forms. In 2014, we welcomed new expertise from the natural and social sciences, as well as traditional perspectives and traditional ecological knowledge. To learn more, visit the OPC-SAT on OceanSpaces, including the new Perspectives from the OPC-SAT blog series.

June 11, 2014 OPC-SAT workshop, "Exploring Ocean Health as a Scientific Concept and Management Goal."

The OPC-SAT's work often originates at semi-annual public workshops hosted by Ocean Science Trust, where OPC-SAT members come together with decision makers and other thought leaders to build new pathways for science in ocean management and policy. The outcomes of their work are reflected throughout this report, including:

- **Seeding the West Coast OAH Science Panel:** At our November 19, 2012 meeting, we brought the OPC-SAT together with state and federal decision makers, and scientists from the Washington State Blue Ribbon Panel to begin exploring how California could meet the challenge of ocean acidification and hypoxia. The OPC-SAT provided a credible, robust foundation for what is now the West Coast Ocean Acidification and Hypoxia Science Panel.

- **Building New Pathways for Science in Fisheries Management:** On September 4, 2013, we convened the OPC-SAT and state decision makers to initiate a conversation about tools and processes that could support the California Department of Fish and Wildlife and Fish and Game Commission in advancing sustainable fisheries under the Marine Life Management Act. From this meeting emerged a commitment to expand partnerships between the State and independent scientists, which now extends into a range of ongoing activities and projects.

- **Launching the Dialogue on Ocean Health:** On June 11, 2014, the OPC-SAT and state leaders launched a dialogue about ocean health as a scientific concept and management goal. At this meeting, decision makers declared that there would be value in building a shared vision of ocean health across mandates and jurisdictions. The OPC-SAT and decision makers also collectively recognized the need to work together to advance this dialogue, and that more than anything, a shared vision is about strengthening institutional partnerships and spanning traditional boundaries.

Expanding Partnerships between Science and the State:
Supporting Sustainable Fisheries Managment

Supporting sustainable fisheries and fishing communities is a declared priority of state decision makers, stakeholders, and many NGOs. As a result, a variety of tools, frameworks, and models have been developed, with increasing attention paid to data-poor stocks, ecosystem effects and new management tools, including MPAs. Our approach over the last two years has focused on arming decision makers with the knowledge they need to make more strategic choices about particular tools, including providing useful syntheses of emerging scientific approaches and lessons learned from other places.

In 2013, Ocean Science Trust released "Rapid Assessments of Selected California Fisheries." The rapid assessments are synopses of eleven California fisheries based on publically available scientific information and using the Marine Stewardship Council (MSC) assessment tree as a framework. The assessments were conducted to inform the OPC in implementing the next steps of California Sustainable Seafood Initiative (CSSI). But more broadly, the assessments offered Ocean Science Trust, the OPC, the Fish and Game Commission (FGC), and California Department of Fish and Wildlife (CDFW) a unique opportunity to identify key gaps in understanding across fisheries, potential fishery improvement projects, and critical research questions.

This initial project, together with our technical review of the methods used to measure abalone density (see box inset), set the stage for the September 2013 OPC-SAT meeting on "Advancing Science in California Fisheries," which was an opportunity to bring the OPC-SAT together with fishery decision makers to discuss our progress up until that point, and develop a shared plan going forward. The commitment to fisheries management supported by independent science supported an OPC resolution that included $4 million to augment the State's capacity to support fisheries management.

Exploring Fisheries Tools and Frameworks

Reflecting a growing momentum in the state to advance fisheries management, we also leveraged private funding to initiate a series of projects to explore new tools and frameworks that offered potential to meet fishery management science needs.

- **Survey of Socioeconomic Data Availability and Applications in California Fisheries:** We conducted an exploration of existing socioeconomic research and monitoring programs, particularly MPA monitoring projects to assess alignment with information needs for fishery assessment, monitoring and management.

- **Productivity Susceptibility Analysis (PSA) Test Case:** This project served as an evaluation of the potential utility of PSA to California fisheries as a tool that identifies and prioritizes fisheries for potential management action based on stock vulnerability to overfishing.

- **Exploring Ecological Risk Assessment (ERA) Frameworks:** With this project, we identified key aspects of ecological risk assessments (PSA above is often a first analytical step in an ERA) and how these align with fisheries management objectives in California, documented lessons learned from existing applications in Australia, the UK and other locations, and articulated considerations for adopting such methods in California fisheries.

Through these projects, we are compiling a toolbox of scientific analyses and methodologies to support sustainable fisheries management in California. These interrelated efforts are supporting California's engaged fisheries community with the science needed to move forward to a stronger, more resilient, future.

Looking Forward: Readying California's Fisheries for Climate Change

Our work alongside our state partners has empowered the State to explore innovative tools and processes as we face the consequences of a changing climate. As this 2-year period closed, we launched new collaborations with CDFW to explore how to incorporate risk assessments into California's fisheries, building consideration of climate change into fishery policy, regulation and day-to-day management, and leveraging existing investment in our statewide network of marine protected areas[3].

[3]An OPC-SAT workshop on Readying California Fisheries for Climate Change was held subsequent to this reporting period: http://oceanspaces.org/sites/default/files/u685/opc-sat_workshop_full_proceedings_2.25.2015.pdf

Strengthening the Use of Independent Scientific Review in Management

In 2014, we completed a scientific review of the survey design and methods used to estimate red abalone (Haliotis rufescens) density. The Final Report of the Science Advisory Committee is now directly informing the development of a Fishery Management Plan (FMP) for the northern red abalone recreational fishery.

While scientific and peer review is a common tool in our science integration toolbox, this effort was our first foray into implementing scientific review on behalf of California Department of Fish and Wildlife (CDFW) for fisheries management. Thus it was critically important to demonstrate our role as honest brokers between the Science Advisory Committee (SAC) and CDFW - as well as to interested stakeholders - to advance a rigorous, credible, and transparent review. We collaborated closely with CDFW to develop a common vision for the review process. The resulting scope and process documents grounded what was a complex and politically high-profile review process. To conduct the review, we convened a six-member SAC composed of independent experts who brought together interdisciplinary expertise as well as experience with the fishery. Throughout we worked to balance scientific rigor with transparency – by allowing the SAC to work independently while also creating venues for public engagement with CDFW and the SAC.

"Thank you for incorporating the citizen aspect in the review. I look forward to seeing how the Department of Fish and Wildlife incorporates the science recommendations. Please let me know if there is any way I as a citizen may further the importance of the recommendations."

- Jack Shaw, abalone diver

The Fish and Game Commission praised the report as clear and understandable, and exactly what the State needed; and fishing constituents applauded the review process itself for its inclusiveness and commitment to transparency, both in public testimony and in writing to us. The SAC itself also lauded the review process, crediting Ocean Science Trust's expertise and support in helping them engage so constructively with management.

Outcomes

- Restored fishermen's trust in science, and in the role they can play in management decisions.
- Strengthened partnerships with CDFW establishing our role as a source for independent, rigorous scientific review to inform fisheries management.

Leveraging State Investments:

Putting the Marine Protected Areas to Work

Our network of marine protected areas (MPAs) is the backbone of our natural resource management and conservation efforts towards a healthier ocean for California. The monitoring program we are building is based on a network of partnerships that knits together existing efforts, and leverages state investments to draw in additional funding and tap into the wealth of intellectual resources available in California.

Across the regions, we are engaging local communities to incorporate their perspectives into MPA monitoring, and expanding the types of knowledge – including traditional, local, and citizen knowledge – that are contributing to our understanding of our coastal ecosystems. We are establishing links between natural resource and water quality monitoring programs, and applying science integration tools to better understand the health of ocean ecosystems statewide. Alongside our state partners, we are building the scientific foundation needed to put our MPAs to work for California – advancing policy and management across fisheries, water quality and climate adaptation mandates. Collectively these efforts will reap greater returns on the significant investments made by so many to implement the statewide network.

Stewarding MPA Monitoring Baseline Programs

North & North Central Coast Regions

Across the North Coast and North Central Coast regions, we have been working to gather diverse sources of scientific knowledge to establish a 'benchmark' – a snapshot of ecological and socioeconomic conditions at the time the regional MPA networks took

effect. The North Coast MPA Baseline Program launched in December 2013, following 18-months of collaborative planning led by Ocean Science Trust and engaging local communities, elected officials and tribal governments. Recognizing that there are many types of information that contribute to our scientific understanding of marine ecosystems, this program is the first ocean monitoring program in the State to recognize and incorporate traditional ecological knowledge (TEK). Eleven projects make up the Baseline Program and include scientists, fishermen, tribal governments, and citizen groups from more than 30 organizations. We are now stewarding this program to maximize coordination and integration, and maximize the value of the state investment. Fieldwork on the North Coast began in late spring 2014, and will continue over the next couple of years.

In 2015, the North Central Coast will be the second region to transition from baseline to long-term monitoring. Leveraging public and private support, we are working with many partners in the region to develop and share baseline monitoring results – collectively forming a benchmark of ecological condition that can inform adaptive management of the regional MPA network. This process will set the stage for launching a partnerships-based, cost effective and useful long-term monitoring program in the region. As a first step, Ocean Science Trust led the development of a Regional Snapshot report, which highlights initial findings from the region, including new characterizations of the habitats that make up the ocean ecosystems of the region and new descriptions of commercial and recreational fishing and other human uses of our ocean resources.

Through a joint Science Integration Fellowship, Ocean Science Trust also joined forces with PISCO to explore ways to integrate this data with data from other programs in the region (e.g., Central and Northern California Ocean Observing System, California Seafloor Mapping Program) to build a more comprehensive picture or 'benchmark' of the region. As we turn our attention to the 5-year anniversary of the regional MPA network in late 2015, we were pleased to be able to sign up as the local host of the upcoming Western Society of Naturalists (WSN) Conference in November 2015. With WSN as an anchoring venue to share monitoring results we are now starting to design and launch communications, engagement and science steps to occur during 2015. Collectively, this work will inform the first 5-year management review of the region's MPA network, as well as leverage monitoring data to contribute to other management dialogues, such as fisheries management, or addressing ocean acidification, hypoxia, and other aspects of climate change.

South Coast Region

The South Coast MPA network was implemented in January 2012. Ocean Science Trust, in collaboration with CDFW, OPC, and California Sea Grant, led the design and implementation of the state-funded South Coast MPA Baseline Program to conduct baseline monitoring in the region. The results of monitoring will inform an initial 5-year adaptive management review of the network, anticipated in early 2017. This region presents a unique opportunity to share baseline MPA monitoring results with a range of decision-making clients beyond natural resource managers, demonstrating how MPAs and MPA monitoring can serve the

information needs of water quality managers and coastal development planners, and in doing so, illuminates opportunities to combine and leverage monitoring programs. We are working with the water quality, oceanographic, citizen science, and human use monitoring communities, and we anticipate co-developing monitoring products to share with decision makers. We highlight here a strengthening collaboration with SCCWRP as they implement the Bight '13 regional monitoring program concurrently with south coast MPA monitoring.

During 2014, final reports were received from each baseline project in the region and, together with the OPC, CDFW and Sea Grant we implemented a peer review process to ensure the scientific rigor of monitoring results. In parallel, we also developed an intuitive and streamlined data upload tool that will be the entry point for principal investigators (PI) to submit their data for publication on OceanSpaces where they will be publically accessible for download and use.

In late 2014 we were pleased to have a proposal accepted for a special issue of the scientific journal Marine Ecology. Ocean Science Trust staff will serve as guest editors to steward the review and publication of a set of 6-8 open access publications that will shape a comprehensive picture of the South Coast region, and provide a strong scientific foundation for ocean management decisions in the coming years.

Transitioning to Long-Term Monitoring

Central Coast Region

In 2012, the Central Coast became the first region to reach the end of the five-year Baseline Program period. To share results, we worked closely with the Central Coast MPA Baseline Program researchers and other key partners to develop a State of the Region report showcasing key Central Coast results and establishing a benchmark of ocean conditions against which future MPA performance can be measured. This report provided the scientific foundation for adaptive management of the regional MPA network and set the stage to transition into a targeted, strategic, partnerships-based long-term monitoring program for the region.

- **Updating the Central Coast MPA Monitoring Plan.** The updated Central Coast MPA Monitoring Plan was collaboratively developed with extensive input from many, including scientists throughout California and beyond, resource managers, native communities, fishermen, and members of the greater Central Coast ocean community. The resulting plan applies California's MPA monitoring framework and is informed by the results of the Central and North Central Coast baseline monitoring programs, and the existing monitoring plans for the North Central and South Coast regions. The draft plan was released for public input in mid-May and received broad, insightful and constructive feedback – a validation of our outreach among Central Coast communities. The FGC adopted the plan as policy guiding MPA monitoring in October 2014.

- **Central Coast Survey.** We conducted a Central Coast Monitoring Survey through OceanSpaces from July through September. This innovative survey attracted more than 60 responses detailing individual monitoring projects in the region and giving the State unique insight into existing capacity in the region. The results show the geographic and temporal coverage of monitoring activities inside and outside of Central Coast MPAs, and the compatibility of those activities with the metrics and priorities outlined in the Central Coast MPA Monitoring Plan. Data from the survey, most of which are publicly available through an interactive online dashboard, are informing a work plan for MPA monitoring by highlighting potential partnerships and opportunities to build upon existing capacity in the region.

- **Work Plan for Central Coast MPA Monitoring.** At its meeting in June 2014, the OPC authorized up to $3 million to support and seed the next five years of MPA monitoring in the Central Coast. The OPC authorization calls for a work plan laying out a budget and implementation plan for MPA monitoring in the region. Building on a series of conversations about state priorities, our knowledge of existing capacity in the region from the Central Coast survey and other sources, and operational considerations such as sampling design, Ocean Science Trust is assembling this work plan for consideration by OPC staff in summer 2015.

Our extensive engagement with Central Coast communities, state partners, and the science community (including citizen science – see the sub-section, Incorporating Citizen Science in MPA Monitoring) are all leading to a nimble and efficient next phase of MPA monitoring in the Central Coast that seeds and supports monitoring activities based on a broad and deep knowledge of existing capacity in the region, and a growing network of strong partnerships.

From the Central Coast Symposium: Celebrating MPA Monitoring

Chuck Bonham, Director, CDFW

Briannon Fraley, Smith River Rancheria

Zeke Grader, Pacific Coast Federation of Fishermen's Associations

State of the Central Coast Symposium

It doesn't happen often – scientists, fishermen, tribal members, environmentalists, decision makers and managers gathered together to discuss the monitoring, enforcement, and management of a regional network of MPAs. But from February 27-March 1, 2013, 380 people gathered in Monterey for the State of the California Central Coast symposium. Co-hosted by Ocean Science Trust, OPC, CDFW, and FGC, this public symposium offered resource managers, policymakers, stakeholders, and scientists an opportunity to reflect on the first five years of MPA monitoring and management in California's Central Coast region.

Reflections on Central Coast Symposium

- **Setting the Standard for Monitoring Ecosystems:** The symposium provided a public platform for setting the standard for MPA monitoring. The various projects of the Baseline Program produced a breadth of sound data and results. One of the main themes that emerged was the value of partnerships in laying a foundation for rigorous and cost effective MPA monitoring as we transition to a long-term monitoring program.

- **The Socioeconomic Side of MPA Monitoring:** At the symposium we heard about socioeconomic change in the Central Coast from a variety of perspectives. It is fair to say, however, that our collective capacity to observe and understand socioeconomic change, and relate that understanding to MPAs, is far behind that of the ecologists. This is a great opportunity: adaptive management of MPAs provides an impetus to bolster our analytical and organizational capacity in social science in ways that may have implications far beyond the MPA network.

- **Sharing Results and Fostering Community:** The Symposium offered an ideal platform to highlight our online community – OceanSpaces, including the unique ways that it brings together community members, monitoring data, and analysis into a single unified view.

- **Advancing Citizen Science:** An impressive variety of motivated citizen groups have devoted their time and energy to monitoring. At the symposium we were surrounded by evidence of why this is so important. We can't afford to take this resource for granted, especially as funds shrink, and the potential scope for monitoring expands.

- **Building Relationships with Tribes and Tribal Communities:** We were privileged to have tribal representatives join us and participate in the discussions. Throughout the symposium, whether in presentations, or panel discussions or conversations at the social mixers, common themes emerged, including a desire to be active participants in monitoring and interest in exploring the ways in which Traditional Ecological Knowledge (TEK) can inform our understanding of ocean health.

Incorporating Citizen Science in MPA Monitoring

Citizen science has been a valuable component of baseline MPA monitoring across the state. Through focused work on the Central Coast, Ocean Science Trust has been exploring the classic challenge of integrating citizen generated data into a monitoring program, and building the credibility and trust needed for managers to feel confident in using this information in decision-processes.

In April 2014, Ocean Science Trust convened a workshop with coastal and ocean citizen science groups from the Central Coast, and staff from CDFW, OPC, and NOAA Marine Sanctuaries. The event, which followed a series of interviews and focus groups with these programs, was an important step in developing guidance that reflects the opportunities and challenges of developing partnerships between citizen science groups and ocean resource managers in California and beyond. We have captured insights from this project in a guidance document entitled "Citizen Science and Ocean Resource Management in California: Guidance for Forming Productive Partnerships." This document acknowledges that it is not easy to build pathways for citizen generated data to inform management, but recognizes the broad benefits of engaging local communities in ocean stewardship through science.

In the South Coast we are continuing a focused effort as part of our collaboration with MPA Watch. We are working with MPA Watch to develop the scientific and technical tools necessary to establish it as a scientifically rigorous partner in MPA human use monitoring. Over the last two years we made great strides in aligning protocol design and implementation, and developing an integrated database. Now that these foundational elements of MPA Watch are in place, we are turning our attention to identifying QA/QC approaches appropriate for volunteer collected data; statistical approaches for data analysis; and reporting tools appropriate given data collection methods.

We have also begun engaging broader communities that may be interested in this work on citizen science and ocean resource management: social scientists studying the development of citizen science, citizen science professionals, and managers who want to engage with citizen science. We co-convened a panel on marine citizen science at the International Marine Conservation Congress in August 2014, which resulted in a manuscript in the Journal of Ocean and Coastal Management. With the growing energy around OceanSpaces

(where we continue to share our work on this project through the OceanSpaces blog) and support from participants at the workshop and throughout California, we are optimistic about the development of a marine citizen science community of practice – supporting ongoing discussions, sharing resources, and linking a dynamic network of practitioners.

Building Bridges Between the MPA and Water Quality Communities

There are multiple ways to advance ocean health, including broadly engaging across the agency and academic landscapes. California has long identified the need to strengthen reciprocal links between water quality monitoring and MPA monitoring to efficiently and effectively meet management needs of the California Environmental Protection Agency (CalEPA) and the Natural Resources Agency. Over the course of the last two years we worked in partnership with SCCWRP and others in the South Coast region, to advance a deeper mutual understanding of MPA and water quality monitoring, and to explore opportunities for collaboration, leveraging and efficiencies across monitoring programs.

Scoping 'My Water Quality' Ocean Health Portal

The Water Quality Monitoring Council (WQMC), a state body appointed by the Secretaries of CalEPA and the Natural Resources Agency, has created a series of data portals aimed at helping the public understand: Is water safe to drink? Is it safe to swim? Are fish safe to eat? And more broadly, is ecosystem health being protected? To continue building on this work, the WQMC began calling for development of an ocean-themed portal. To advance this dialogue, and bring clarity and focus to the portal, Ocean Science Trust solicited external funding to lead a collaborative scoping effort with members of the ocean portal workgroup. Engaging representatives from SCCWRP, San Francisco Estuary Institute (SFEI), Department of Water Resources (DWR), State Water Resources Control Board (SWRCB), and California Coastkeeper, we produced the a "My Water Quality Ocean Portal Roadmap" to guide development of an ocean health web portal. The completed Roadmap charts an achievable, cost-effective content and technical development strategy, and has set the stage for an enduring collaboration among data providers and users in the ocean realm, across multiple regulatory and management dialogues.

Strengthening Links between MPA and Water Quality Monitoring

Co-located MPAs and Areas of Special Biological Significance (ASBS) in southern California offer an important opportunity to bridge across the water quality and MPA communities. Through 2014, Ocean Science Trust joined with the SCCWRP to support a Science Integration Fellow to evaluate the technical overlap between monitoring programs designed to meet differing state mandates, conduct data analyses in support of the Bight '13 program, and integrate Bight and MPA monitoring data to answer key questions identified by program partners. Specifically, the MPA workgroup within the Bight '13 program has focused on meta-analyses of existing data that aim to parse the effects of

water quality on ecosystem condition from the effects of fishing on ecosystems – a topic of long standing interest to the fishing community in the region. A manuscript from this work has been recently submitted to Marine Ecology Progress Series and the results are being fed directly into both Bight '13 reporting and South Coast baseline MPA monitoring results reports.

This work has built productive relationships that are founded in the partnership between Ocean Science Trust and SCCWRP but which now extend to encompass a network of relationships between our respective partners, member agencies and constituencies. Indeed, our initial collaboration has been lauded by partners at the SWRCB and funding support committed to launch a second phase of collaborative work.

The Role of Expert Judgment in Understanding Ecosystem Health

As natural resource management shifts toward ecosystem protections and regulations, managers increasingly rely on expert judgment processes to report on the resources and ecosystems that are the focus of these policies. Here we refer to expert judgment as a process leading to assertions based on specialized knowledge and experience. In the broader challenge of crafting a constructive role for science in decision making, expert judgment is an important tool.

Initially, we piloted an expert judgment project to better understand the health of kelp forest ecosystems inside and outside of MPAs in California's Central Coast region. As a second case study, as part of our Aquatic Invasive Species Vector Risk Assessments, we facilitated a process to judge the relative risk of different vectors for introducing aquatic invasive species to California. To mark the next phase in our work to test the application of expert judgment, we are now convening a team of scientists to assess the ecosystem health of sandy beach and surf zone ecosystems in the North Central Coast.

Learning from an Emerging Body of Practice

While there are many examples from which to draw, there is no widely used framework for developing expert judgment processes for natural resource decision making. Processes differ greatly, from highly structured to informal and ad-hoc; from qualitative to quantitative; from open and transparent to anonymous and opaque. Thus through

background research, a series of interviews with practitioners, and a workshop we developed "Putting the Pieces Together: Designing Expert Judgment Processes for Natural Resource Decision Making." In this guide, we distilled lessons from wide-ranging experiences with the use of expert judgment to help ourselves and others avoid mistakes, and secure positive outcomes for expert judgment processes related to natural resource management.

Developing Tools in the Toolbox of Science Integration

Synthesizing our own learning about the 'tools of our trade' clarifies who we are and what we do, and it also catalyzes next steps. In the case of expert judgment, we are poised to work in partnership with the OPC to engage in a process to align policies, mandates and management frameworks across agencies for a shared vision of a healthy ocean for California. With citizen science, we are guiding the State on how to form productive partnerships between decision makers and citizen scientists.

Similarly, science needs assessment, which is the use of interview and other survey techniques to better understand decision makers' science needs, is a fundamental tool in our toolbox. From ensuring that the West Coast Ocean Acidification and Hypoxia Science Panel focuses on useful, salient science, to scoping the scientific review of the methods used to estimate densities of red abalone, science needs assessment is enabling us to design the processes by which new information can be taken up and used. Like expert judgment and citizen science, we are now developing a guidebook describing the development of our own thinking and approaches to implementing strategic interviews, the outcomes of our many applications of science needs assessment to date, and lessons-learned.

Bringing Communities Together Around Science:

OceanSpaces is the online community that tracks the health of California's oceans. A shared body of scientific knowledge empowers broad participation in the decisions shaping the future of our coasts and oceans.

Launched in June 2014, our continued commitment to the ocean community is manifest in multiple ways in the upgraded OceanSpaces 2.0. Based on feedback from users and others, the new OceanSpaces includes improved navigation, a new technology platform, expanded themes of content, and a new visual identity. The evolution also ushers in several improvements on how users can interact with site content and new ways to contribute to the community. As part of this redesign process, we performed a major upgrade to the basic technology powering OceanSpaces. With this upgrade in place we have a versatile platform to build out new features that enhance the benefits of OceanSpaces membership and empower our users.

A major new feature is the ability to easily self-publish a blog or community news story. Members can now tell their story – adding directly to the depth of knowledge within the OceanSpaces community. Creating a community group or organization page is now simple and efficient. Users can easily showcase research or monitoring programs, or collaborate and share information about a topic important to the community. We've also expanded the breadth of content to highlight the holistic approach we need for ocean resource management. Community members can learn about the topics that are critical to securing a healthy and resilient ocean for California, such as MPAs, sustainable fisheries, water quality, and ocean acidification.

During the last quarter of 2014 and the first quarter of 2015 we have been developing a brand new version of our data upload tool. This tool will be the conduit for South Coast scientists to submit their data to OceanSpaces. The tool is redesigned from the ground up to provide an advanced and user-friendly interface, which will reduce the time and effort required for labs to submit their data. With the addition of South Coast data, OceanSpaces will offer the ocean health community access to approximately 200 data packages from the North Central, Central and South Coast regions.

Member contributions to OceanSpaces content have grown substantially. Prior to relaunching OceanSpaces, most of our blog content was curated by Ocean Science Trust staff. Now, the majority of our blog posts and news items are generated from the community. We will to continue to receive user feedback to help us shape further upgrades and new features. We are actively reaching out to groups and organizations that would benefit from OceanSpaces membership, and are working with them to create a presence that continues to enhance this vibrant and evolving community.

Appendix I: Our Funding

Statement of Activities and Changes in Net Assets

	FY2012-2013* Oct 1, 2012 - Sept 30, 2013	FY2013-2014** Oct 1, 2013 - Sept 30, 2014
Revenues		
Contributions	1,183,793	1,081,473
Contracts	1,487,346	1,536,783
Other	6,793	2,907
Total Revenues	**2,677,932**	**2,621,164**
Expenses		
Program Services	**1,733,119**	**1,908,958**
Supporting Services		
Management and General	561,104	581,684
Fundraising	6,363	6,877
Total Supporting Services	**567,467**	**588,561**
Total Expenses	**2,300,586**	**2,497,523**
Net Income	**377,346**	**123,641**
Change in Donor Intent	-	-
Change in Net Assets	377,346	123,641
Net Assets at the Beginning of Year	2,638,626	3,015,972
Net Assests at the End of the Year	**3,015,972**	**3,139,614**

Statement of Financial Position

	FY2012-2013	FY2013-2014
Assets		
Cash	2,518,459	2,090,254
Account Receivable		5,872
Contribution Receivable	200,000	200,000
Grants Receivable	43,948	26,895
Contracts Receivable	910,762	1,009,830
Prepaid Expense	33,792	23,300
Equipment	25,503	22,426
Total Assets	**3,732,464**	**3,378,577**
Liabilities		
Accounts Payable	81,210	62,613
Payroll Payable	37,390	40,449
Refundable Grant	-	-
Deferred Support	581,471	121,257
Deferred Rent	16,421	14,643
Total Liabilities	**716,492**	**238,963**
Net Assets		
Unrestricted	2,866,972	2,947,901
Temporarily Restricted	149,000	191,713
Total Net Assets	**3,015,972**	**3,139,614**
Total Liabilities and Net Assets	**3,732,464**	**3,378,577**

*Audited

**Unaudited

Our Funding Partners

2012-2013 Partners

Resources Legacy Fund Foundation

The Ocean Protection Council

National Oceanic and Atmospheric Administration

The Keith Campbell Foundation for the Environment

The David and Lucile Packard Foundation

2013-2014

Resources Legacy Fund Foundation

The Ocean Protection Council

National Oceanic and Atmospheric Administration

The Keith Campbell Foundation for the Environment

The David and Lucile Packard Foundation

Appendix II: Our Board

Board of Trustees

(as of September 2014)

- *Ken Wiseman, Board of Trustees Chair, General Public Representative
- *Honorable Fred Keeley, Chair, Audit and Finance Subcommittee, General Public Representative
- Jonathan Bishop, CAL EPA Representative
- Catherine Kuhlman, Natural Resources Agency Representative
- *Kenneth Coale, CSU/UC Representative
- Karen Finn, Department of Finance Representative
- Leslie Mintz Tamminen, Ocean and Coastal Interest Group Representative
- *Stephen Weisberg, General Public Representative

The Finance and Audit Subcommittee

- Fred Keeley, Chair, General Public Representative
- Karen Finn, Department of Finance Representative
- Ken Wiseman, General Public Representative

*Board term ended subsequent to this reporting period.

Appendix III: Additional Information

Former Staff

Ocean Science Trust wishes to recognize the contributions of staff from this reporting period that have since moved on to other exciting endeavors:

Julie Besaha, Director of Finance and Administration

Julia Coates, Science Integration Fellow

Amy Freitag, Science Integration Fellow

Holly Rindge, Communications Manager

Erin Traylor, Office Manager

Hayley Zemel, Program Associate

Former Board Members

Barry Gold, Vice Chair, Ocean and Coastal Interest Group Representative

David D. Caron, CSU/UC Representative

Photo Credits:

Cover: M. Beetham; Who We Are: E. Knight; Page 3: E. Knight; Page 6: H. Carter; Page 7: N. Bednarsek (pteropod); M. O'Donnell (oysters); Page 9 B. Stamski; Page 10: V. Termini; Page 11: S. Lonhart; Page 15: E. Knight; Page 23: E. Knight