Item 3a

Staff Recommendation
May 23, 2019

Long-Term MPA Monitoring Projects
Michael Esgro, OPC Marine Ecosystems Program Manager

RECOMMENDED ACTION: Staff recommends that OPC approve the disbursement of $9,500,000 to various grantees for the following long-term marine protected area (MPA) monitoring projects:

3.a.1 $1,100,000 to the University of California (UC) Santa Cruz for rocky intertidal habitats

3.a.2 $2,600,000 to UC Santa Cruz for kelp forest/shallow rocky reef habitats

3.a.3 $2,400,000 to San Jose State University for deep rocky reef habitats

3.a.4 $1,000,000 to UC Santa Barbara for sandy beach/surf zone habitats

3.a.5 $900,000 to Ecotrust for establishment of a statewide socioeconomic monitoring program for consumptive human uses

3.a.6 $1,000,000 to San Jose State University for continuation of the statewide California Collaborative Fisheries Research Program

3.a.7 $500,000 to Monterey Bay Aquarium Research Institute/Central and Northern California Ocean Observing Systems for the integration of oceanographic data into MPA monitoring

LOCATION: Statewide

STRATEGIC PLAN OBJECTIVE(S): 8.1: Support effective implementation of MPAs consistent with the Marine Life Protection Act (MLPA) through strategic partnerships; 8.2: Coordinate MLPA implementation with other ocean management agencies to improve management effectiveness.

EXHIBITS

Exhibit A: Letters of Support

FINDINGS AND RESOLUTION:

Staff recommends that the Ocean Protection Council (OPC) adopt the following findings:

> "Based on the accompanying staff report and attached exhibit(s), OPC hereby finds that:
>
> 1) The proposed projects are consistent with the purposes of Division 26.5 of the Public Resources Code, the Ocean Protection Act;
> 2) The proposed projects are consistent with the Ocean Protection Council's Proposition 84 grant funding guidelines (Interim Standards and Protocols, February 2014), the Budget Acts of 2017 and 2018, which included a $2.5 million General Fund appropriation for MPA Monitoring, and the adopted State Water Resources Control Board's Once-Through Cooling Policy;
> 3) The proposed projects are not 'legal projects' that trigger the California Environmental Quality Act (CEQA) pursuant to Public Resources Code section, section 15378."

Staff further recommends that OPC adopt the following resolution pursuant to Sections 35500 *et seq.* of the Public Resources Code:

> "OPC hereby approves the disbursement of up to the following amounts to the following grantees to implement long-term marine protected area (MPA) monitoring projects:
>
> - $7,100,000 to statewide academic research consortiums for habitat-based ecological monitoring
> - $1,100,000 to the University of California (UC) Santa Cruz for rocky intertidal habitats
> - $2,600,000 to UC Santa Cruz for kelp forest/shallow rocky reef habitats
> - $2,400,000 to San Jose State University for deep rocky reef habitats
> - $1,000,000 to UC Santa Barbara for sandy beach/surf zone habitats
> - $900,000 to Ecotrust for establishment of a statewide socioeconomic monitoring program for consumptive human uses

- $1,000,000 to San Jose State University for continuation of the statewide California Collaborative Fisheries Research Program
- $500,000 to the Monterey Bay Aquarium Research Institute/Central and Northern California Ocean Observing Systems for the integration of oceanographic data into MPA monitoring.

This authorization is subject to the condition that prior to disbursement of funds, the grantees listed above shall submit for the review and approval of the Executive Director of the OPC detailed work plans, schedules, staff requirements, budgets, and the names of any contractors intended to be used to complete the projects, as well as discrete deliverables that can be produced in intervals to ensure the projects are on target for successful completion. All work will be conducted in close coordination with OPC staff for design of the update process, as well as management and delivery of documents."

EXECUTIVE SUMMARY:

Staff recommends that the Ocean Protection Council (OPC) approve the disbursement of $9,500,000 to fund seven long-term marine protected area (MPA) monitoring projects that are grounded in the state's MPA Monitoring Action Plan and were selected through a competitive grant process administered by California Sea Grant. At its July 25, 2018 meeting, the Council authorized the disbursement of these funds to support a competitive process to identify long-term MPA monitoring projects[1]; staff is now bringing the individual recommended projects to the Council for approval. Four of the projects being considered will track priority ecological measures and metrics (e.g. indicator species abundance) inside and outside MPAs in the following key habitats: rocky intertidal, sandy beach/surf zone, kelp forest/shallow rocky reef (0-30 meters depth), and deep rocky reef (> 30 meters depth). The remaining projects will: assess the effect of MPA establishment on consumptive human uses; continue a highly successful statewide collaborative program that involves recreational fishermen in MPA monitoring; and provide a framework for the integration of oceanographic data into MPA performance evaluation. These projects will provide the state with critical information to inform adaptive management of California's MPAs into the future, helping to ensure a successful management review of the MPA network in 2022 and contributing to broader state priorities such as sustainable fisheries and climate resilience.

[1] http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180725/Item4a_MPA_MonitoringProgramPhase2_FINAL.pdf

PROJECT DESCRIPTION:

Introduction:
In 2012, California completed the implementation of a science-based and stakeholder-driven marine protected area (MPA) network that spans the state's entire 1,100-mile coastline and protects 16% of state waters. The network consists of 124 individual MPAs that have varying levels of protection, including some reserves that prohibit all "take" within their boundaries; it is the largest network of its kind in North America and one of the largest in the world.

The design of the network was driven by goals identified in the Marine Life Protection Act (MLPA), which focus on protecting, conserving, and restoring marine ecosystems. The MLPA also requires "monitoring, research, and evaluation at selected sites to facilitate adaptive management of MPAs and ensure that the system meets [its] goals" (Fish and Game Code Title 14 §2853 6(3)c). Led by the MPA Statewide Leadership Team (Leadership Team), a standing advisory body made up of representatives from agencies, departments, boards, commissions, organizations, and tribes with significant regulatory authority, mandate, or interest in the state's MPA network, California has developed a comprehensive MPA management program that is rooted in the goals of the MLPA and includes research and monitoring as a key focal area.

Phase 1 of MPA monitoring began at or near the time of MPA implementation in each of four study regions. In 2008, OPC approved a total of $16 million for comprehensive monitoring in each study region, to be disbursed in the order that MPAs were implemented ($4 million each for the Central Coast, North Central Coast, South Coast, and North Coast study regions, in that order). In total, 39 state-approved projects were awarded (Central = 7, North Central = 11, South = 10, North = 11). Establishing a baseline at the time of MPA implementation allows for the tracking of trends over time – i.e. scientists can measure ecological changes against the baseline to determine the effects of removing or reducing fishing pressure inside individual MPAs, as well as across the statewide network. The state's significant investment in baseline MPA monitoring has resulted in a wealth of raw data, analyses, and technical reports that are publicly available and can be accessed on the California Natural Resources Agency's Open Data Platform at www.data.cnra.ca.gov.

Phase 2 of MPA monitoring, referred to as long-term monitoring, builds on the knowledge, capacity, and unique considerations developed during baseline monitoring, and takes a statewide rather than a regional approach. Long-term MPA monitoring will be guided by

the state's MPA Monitoring Action Plan[2], which outlines a priority list of metrics, habitats, sites, and species to target for monitoring as the state seeks to understand how the MPA network is meeting the goals of the MLPA. The Action Plan underwent a simultaneous peer review and public comment process during summer 2018 and was formally adopted by OPC and the California Fish and Game Commission in fall 2018. Specifically, the Action Plan accomplishes the following:

- Prioritizes a list of key measures/metrics to advance understanding of trends cross the MPA network and inform network evaluation. This list includes those ecological, physical, chemical, human use, and enforcement measures/metrics which decades' worth of studies from around the world indicate are the most important for evaluating and interpreting MPA performance.
- Prioritizes long-term MPA monitoring locations by sorting California's individual MPAs into tiers: required (Tier I), secondary (Tier II), and tertiary (Tier III). These monitoring priority tiers are based on best available science and will enable efficient data collection by researchers while still allowing for a broad evaluation of network performance.
- Provides lists of species and species groups to target for long-term monitoring. These lists of fishes, invertebrates, algae, and birds were compiled using best available science, which included Regional MPA Monitoring Plans, Deepwater MPA Monitoring Workshop target species, and Marine Life Management Act target species, as well as special status species designations.
- Facilitates the leveraging of existing monitoring efforts by providing partners with a clear process and description of mechanisms that will be deployed to fund the MPA monitoring program moving forward.

In early November 2018, California Sea Grant, in cooperation with OPC and the California Department of Fish and Wildlife (CDFW), released a competitive call[3] for $9.5 million to support long-term MPA monitoring projects grounded in the Action Plan. This funding was authorized by OPC in July 2018, pending Council approval of the selected projects. Fifteen proposals were received through this competitive call, for a total of $22,330,638 worth of work proposed. A review panel consisting of experts from relevant scientific disciplines, as well as OPC and CDFW staff, was convened in February 2019. The panel recommended funding seven projects, each of which underwent significant budget and workplan revisions due to the limited amount of funding available. Two proposals received through this call (one to advance the collection and use of Traditional Ecological Knowledge in MPA monitoring, and one to conduct habitat-based ecological monitoring of California's

[2] https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Management/monitoring/action-plan
[3] https://caseagrant.ucsd.edu/grants-and-funding/mpa19-call-for-submissions

estuarine MPAs) were determined by staff to be more appropriate for a different funding source. They will be brought to the OPC for consideration at its August 2019 meeting.

Site Description:
All projects will take place statewide across three coastal regions identified in the MPA Monitoring Action Plan:

- North: California/Oregon border to San Francisco Bay, including the Farallon Islands
- Central: San Francisco Bay to Point Conception
- South: Point Conception to the U.S./Mexico border, including the Channel Islands

Project Timeline:
May 23, 2019 – OPC formally approves award recommendations
May 24, 2019 – Awards to principal investigators (PIs)/teams, work begins
May 24, 2020, 2021 – annual reports from PIs due to California Sea Grant
Oct 31, 2021 – draft final technical reports from PIs due to Sea Grant
Nov-Dec 2021 – review of draft final technical reports by Sea Grant, OPC, and CDFW
Feb 1, 2022 – revised final reports due to Sea Grant
May 15, 2022 – all projects completed

These projects represent a major step forward in MPA monitoring and will protect the state's significant investment in the MPA network to date. They will continue OPC's support for the long-term success of California's MPAs and will ensure that the state is prepared for the MPA network's first management review in 2022. Individual project summaries follow below.

Projects 3.a.1 – 3.a.4: $7,100,000 to statewide academic research consortiums for habitat-based ecological monitoring

California's MPA network spans California's entire 1,100-mile coastline, but academic research programs are often clustered around research institutions and focused on monitoring in their local geographic region. Therefore, California's MPA monitoring program supports a partnership-based approach to leverage existing capacity and collect data statewide. Staff is recommending that grants for ecological monitoring be awarded to statewide research consortiums of PIs from multiple institutions or organizations, organized around the following important coastal and marine habitat types: rocky intertidal, sandy beach/surf zone, kelp forest/shallow rocky reef (0-30 meters depth), and deep rocky reef (> 30 meters depth). For the four such projects listed below, a single lead PI and their associated institution has submitted a single proposal that identifies their geographically distributed co-PIs as sub-awardees. If the proposals are approved, the lead

PI will be awarded funds and will be responsible for using their institution's accounting practices to disburse funds to their co-PIs. This significantly decreases the administrative burden to the state and will allow PIs to share equipment, training materials, analytical tools, and other resources across the state to increase efficiency and keep costs as low as possible.

Monitoring teams for each the following three-year projects will collect data at Tier I MPA sites and associated reference sites for two field seasons (2019 and 2020), unless otherwise specified, as well as Tier II and III MPA sites as capacity and budget permit. Teams will focus on data analysis/report writing in year three. For the purposes of this staff recommendation, "biological data," "environmental data," and "human use data" should be interpreted to mean data collected to address the priority measures and metrics listed in the Action Plan. Examples of such data include organism counts, organism sizes, pH/dissolved oxygen measurements, etc.

Project 3.a.1: $1,100,000 to UC Santa Cruz for rocky intertidal habitat monitoring

Background:
California's rocky intertidal habitats are highly biodiverse, hosting a variety of ecologically and economically important plants and animals. The rocky intertidal also provides significant recreational, cultural, and economic value to the people of California, including California's tribes; tidepools are easily accessible and allow the public to interact with natural ocean ecosystems without the need for technical equipment such as a boat or SCUBA gear. However, rocky intertidal habitats are also seriously threatened by a variety of local and regional anthropogenic disturbances, including overexploitation, pollution, habitat destruction, and invasive species; they are also particularly susceptible to climate-related impacts such as increased sea surface temperatures, ocean acidification, hypoxia, and sea level rise. These disturbances are especially concerning given the extreme rarity of rocky intertidal habitat in California (less than 5 square kilometers total statewide). Because of these concerns, rocky intertidal habitats were targeted for protection in the Marine Life Protection Act Master Plan[4] and are listed as a priority in the Action Plan. Continued rocky intertidal monitoring, especially in the face of climate change, is a key state need.

Project Summary:
This project will accomplish the following objectives:

[4] https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Master-Plan

- Aggregate historical biological and environmental data from rocky intertidal habitats (20-30 years at some sites) from a variety of sources.
- Collect additional biological and environmental data via transect and fixed plot surveys in Tier I MPAs and at associated reference sites, according to standardized protocols established by the Multi-Agency Rocky Intertidal Network (MARINe), which has been monitoring rocky intertidal habitats on the U.S. west coast since the 1980s. Data collection will focus on the following:
    - Individual and population attributes (biomass, size structure, density, recruitment)
    - Community attributes (diversity, stability, vulnerability, redundancy, resilience)
    - Environmental attributes (temperature, wave climate, geomorphology, ocean chemistry)
    - Anthropogenic attributes (harvest, human use, associated environmental impacts)
- Conduct analyses using both historical and new data to assess individual MPA effects as well as network-wide effects in intertidal communities. Examples of potentially detectable effects include:
    - Population changes
    - Community changes
    - Changes in vertical distributions of species at the centimeter scale
    - Network-level changes over broad spatial and temporal scales
- Develop web-based data visualization tools for use by researchers, resource managers, and the general public.

About the Grantee:
This project is a collaboration between UC Santa Cruz (lead institution), MARINe, UC Santa Barbara, Cal Poly Pomona, Cal State Fullerton, UC Irvine, Long-term Monitoring Program and Experiential Training for Students (LiMPETS), and the National Park Service. This team has several decades of experience conducting research in rocky intertidal systems both in California and around the world; the PIs are global leaders in designing, implementing, and managing long-term rocky intertidal monitoring programs. Team members are also extremely active in research related to California's MPA network, with several of the PIs having been directly involved in MPA baseline monitoring.

Project 3.a.2: $2,600,000 to UC Santa Cruz for kelp forest/shallow rocky reef habitat monitoring

Background:
Kelp forests and shallow rocky reefs (0-30 meters depth) represent some of California's most iconic nearshore marine ecosystems. They support ecologically, economically, and culturally important native species. They also provide valuable ecosystem services to millions of Californians, including tourism and nearshore recreational and commercial fisheries. For these reasons, kelp forest and shallow rocky reef habitats were targeted for protection in the Marine Life Protection Act Master Plan and are listed as a priority in the MPA Monitoring Action Plan. Continued monitoring of kelp forest ecosystems is especially important to the state given the recent dramatic declines in both bull kelp (*Nereocystis luetkeana*) on California's north coast, and giant kelp (*Macrocystis pyrifera*) on California's central and south coasts, which have resulted in significant adverse ecological and economic impacts.

Project Summary:
This project will accomplish the following objectives:

- Aggregate historical biological and environmental datasets from previous kelp forest and shallow rocky reef surveys, including baseline MPA monitoring.
- Collect biological data via SCUBA transect surveys in Tier I MPAs and at associated reference sites, as well a limited number of Tier II and Tier III MPAs, according to standardized protocols established by the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO), a long-term ecosystem-based scientific monitoring program involving marine scientists from four U.S. west coast universities, as well as Reef Check California (RCCA), a citizen science program that trains volunteer SCUBA divers to collect biological data. Data collection will focus on the following:
    - Density and size distribution (to 1 cm) of all conspicuous fishes
    - Density of large (> 2.5 cm) mobile invertebrates and stipitate algae, size frequency of commercially and ecologically important invertebrates (red and purple urchins, abalone, lobsters)
    - Percent cover of sessile invertebrates
    - Geologic habitat characteristics
- Collect environmental data via remote sensing as well as in situ instruments measuring temperature, pH, and dissolved O2; harvest sea surface temperature, wave height, and chlorophyll-a data from online databases.

- Collect kelp canopy data via aerial monitoring, as well as historical analysis of Landsat imagery, to create a multidecadal statewide time series of kelp canopy areal extent and biomass per unit area.
- Conduct integrative analyses (both univariate and multivariate; Before-After-Control-Impact where possible) using historical and new data to assess trends in kelp forest and shallow rock communities at the scale of individual MPAs, bioregions, and the three coastal regions identified in the Action Plan. Analyses will focus on changes in:
    - Density, biomass, size structure, species diversity
    - Ecosystem structure and function
    - Measures of resilience (spatial distribution, changes in species abundance, trophic structure, functional diversity)

About the Grantee:
This project is a collaboration between UC Santa Cruz (lead institution), UC Santa Barbara, UC Los Angeles, PISCO, RCCA, the Vantuna Research Group/Occidental College, the Monterey Bay Aquarium Research Institute, and Humboldt State University. This project team includes researchers with more than 140 years of cumulative experience in kelp forest research, including long-term monitoring, and decades of experience in MPA science geared toward stakeholders and policymakers. This group has been involved with California's MPA network since the passage of the Marine Life Protection Act in 1999 and includes experts in related disciplines (remote sensing, ocean acidification/hypoxia, and citizen science) to further enhance the scope of data collection and analysis.

Project 3.a.3: $2,400,000 to San Jose State University for deep rocky reef habitat monitoring

Background:
Deep rocky reef habitats (> 30 meters depth) represent at least 75% of all marine habitats in California state waters by area. Deep rocky banks and outcroppings, underwater pinnacles, and submarine canyons support a high diversity of ecologically and economically important fish and invertebrate species, including many species that CDFW has determined are likely to benefit from MPA establishment. These habitats also experience a much greater likelihood of habitat alteration than nearshore habitats due to the heavy use of trawls, longlines, and gillnets in deep water. However, despite the prevalence of these habitats, their ecological and economic importance, and their threatened nature, little is known about them due to the difficulties associated with sampling in deeper water. This project represents an opportunity for the state to build on

knowledge and expertise acquired during baseline MPA monitoring and continue to fill a key gap in scientific understanding of these unique systems.

Project Summary:
This project will accomplish the following objectives:

- Identify any observable MPA effects in deepwater habitats to date, via analysis of 25+ years of historical imagery and data from California waters (submersible, remotely operated vehicle (ROV), towed camera, etc.) as well as advanced modeling approaches integrating fisheries recruitment and physical oceanographic data.
- Conduct ROV surveys to collect biological data in Tier I MPAs and associated reference sites.
- Conduct drop camera surveys to collect biological data in Tier I MPAs and associated reference sites, with the goals of a) demonstrating the effectiveness of new, lower-cost video tools that are being used around the world and b) providing comparison/calibration with data collected from ROV and SCUBA surveys as well as fisheries catch data.
- Synthesize analyses of historical data with analyses of newly collected data to provide a comprehensive assessment of deep rocky reef ecosystem health across the MPA network. Integrative analysis will focus on:
    - Differences in key indicator species and community response metrics (density, biomass, size structure, percent cover, species composition) between MPA and reference sites, as well larger-scale trends as across the statewide network
    - Changes in environmental conditions (temperature, salinity, pH, chlorophyll-a) at varying spatial and temporal scales across the statewide network
- Provide the state with recommendations for future monitoring in this habitat.

About the Grantee:
This project is a collaboration between San Jose State University (lead institution), California State University Monterey Bay, Humboldt State University, UC Santa Barbara, and Marine Applied Research and Exploration. The PIs on this project are experts in the design, monitoring, and evaluation of California's MPAs. They bring over 100 years of cumulative experience sampling in deepwater habitats both in California and around the world.

Project 3.a.4: $1,000,000 to UC Santa Barbara for sandy beach/surf zone habitat monitoring

Background:
Sandy beaches and their associated surf zones are significant components of California's coastline. These habitats host a variety of native species, including fishes, invertebrates, and birds; their rich and productive food webs support a variety of higher trophic level species such as avian predators and marine mammals. Sandy beaches are also ecologically linked to offshore habitats, especially kelp forests and shallow rocky reefs, meaning that beaches are protected both directly (through limits on take of finfish and invertebrates) and indirectly (through trophic cascades in offshore donor ecosystems) by MPAs. Finally, these habitats are heavily used by millions of Californians each year for recreation, including recreational surf fishing. Therefore, although soft-bottom habitats were not prioritized for monitoring in the Action Plan, sandy beaches and surf zones are nonetheless important systems for the state to consider in long-term MPA monitoring and adaptive management of the MPA network.

Project Summary:
This project will accomplish the following objectives:

- Conduct standardized transect surveys at beaches inside Tier I MPA sites and associated reference sites for one field season to collect key biological and environmental data, including the following:
    - Abundance, species composition, and size structure of birds (including shorebirds, snowy plovers, seabirds, and terrestrial birds), macrophyte wrack (major species of drift kelp), and surf zone fishes (including surfperch, atherinids, flatfish, smelt, sharks, and rays), with an emphasis on indicator species listed in the Action Plan as well as endangered, special status, and culturally significant species
    - Physical characteristics of beach and surf zone habitats (temperature, salinity, wave and swash climate, zone widths and slopes, and sediment grain size)
    - Human uses, including shore-based fishing
- Compare abundance/biomass of indicator species, species diversity, trophic structure, and occurrence of special status species between Tier I MPAs and reference sites.
- Produce analyses of changes in biological and environmental variables inside and outside MPAs over time, as well as across the statewide network, using a variety of advanced statistical and modeling approaches.

- Assess changes in human use patterns as a result of MPA implementation.

About the Grantee:
This project is a collaboration between UC Santa Barbara (lead institution), the Greater Farallones Association Beach Watch Group, Humboldt State University, Point Blue Conservation Science, and San Jose State University. This research team includes 13 highly qualified PIs and affiliated researchers who have extensive experience leading active field research programs focused on sandy beach and surf zone habitats, as well as prior experience with MPA baseline monitoring in these systems.

Project 3.a.5: $900,000 to Ecotrust for establishment of a statewide socioeconomic monitoring program for consumptive human uses

Background:
Humans are a key component of California's ocean and coastal ecosystems, and fishing communities have voiced concern about socioeconomic and recreational impacts related to the establishment of California's MPA network. Socioeconomic monitoring, in particular the collection of data that provides a comprehensive understanding of changes in fishing patterns over space and time, will help ensure that MPAs maximize their ecological, economic, and sociocultural benefits while minimizing potentially negative socioeconomic impacts. This project will establish a scalable and replicable monitoring program for two consumptive human uses: commercial fisheries and commercial passenger fishing vessel (CPFV or "party boat") fisheries. Such a program is a key need for the state. Furthermore, this project also has the potential to inform fisheries management, federal offshore renewable energy siting processes, and other overlapping initiatives in California.

Project Summary:
This project will accomplish the following objectives:

- Conduct focus groups with commercial fishermen in each of California's major ports to obtain qualitative information on direct and indirect socioeconomic consequences of MPA establishment.
- Conduct integrated analyses using Ecotrust and CDFW data (commercial landings, CPFV logbooks from 1992-2018) to quantitatively assess effects of MPA establishment on fishing communities. Examples of potentially detectable effects include:
    - Changes in landings, revenue, participation rates, etc.
    - Changes in spatial distribution of fishing, especially displacement of fishing effort
    - Loss of revenue and broader economic changes

  - Effects of additional spatial fishing regulations
  - Loss of port infrastructure
- Communicate and collaborate with commercial and CPFV fishermen at the initiation of the project, during port-level engagement efforts, and at the closing of the project.
- Recommend key metrics and methods for monitoring the socioeconomic health of commercial and CPFV fisheries into the future.

About the Grantee:
Since 1991, Ecotrust has partnered with local communities from California to Alaska to provide ecological and economic assessments of fisheries policy and marine conservation. Ecotrust works across a variety of sectors to advance social equity, economic opportunity, and environmental well-being. This project also involves multiple independent co-PIs, including a human geographer and marine spatial planning consultant, who have worked with Ecotrust in the past on coastal and marine management projects. Individuals form this integrative team have been deeply involved in the design, implementation, and management of California's MPA network for the past 10 years, including the socioeconomic component of baseline MPA monitoring.

Project 3.a.6: $1,000,000 to San Jose State University for continuation of the statewide California Collaborative Fisheries Research Program (CCFRP)

Background:
CCRFP is a diverse partnership of volunteer fishermen, boat captains, scientists, non-governmental organizations, and charter companies interested in promoting sustainable fisheries. Since the establishment of the MPA network, CCFRP has worked to develop a long-term coordinated, collaborative, and standardized statewide monitoring program that involves recreational anglers in hook-and-line surveys inside and outside MPAs. Incorporating an interdisciplinary approach, CCFRP has worked closely with state and federal partners since the program's creation in 2006. In the intervening 10+ years, CCFRP has produced reliable estimates of relative abundance, size frequency distributions, and fish movements across 16 MPAs and associated reference sites statewide; they have also generated highly useful long-term trends in catch and biomass for central coast fishes, published peer-reviewed papers in scientific literature, and deployed two socioeconomic surveys to assess angler perception of MPAs and compliance with MPA regulations. Their approach includes not only scientifically rigorous data collection and analysis, but also meaningful outreach and engagement with fishermen, scientists, resource managers, and the general public. The state should continue its investment in this novel and effective program.

Project Summary:
This project will accomplish the following objectives:

- Continue CCFRP trips and data collection in Tier I MPA sites statewide through 2020, and on the central coast through 2021, with a focus on monitoring fish abundance, size, biomass, diversity, species composition, and spillover.
- Conduct spatial and temporal analyses to evaluate MPA performance, including MPA-reference site comparisons of the following:
    - Abundance/biomass of indicator species
    - Species diversity
    - Trophic structure
    - Occurrence of special status species
- Assess spillover, connectivity, and impact of environmental stressors.
- Assess level of compliance and attitude towards/perception of MPAs in recreational fishing community.

Continue community outreach & education with a focus on the recreational fishing community.

About the Grantee:
CCFRP, based at Moss Landing Marine Laboratories (San Jose State University), is a collaborative effort among researchers from six California universities, the captains and crew of 27 commercial passenger fishing vessels, and more than 1,200 volunteer anglers spanning the entire California coast. CCFRP PIs have extensive experience with California's MPA network and monitoring priorities, familiarity with existing data streams, rigorous theoretical grounding in quantitative approaches for MPA evaluation, and proven success in building broad, collaborative partnerships.

Project 3.a.7: $500,000 to the Monterey Bay Aquarium Research Institute/Central and Northern California Ocean Observing Systems for the integration of oceanographic data into MPA monitoring

Background:
California's ocean and coast face a variety of environmental stressors that vary considerably over time and space. This presents a challenge to resource managers tasked with evaluating MPA effectiveness – namely, how can managers separate the ecological consequences of removing or reducing fishing pressure inside an MPA from other factors such as increased sea surface temperatures, regularly occurring minima in pH and dissolved oxygen, variation in delivery of nutrients for primary production, and climate-

related ecological phenomena such as harmful algal blooms and marine disease? This project aims to address that question for the first time in California by integrating data from various investigators, locations, habitats, and methods to produce robust assessments of change in key environmental indicators at a variety of scales. These assessments will help to place long-term MPA monitoring in the broader context of changing ocean conditions, a key need for the state.

Project Summary:
This project will accomplish the following objectives:

- Use satellite data and other ocean observing system assets to develop regularly updating data products (both large and fine scale), quantifying relationships between large-scale oceanographic phenomena and conditions at Tier I MPA sites statewide.
- Work with PIs conducting long-term MPA monitoring projects to integrate in situ data (e.g. temperature, pH) into data products referenced above.
- Integrate existing ecological models and in situ data into a multivariate description of regional ecosystem health.
- Create quantitative, indicator-based assessments of environmental health and water quality at Tier I MPAs, which can be used by managers statewide.

About the Grantee:
U.S. Integrated Ocean Observing Systems (IOOS) is a national-regional partnership working to provide new tools and forecasts to improve safety, enhance the economy, and protect the environment. IOOS coordinates ocean observing interests of 17 federal agencies and is managed by the National Oceanic and Atmospheric Administration. Two of its 11 regional associations are located in California: the Central and Northern California Ocean Observing System (CeNCOOS), housed at the Monterey Bay Aquarium Research Institute, and the Southern California Coastal Ocean Observing System (SCCOOS). CeNCOOS and

SCOOS have developed a variety of tools aimed at creating unified quantitative and qualitative frameworks for marine resource management, including dynamic ocean models, high resolution measurements of surface currents, high-frequency radar systems, and in situ measurements from gliders, moorings, and shore stations. These tools represent an unparalleled array of assets that have long been envisioned as a key partner in California's collaborative approach to MPA management. CeNCOOS will lead this project in collaboration with SCOOS and other key agencies/organizations.

PROJECT FINANCING:

Staff recommends that the Ocean Protection Council (OPC) authorize encumbrance of up to $9,500,000 to the grantees listed above to conduct the projects summarized above.

Ocean Protection Council	**$9,500,000**
UC Santa Cruz – rocky intertidal habitat monitoring	$1,100,000
UC Santa Cruz – kelp forest/shallow rocky reef habitat monitoring	$2,600,000
San Jose State University – deep rocky reef habitat monitoring	$2,400,000
UC Santa Barbara – sandy beach/surf zone habitat monitoring	$1,000,000
Ecotrust – establishment of a statewide socioeconomic monitoring program for consumptive human uses	$900,000
San Jose State University – continuation of the statewide California Collaborative Fisheries Research Program	$1,000,000
Monterey Bay Aquarium Research Institute/Central and Northern California Ocean Observing Systems – integration of oceanographic data into MPA monitoring	$500,000
TOTAL	**$9,500,000**

Funding for these projects aggregates funds from four sources designated to support MPA Monitoring: 1) $304,685 from the FY 17/18 General Fund appropriation; 2) $2.5 million from the FY 18/19 General Fund appropriation; 3) $2,613,875 from Proposition 84 funds; and 4) $4,561,627 from Once-Through Cooling (OTC) Interim Mitigation Funds. **OPC authorized the use of these funds at its July 25, 2018 meeting through a $9,980,187 grant to California Sea Grant for the administration of long-term MPA monitoring subgrants, pending Council approval of selected projects. $480,187 of this grant amount is supporting Sea Grant's administrative costs. The remaining $9,500,000 is being considered for disbursement to sub-grantees at this Council meeting.**

General Fund Appropriation. As directed by the Leadership Team Work Plan, OPC staff has been leading discussions with CDFW and partners statewide to implement a

partnership-based monitoring program that assesses MPA network performance and informs multiple mandates. In 2015, the Legislature allocated a $2.5 million annual General Fund appropriation to the Secretary for Natural Resources to support the MPA Monitoring Program. Through a collaborative process between the Leadership Team and the Secretary, the initial spending of this appropriation to support MPA monitoring was approved by the Secretary in early 2016. The spending focused on: maintaining required scientific tools to conduct monitoring and increasing scientific capacity within the state; continuing ongoing monitoring statewide in subtidal and intertidal habitats; and ensuring the completion of the first five-year management reviews for all regions. Since the initial spending in FY15/16, subsequent spending has focused on creating a long-term monitoring program for the state to ensure the state is well prepared for the 2022 mandated MPA Network Management Review. OPC has approved $304,685 from the FY 17/18 General Fund appropriation and all $2.5 million from the FY 18/19 General Fund appropriation to support long-term MPA monitoring.

Proposition 84 Funds. On June 14, 2014, OPC authorized the disbursement of $3 million for long-term monitoring of the Central Coast MPAs. $2,613,875 of that original $3 million was set aside to support the comprehensive statewide long-term monitoring effort that is being recommended here, rather than a year-by-year regionally focused monitoring effort that increases operational costs. OPC has approved bundling the remaining $2,613,875 into a larger statewide monitoring approach facilitated by this project.

OTC Interim Mitigation Funds. At the November 1, 2017 OPC meeting, the Council received an update on the ongoing implementation of OPC's OTC Interim Mitigation Program (Mitigation Program). During the development of this Mitigation Program, OPC created a white paper outlining the nexus between the State's MPA Network and OTC impacts. Research to establish and quantify the expected ecological benefits of the MPA network is critical to understanding what additional mitigation projects may be required to offset for OTC impacts. Additionally, the recent OPC Science Advisory Team Working Group's OTC report identifies this type of research as being critical to achieve the goals of the OTC policy. MPAs can offset some negative ecological impacts caused by OTC and understanding the quantitative proportion of that offset requires the same type of monitoring required to evaluate the performance of the MPA Network. Because of this alignment between long-term monitoring needs and research necessary to meet the OTC Policy (as prioritized in the Mitigation Program), OPC has approved $4,561,627 of 2018/2019 OTC Mitigation Funds is requested to support this project.

CONSISTENCY WITH CALIFORNIA OCEAN PROTECTION ACT:

The proposed project is consistent with the Ocean Protection Act, Division 26.5 of the Public Resources Code, because it is consistent with trust-fund allowable projects, defined in Public Resources Code Section 35650(b)(2) as projects which:

- Eliminate or reduce threats to coastal and ocean ecosystems, habitats, and species: *This project will help identify emerging threats from climate change and ensure existing protections are being effectively implemented.*
- Foster sustainable fisheries: *Expected ecological benefits from MPA networks include benefits to fished populations.*
- Improve coastal water quality: *This project will create water quality assessment tools to strengthen the nexus between water quality protection and MPA protection.*
- Allow for increased public access to, and enjoyment of, ocean and coastal resources, consistent with sustainable, long-term protection and conservation of those resources: *Increased understanding of the MPA network will help ensure continued access by the public.*
- Improve management, conservation, and protection of coastal waters and ocean ecosystems: *Information from this project will directly inform the adaptive management of the MPA network.*
- Provide monitoring and scientific data to improve state efforts to protect and conserve ocean resources: *This is a long-term monitoring project that will generate scientific data to directly inform adaptive management of the MPA network.*
- Protect, conserve, and restore coastal waters and ocean ecosystems: *MPA networks globally, and early results from California's MPA network, have shown protection, conservation and restorations benefits for some species and habitats.*
- Provide funding for adaptive management, planning, coordination, monitoring, research, and other necessary activities to minimize the adverse impacts of climate change on California's ocean ecosystem: *Information from this project will directly inform the adaptive management of the MPA network as well as informing the understanding of climate change impacts.*

CONSISTENCY WITH THE OPC'S STRATEGIC PLAN:

These projects implement Goal 8.1: Support effective implementation of MPAs consistent with the Marine Life Protection Act (MLPA) through strategic partnerships and Goal 8.2: Coordinate MLPA implementation with other ocean management agencies to improve management effectiveness.

CONSISTENCY WITH PROPOSITION 84 (The Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006; Public Resources Code §75060(g)

The Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 (Proposition 84) provides funding for the protection of beaches, bays, and coastal waters. This project will provide coastal managers and planners with scientific information necessary to properly and effectively protect the coast and adaptively manage the state's MPA network, consistent with the objectives of Proposition 84.

CONSISTENCY WITH THE OPC'S GRANT PROGRAM FUNDING GUIDELINES:

The proposed project is consistent with the OPC's interim Grant Program Funding Guidelines for Proposition 84 funds, in the following respects:

Required Criteria

1. Directly relate to the ocean, coast, associated estuaries, or coastal-draining watersheds: *This project directly relates to the ocean and coast because it will provide data informing evaluation of the performance of the state's MPA network at meeting the goals of the Marine Life Protection Act.*
2. Support of the public: *See Exhibit A.*
3. Greater-than-local interest: *This project is statewide.*

Additional Criteria

4. Improvements to management approaches or techniques: *The proposed work will improve management approaches or techniques by providing the most current, best available science to inform adaptive management of the state's MPA network.*
5. Resolution of more than one issue: *The MPA network spans the entire coast and data collected as part of this project will directly inform not only the MPA Management Program but also contribute to sustainable fisheries and climate change adaptation management.*
6. Leverage: *In-kind support from grantees and state agencies will be part of this project. This project also builds on previous OPC investments in MPA monitoring and management.*
7. Timeliness or Urgency: *The required 2022 management review requires both additional data and analyses that will take multiple years to provide insight into MPA network performance.*

8. Coordination: *This project continues to support the diverse statewide community of scientists, tribes, fishermen, citizen scientists, and federal and state managers that are actively engaged in monitoring the state's MPA network to establish an understanding of performance related to the goals of the Marine Life Protection Act.*

COMPLIANCE WITH THE CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA):

The proposed projects are categorically exempt from review under the California Environmental Quality Act ("CEQA") pursuant to 14 Cal. Code of Regulations Section 15306 because the projects involve only data collection, research and resource evaluation activities that will not result in a serious or major disturbance to an environmental resource. Staff will file a Notice of Exemption upon approval by the OPC.