California Ocean Science Trust

Progress Report from October 2016 through September 2017

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Introduction

California Ocean Science Trust (OST) is a 501c(3) with a unique charter and value to the State. We were founded by state legislation - California Ocean Resources Stewardship Act (CORSA) - to work in service of California's goals of a healthy, resilient and productive ocean and coast.

Ocean Science Trust was established by CORSA in recognition of both the value of independent science advice in natural resource policy and management decisions, and the noteworthy breadth and depth of scientific knowledge in California's academic community. We are the only independent nonprofit in California solely dedicated to California's ocean policy and management goals; we take this responsibility seriously.

The growing challenge of changing ocean conditions

Exemplified by ocean acidification, harmful algal blooms and rising temperatures, California's ocean conditions are changing. Ecological and socioeconomic impacts are increasing in severity but are also increasingly hard to predict. Faced with increasing uncertainty, resource managers, regulators and policy-makers need credible scientific information presented in a timely, useful format to inform decisions.

OST strives to deliver the science necessary to establish and support resilient management frameworks and sound governance structures. We recognize that resilience – both societal and ecological – is strengthened through participatory public policy in which all participants are empowered with rigorous science and can contribute to decision-making processes armed with that knowledge.

As described in this report, during 2016-2017 we delivered science guidance to state resource managers, policy-makers, legislators, and the public across a range of priority issues. Today, we are building upon this foundation and continuing to support the State with the science we need to address the changing conditions of our coast and ocean, and the ensuing impacts on coastal communities and economies.

Providing scientific advice and recommendations

California Ocean Science Trust occupies a unique niche: we serve as Ocean Protection Council (OPC) Science Advisor and as convener of the OPC's Science Advisory Team (OPC SAT).

The OST Executive Director serves as the designated OPC Science Advisor and co-chair of the OPC SAT - connecting the dots between and among the academic community and the many state agencies with ocean and coastal jurisdiction. All OST team members support this role.

During this reporting period we served on committees and panels including the Central and Northern California Ocean Observing System (CenCOOS) governing council, Marine Protected Area Statewide Leadership Team, and California Current Acidification Network (C-CAN), and represented the State's priorities and science needs to the academic community. We also provided a quarterly science update to the Council and collaborated with OPC staff to provide sound scientific guidance and foundation to OPC's policy and investment decisions.

We recognize the important value of the authoritative and collective voice of the OPC SAT, particularly on topics with rapidly evolving and uncertain scientific understanding. During the 2016-17 reporting year the OPC SAT embraced its most active agenda with more concurrent working groups than ever before (see references in Programmatic Achievements below); a testament to the commitment of this group and their recognition of the need for responsiveness to changing ocean conditions. In addition, we put the building blocks in place for durable and appropriate functioning of this important body. We began developing OPC SAT Working Procedures - a summary of options and processes for engaging with and deploying the OPC SAT that clarifies when and how to engage this team.

Our Programmatic Achievements

Climate Change, Adaptation and Mitigation

Rising seas in California: An update to sea-level rise science

The *State of California Sea-Level Rise Guidance Document,* initially adopted in 2010 and updated in 2013, provides guidance to state agencies for incorporating sea-level rise projections into planning, permitting, investment and other decisions. In 2017, the California Ocean Protection Council and the California Natural Resources Agency, in collaboration with the Governor's Office of Planning and Research and the California Ocean Science Trust, began revising this statewide guidance to reflect recent advances in ice loss science and projections of sea-level rise. The updated guidance focuses on the needs of state agencies and local governments. It helps cities and counties as they comply with a new law that requires them to incorporate climate change into their planning efforts. The updated guidance document assists state agencies in preparing for and adapting to climate change, as directed by Governor Brown's recent Executive Order.

California Ocean Science Trust convened an OPC SAT Working Group from January – April 2017 to consider the implications of recent scientific advances on ice melt/loss dynamics to update sea-level rise projections, and develop a 'state of the science' summary of the drivers of sea-level rise and implications of model selection, approach and uncertainty. The final report - *Rising Seas in California: An update to sea-level rise science* - served as the scientific foundation for the subsequent 2018 adoption of new statewide policy guidance on sea-level rise. Download this report.

In parallel, we also led an effort to solicit input from users of the guidance document so that it could best respond to the needs of those who will ultimately use it. In summer 2017, OPC and OST convened a series of public workshops with state, regional, and local stakeholders to share the science findings and to solicit feedback on how stakeholders will utilize the guidance document. This and subsequent public input shaped the updated statewide policy guidance document.

Ocean and coast in California's 4th Climate Assessment

The state of California has been addressing climate change for over 20 years. Scientific assessments are an important way that state and local leaders better understand how climate change is currently affecting us, what we might expect in the future, and what we can do about it. Previous California climate assessments have focused on the physical changes expected in our oceans, including sea-level rise and changing ocean chemistry. In 2017, in partnership with OPC, we launched a new effort to bring a greater focus and attention on ocean ecosystems as a component of California's 4th Climate Assessment. In what later became a statewide chapter of the assessment on coasts and oceans, we collaborated with OPC staff to convene a working group of the OPC SAT to:

- Synthesize knowledge of the impacts of climate change on human coastal communities and associated ocean and coastal ecosystems;
- Advance science-based solutions to inform decision-making;
- Identify emerging issues, knowledge, and policy gaps to advance the State's ongoing adaptation research and funding agenda.

This report was finalized and released in 2018. Download this report.

Seagrass and kelp as an ocean acidification management tool

California is exploring local and regional management strategies to address ocean acidification (OA). In early 2016, the West Coast OA and Hypoxia Science Panel recommended that states advance approaches that remove CO2 (carbon dioxide) from seawater, including making use of photosynthesizing plants in coastal environments. In addition, recent legislation in California (Senate Bill No. 1363, Monning, 2016) calls for scientific approaches to protect and restore eelgrass beds as a critical strategy in enhancing California's ability to withstand OA.

As California considers nature-based adaptation strategies, the State is challenged with identifying when, where, and conditions under which submerged aquatic vegetation - particularly kelp and seagrasses - restoration and protection can most successfully be applied to ameliorate OA. To assist the State with synthesizing knowledge on the West Coast and prioritizing next steps for California, OST convened a working group of the OPC SAT to provide guidance on:

- Current approaches to evaluate and quantify amelioration potential;
- Scaling up existing demonstration projects;
- Existing efforts and their ability to inform management and policy in California;
- Understanding the impacts of future climate stressors on the amelioration potential of SAV.

Download the final report, released in January 2018.

Sustainable Fisheries

Considering climate change in fisheries management

California fisheries are at risk from a variety of impacts including a changing climate. In collaboration with an OPC SAT Working Group, OST provided guidance to California Department of Fish and Wildlife (CDFW), OPC and other state partners about the range of expected impacts and potential management responses. The resulting report - Readying California Fisheries for Climate Change - was finalized in early 2017 and formed an important resource for CDFW as they undertook to amend the Marine Life Management (MLMA) Master Plan, the primary policy document guiding management of state-managed fisheries. Download the final report.

Planning for and monitoring harmful algal blooms (HABs)

In 2015 and 2016, elevated levels of domoic acid were observed in major commercial and recreational shell-fisheries in California, including Dungeness crab and rock crab, leading to health advisories and fishery closures during the 2015/16 season. Given California's changing ocean conditions and increasing threats to coastal economies, the State is interested in exploring opportunities to bolster its existing seafood biotoxin sampling and harmful algal bloom (HAB) monitoring programs, as well as advance understanding and ability to predict HAB events and fishery impacts.

In response to these events, the Interagency Marine Harmful Algal Bloom Task Force, convened by OPC, asked OST to convene an OPC SAT working group to explore the science supporting California's existing HAB and biotoxin monitoring in the marine environment along the coast of California, and provide scientific guidance on how to add capacity and support state needs. We worked closely with the OPC SAT working group to develop scientific guidance and options for adding capacity to the State's existing HAB monitoring and sampling efforts. This document:

- Reflects on our current understanding of harmful algal blooms in light of the 2015-16 domoic acid event;
- Identifies primary science needs;
- Determines how the scientific community can best add capacity to the state as we prepare for future toxic bloom events in California.

Download the final report, released in October 2016.

Evaluating the utility and value of ecological risk assessments

Risk assessment models and tools offer an approach to develop transparent prioritizations of fisheries for management plan development and regulatory action. These assessments also incorporate a diverse array of information into the fishery management process (including social, climate change, Marine Protected Area (MPA) information, etc). These tools are regularly employed in other countries but currently have limited use in the US.

CDFW requested that OST research, develop and pilot-test a risk-based decision framework that advances the goals of the MLMA with regard to prioritization of fisheries for management attention, and is transparent, cost-effective to implement, and scientifically rigorous. CDFW sought an ecosystem-based management tool that could assess three ecosystem components: target species, bycatch species, and marine habitats. CDFW was also interested in considering the potential benefits of California's network of MPAs. The goal of this project was to provide CDFW with a scientifically vetted pilot test of an ecological risk assessment (ERA) that could inform the prioritization among fisheries as part of the MLMA Master Plan amendment.

OST worked closely with experts Jameal Samhouri and Joe Bizzarro, NOAA Fisheries West Coast Region, to pilot an ERA adapted from Samhouri and Levin, 2012. During the summer of 2017, OST hosted two stakeholder workshops to share and refine both the tool operation and the data input. This was a novel approach given that often stakeholders and knowledge outside of academia are not included in the tool development or analysis. The pilot was conducted on nine California state marine fisheries with a range of different characteristics. Download the final report.

Designing scientific peer review for fishery management plans

Scientific and technical review is an essential element of fisheries management but classic approaches defer this scientific input to a late stage in the development of fishery management plans. OST has deep experience in review processes that are tailored to the needs of managers and regulators. In 2016, OST presented a scaled approach to peer review that both accommodates different tiers of fishery management plan and that increases the options for including science in multiple steps of the fishery management process. This report formed the foundation for the peer review chapter of the MLMA Master Plan amendment. Download the peer review guidance report, released in June 2016.

Marine Protected Areas

MPA baseline monitoring

California has made a globally significant investment to establish its statewide MPA network and monitor its effectiveness. During this year we synthesized data and findings from the South Coast and the North Coast baseline monitoring programs and shared results in print, in-person, and online. Collectively these results add up to the most comprehensive snapshot of our coastal ecosystems, and will serve in perpetuity. During this time period we delivered:

- *South Coast MPA Baseline Results* - We developed and release the findings of the South Coast MPA Baseline Program, in collaboration with OPC, CDFW and many academic, agency and private partners. This included engaging stakeholder communities, facilitating contributions from research and monitoring programs, sharing results widely and reporting to the Fish and Game Commission to inform adaptive management decisions. We produced eight snapshot reports summarizing components of baseline monitoring results and a synthetic 'state of the region' summary report. Download all data and reports here.
- *Implementation of the North Coast MPA Baseline Program* - We also launched a comparable effort tailored for the North Coast. Initial steps during this year included coordinating peer review of technical reports and overseeing data upload and delivery. We also took steps to build capacity in the region and facilitate stronger connections with the academic community by hiring an 18-month science integration fellow in partnership with Humboldt State University.

Informing long-term MPA monitoring

California is adopting a statewide approach for long-term MPA monitoring, informed by regional differences and considerations. In 2016-17 the state focused on building durable capacity for that program and we collaborated with CDFW and OPC to create a program that delivers useful monitoring results to a broad array of California resource decision-makers. Specifically we produced:

- Recommendations for monitoring estuaries - A report that examines the opportunities to leverage existing efforts and align programs to build an efficient estuaries monitoring component of the broader statewide MPA monitoring program.
- EOI process recommendations - Adapting 'expressions of interest' processes used by many other organizations to MPA monitoring program goals and developing opportunities to seed funding that attracts (is match for) additional support.

These reports informed the subsequent development of the statewide MPA Monitoring Action Plan and later became appendices to that plan.

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Funders (2016-2017)

California Ocean Protection Council

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Financial summary on the following page

Statement of Activities and Changes in Net Assets

	FY2016-2017 (Audited) Oct 1, 2016 - Sept 30, 2017
Revenues	
Contributions	524,455
Contracts	1,570,486
Other	11,548
Total Revenues	**2,106,489**
Expenses	
Program Services	**1,958,710**
Supporting Services	
Management and General	227,953
Fundraising	95,925
Total Supporting Services	**323,878**
Total Expenses	**2,282,588**
Net Income	**(176,099)**
Change in Donor Intent	
Change in Net Assets	(176,099)
Net Assets at the Beginning of Year	3,420,191
Net Assests at the End of the Year	**3,244,092**

Statement of Financial Position

Assets	
Cash	2,903,289
Account Receivable	2,336
Contribution Receivable	
Grants Receivable	
Contracts Receivable	1,058,392
Prepaid Expense	26,903
Equipment	8,217
Total Assets	**3,999,137**
Liabilities	
Accounts Payable	670,961
Payroll Payable	32,819
Refundable Grant	
Deferred Support	39,521
Deferred Rent	11,744
Total Liabilities	**755,045**
Net Assets	
Unrestricted	3,244,092
Temporarily Restricted	
Total Net Assets	**3,244,092**
Total Liabilities and Net Assets	**3,999,137**