Marine Protected Area (MPA) Monitoring Program
2019 CALL FOR SUBMISSIONS

CONTENTS

NOTE: California Sea Grant, California Ocean Protection Council, and the California Department of Fish and Wildlife will host an optional informational webinar to review this call for submissions, application logistics, and answer questions on November 15, 2018 from 1:00pm to 2:30pm.

Registration Link: https://ucsd.zoom.us/j/839453585
Call-In Number: 1- 669-900- 6833 or 1-646-558-8656
Meeting ID: 839 453 585

The webinar will be recorded and posted online afterwards along with a copy of the presentation on California Sea Grant's webpage: https://caseagrant.ucsd.edu/grants-and-funding/mpa19-call-for-submissions

I. Program Summary

Recognizing the importance of California's diverse marine species and ecosystems as vital to the state's coastal economy, public well-being, and ecological health, the California Legislature passed the Marine Life Protection Act (MLPA, Chapter 10.5 of the California Fish and Game Code [FGC], §2850-2863) in 1999. The MLPA required the state to redesign its pre-existing system of marine protected areas (MPAs) to function as a statewide network in order to protect the abundance, integrity, and diversity of marine life, habitats, and ecosystems for future generations. The MLPA was implemented across California's coast incrementally, and resulted in the creation of an ecologically connected network of 124 new or redesigned MPAs and 15 special closures.

California's MPAs are managed as a statewide network through the MPA Management Program (Management Program), a highly collaborative program led by the California Fish and Game Commission (Commission), California Department of Fish and Wildlife (CDFW), and the California Ocean Protection Council (OPC). CDFW implements and enforces the regulations set by the Commission, and is the lead managing agency for the MPA Network, while OPC serves as the policy lead for MPAs and the implementation of MLPA activities. The Management Program consists of four focal areas: 1) outreach and education, 2) enforcement and compliance, 3) research and monitoring, and 4) policy and permitting. Within the research and monitoring focal area, CDFW and OPC jointly direct California's MPA Monitoring Program (Monitoring Program), in partnership with the MPA Statewide Leadership Team[1] and the broader scientific community.

The MLPA requires monitoring of MPAs, specifically "monitoring, research, and evaluation at selected sites to facilitate adaptive management of MPAs and ensure that the [MPA] system meets the goals stated in this chapter."[2] The MLPA defines adaptive management of MPAs as a process that facilitates learning from program actions and helps evaluate whether the MPA Network is making progress toward achieving the goals of the MLPA.[3] The MPA Monitoring Action Plan[4] (Action Plan), recently adopted by the Commission and OPC, guides the Monitoring Program.

To achieve progress and priorities delineated in the Action Plan, OPC and CDFW are partnering with California Sea Grant (CASG) to announce this opportunity to support the Monitoring

[1] http://www.opc.ca.gov/programs-summary/marine-protected-areas/partnerships/

[2] California Marine Life Protection Act, Fish and Game Code section 2853(c)(3). See also sections 2852(a), and 2856(a)(2)(H).

[3] Fish and Game Code section 2852(a).

[4] CDFW and OPC. 2018. Marine Protected Area Monitoring Action Plan. Approved by the California Fish and Game Commission on October 17, 2018 and California Ocean Protection Council on October 25, 2018. https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Management/Monitoring/Action-Plan

Program for the state's MPAs over the next three years. CASG will handle receipt and review of proposals, and management of awards, in consultation with OPC and CDFW, that will be based on the Action Plan.

OPC has authorized $9.5 million to support the MPA Monitoring Program in this solicitation to inform adaptive management and evaluation of California's MPA Network in preparation for the decadal management review, the first of which is anticipated in 2022.

This announcement invites the submission of proposals of one of two types (Qualification Request, or Full Proposal Request), depending on the type of work to be proposed (see below). Regardless of type – applications must be submitted **no later than 5:00 pm Pacific Time, Thursday 20 December 2018**, using eSeagrant, CASG's electronic proposal submission system.

For successful applicants, work is expected to begin approximately 16 May 2019 and must end (i.e. including completion of all revised final reports) no later than 15 May 2022.

For interested parties, OPC, CDFW and CASG will host an optional, informational webinar regarding this opportunity on Thursday, 15 November 2018 from 1:00 pm – 2:30 pm Pacific Time. Details are provided in section V.

Following, in sequence, are: (1) further background on the state's MPA Network, Management Program, and Monitoring Program; (2) priority habitats and human uses, evaluation questions, sites, measures and metrics, and species identified for monitoring over the next three years; (3) information on eligibility to submit, and details on choosing between the two types of submission; (4) required content for each type of submission; (5) guidance on submission via eSeagrant and details on the optional, informational webinar; (6) an overview of the proposal evaluation process; (7) a timetable for the program; and (8) contact information for key personnel.

II. Background on MPA Network, Management and Monitoring Programs

Recognizing the importance of California's marine resources to the state's coastal economy, public well-being, and ecological health, the California Legislature passed the Marine Life Protection Act (MLPA, Chapter 10.5 of the California Fish and Game Code [FGC], §2850-2863) in 1999. The MLPA required the state to redesign its pre-existing system of marine protected areas (MPAs) to meet six goals:

1. Protect the natural diversity and abundance of marine life, and the structure, function and integrity of marine ecosystems.
2. Help sustain, conserve and protect marine life populations, including those of economic value, and rebuild those that are depleted.

3. Improve recreational, educational and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and manage these uses in a manner consistent with protecting biodiversity.
4. Protect marine natural heritage, including protection of representative and unique marine life habitats in California waters for their intrinsic values.
5. Ensure California's MPAs have clearly defined objectives, effective management measures and adequate enforcement, and are based on sound scientific guidelines.
6. Ensure that the State's MPAs are designed and managed, to the extent possible, as a network.

The MLPA further requires monitoring of MPAs, specifically "monitoring, research, and evaluation at selected sites to facilitate adaptive management of MPAs and ensure that the [MPA] system meets the goals stated in this chapter."[5]

Guided by these six goals, the MLPA was implemented incrementally across four planning regions through science-based and stakeholder-driven processes, resulting in the creation of an ecologically connected network of 124 MPAs. Implemented regionally, the new and revised MPAs went into effect in the central coast (Pigeon Point to Point Conception) in September 2007, the north central coast (Alder Creek near Point Arena to Pigeon Point) in May 2010, the south coast (Point Conception to U.S./Mexico border) in January 2012, and the north coast (California/Oregon border to Alder Creek) in December 2012. California's MPA Network now spans the state's entire 1,100-mile coastline including offshore Islands, encompasses approximately 740 square nautical miles (16% of California's jurisdictional waters). It is the largest network of MPAs in North America and one of the largest in the world.

California's MPA Network is adaptively managed as a network through the MPA Management Program which consists of four focal areas: 1) outreach and education, 2) enforcement and compliance, 3) research and monitoring, and 4) policy and permitting. Within the research and monitoring focal area, the California Department of Fish and Wildlife (CDFW) and Ocean Protection Council (OPC) jointly direct California's MPA Monitoring Program, in partnership with the MPA Statewide Leadership Team[6] and the broader scientific community. The MPA Monitoring Program has three primary components (Figure 1), and includes a two-phased, ecosystem-based approach to collect, analyze, communicate results and evaluate the performance of California's MPA Network. Regional baseline monitoring (Phase 1, 2007 – 2018)[7] characterized ecological and socioeconomic conditions near the time of regional MPA implementation and improved our understanding of a variety of representative marine habitats and the associated biodiversity. CDFW and OPC are now designing and implementing statewide long-term monitoring (Phase 2) to reflect current priorities and management needs.

[5] California Marine Life Protection Act, Fish and Game Code section 2853(c)(3). See also sections 2852(a), and 2856(a)(2)(H).

[6] http://www.opc.ca.gov/programs-summary/marine-protected-areas/partnerships/

[7] http://www.opc.ca.gov/programs-summary/marine-protected-areas/research-and-monitoring/regional-baseline-monitoring/

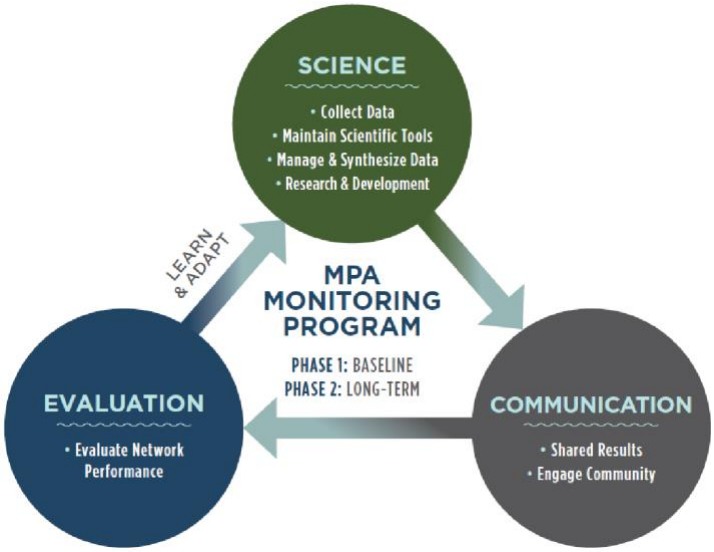

Figure 1: Science, communication, and evaluation elements that help inform adaptive management of California's MPA Monitoring Program.

Phase 1, baseline monitoring, established a comprehensive snapshot of ecological and socioeconomic conditions at or near the time of MPA implementation in each of four planning regions across California's coast. Baseline monitoring projects were guided by regional priorities funded through a competitive peer review process, and were focused across eight habitats and two human use types. Additional guidance was taken from the recommendations of the MLPA Science Advisory Team (SAT) during the MPA design and siting process. Another important component of baseline monitoring was to advance the use of Traditional Ecological Knowledge (TEK) in informing adaptive management. Data and results are found in raw data packages and individual technical reports for each funded project, as well as in summary "State of the Region" reports. Baseline products informed an initial 5-year management review of regional MPA implementation, and provide a benchmark against which future changes can be measured. All baseline monitoring data and reports can be accessed at the California Natural Resources Agency's Open Data Platform (https://data.cnra.ca.gov[8]).

To guide Phase 2 of the MPA Monitoring Program, the Commission and OPC adopted the Action Plan in October 2018. The Action Plan is the foundational document of the Monitoring Program which aggregates and synthesizes work from the MPA design and siting process, Phase 1, and additional scientific study in California on MPAs over the past decade, as well as incorporating novel, quantitative, and expert informed approaches. The Action Plan prioritizes key measures, metrics, habitats, sites, species, human uses, and management questions to target for long-term monitoring to inform the adaptive management and evaluation of California's MPA Network.

[8] Some reports and data from the Central and North Central are not uploaded yet are available upon request

Phase 2 has two primary purposes:

1. **Describe and track changes in ecological and socioeconomic conditions** of the MPA Network, inside and outside MPAs designated pursuant to the MLPA. The MPA Monitoring Program broadly describes and assesses conditions and focus analyses on determining any MPA related effects to individuals, communities, populations and ecosystems. This is achieved through collection of new information and evaluation of existing information including analyses that cross scientific disciplines, habitats and human uses.

2. **Provides information on the spatial and temporal scope of changing ocean conditions associated with climate change** that are impacting nearshore ecosystems. This information is required to understand the performance of the MPA Network as well as inform other state priorities including sustainable fisheries, climate change adaptation, aquaculture and water quality.

Those interested in submitting a response to this call are invited to visit the following webpages for additional information:

MPA Monitoring Program: These websites host information and resources related to the MPA Monitoring Program, including references and other supporting information.

- https://www.wildlife.ca.gov/Conservation/Marine/MPAs/management/monitoring
- http://www.opc.ca.gov/programs-summary/marine-protected-areas/research-and-monitoring/

MPA Monitoring Program Data: These websites host access to MPA regulation, outreach, and monitoring data resources.

- https://www.wildlife.ca.gov/Conservation/Marine/MPAs
- https://data.cnra.ca.gov/organization/ocean-protection-council/portal/home

MPA Management Program:

- http://www.opc.ca.gov/programs-summary/marine-protected-areas/

III. Priority Habitats and Human Uses, Evaluation Questions, Sites, Measures and Metrics, and Species

A. Priority Habitats and Human Uses

Priority habitats and humans uses include:

- Rocky Intertidal
- Kelp and Shallow Rock (0-30 m)
- Mid-depth Rock (30-100m)

- Soft-bottom Intertidal and Beach
- Soft-bottom Subtidal (0-100m)
- Deep Ecosystems and Canyons (>100 m)
- Consumptive Human Uses
- Non-Consumptive Human Uses

Projects proposed in response to this call should identify one or more priority habitats, or human use types, on which to focus data collection and analyses. This does not mean that funding will be distributed equally among habitat priorities or use types, as some are more resource-intensive for data collection. This call is focused on data collection in combination with an analysis of historical data for priority habitats and human uses. While the Monitoring Program has historically focused sampling primarily on shallower (< 100 m depth) hard substrate along the open coast, this does not preclude sampling in other habitat types.

B. Key Evaluation Questions

The MLPA Master Plan for MPAs[9] directed the development of evaluation questions to help guide monitoring and adaptive management. Informed by existing science and policy, this broad list of evaluation questions (Appendix 1) represent the key elements regarding the design, performance, and functioning of the MPA Network in relation to the goals of the MLPA.

In order to provide a contextual framework for the priority sites, measures and metrics, and species identified in the Action Plan, a sub-set of these evaluation questions are shown below as examples:

- ❖ GOAL 1: Do indicator species inside of MPAs differ in size, numbers, and biomass relative to reference sites?
- ❖ GOAL 2: Do California Monitoring Program indicator species, including those of economic importance, experience positive population level benefits (e.g. increase in abundance, larger size, increased reproductive output, increased stock size) in response to MPA network implementation?
- ❖ GOAL 3: How are the frequency of non-consumptive use, knowledge, attitudes, and perceptions regarding the MPAs changing over time?
- ❖ GOAL 4: Have endangered, special status species and/or culturally significant species benefited from the presence of California's MPAs?

[9] CDFW. 2016. California Marine Life Protection Act Master Plan for Marine Protected Areas. Adopted by the California Fish and Game Commission on August 24, 2016. https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Master-Plan

- ❖ GOAL 5: How has the level of compliance changed over time since the MPAs were first implemented and what factors influence variation in compliance within and among MPAs?
- ❖ GOAL 6: How do other stressors impact the performance of MPAs over time (e.g., water quality, oil spills, desalination plants, ocean acidification, sea level rise)?

Inquiry into the additional evaluation questions listed in Appendix 1 by Monitoring Program partners is encouraged. It is important to note that the overarching questions listed above in many cases will provide insights into the other evaluation questions listed.

C. Priority Sites

The Monitoring Program encompasses the entire state, which extends along the California coastline from the California/Oregon border in Del Norte County to the United States/Mexico border in San Diego County. In general, state waters extend from the shoreline (mean high tide) out to three nautical miles from shore. However, state waters and the Monitoring Program also includes three nautical miles around offshore rocks and islands. The MPA Network is made up of 124 individual MPAs with varying levels of protection that limit or prohibit fishing activity.

The Action Plan identifies three bio-regions for long-term monitoring: the north coast (California/Oregon border to San Francisco Bay, including the Farallon Islands), the central coast (San Francisco Bay to Point Conception), and the south coast (Point Conception to the U.S./Mexico border, including the Channel Islands). The Action Plan identifies Tier 1 sites based on these bio-regions which meet many of the design criteria needed for effective protection, are well connected components of the MPA network, and may have long time series of monitoring data and/or have experienced high historical fishing effort, which make these MPAs good candidates for detecting the potential effects of protection over time.

See Appendix 2 for a complete list of selected site and reference site criteria. **Projects should preferentially focus on as many Tier 1 sites as possible that align with the proposed monitoring project method, and an associated reference site.** Projects will be required to list the sites and reference sites that will be monitored as well as justify reference site(s) selection, based on the above criteria listed in Appendix 1, and using quantitative methods to do so whenever possible. The justification for reference site selection may take the form a short narrative with the caveat that reviewers may ask for additional information and quantitative analyses if available to support the choice of reference site.

D. Priority Measures and Metrics

To meet California's adaptive management objectives[10], a prioritized list of key measures and metrics have been selected to advance understanding of conditions and trends across the MPA Network to inform network evaluation. A complete list can be found in Appendix 3. State funded long-term monitoring projects will compare changes in the selected performance measures inside and outside MPAs over time. **Some projects may not measure all the key measures and metrics but, where feasible, it will be important to measure as many of the key measures and metrics as possible at priority sites and their associated reference sites. This includes a focus on co-locating physical, chemical, and biological monitoring.**

E. Priority Species

California's MPA Network was implemented, in part, to help conserve ecologically and economically important marine species, as well as to protect the structure and function of marine ecosystems. Appendix 4 provides lists of species and species groups to target for long-term monitoring at MPA and reference sites.

IV. Eligibility, Types of Submission and Submission Contents

A. Eligibility

Individuals associated with institutions of higher education, nonprofit organizations, commercial organizations, and federal, state, local and tribal governments are all eligible to submit proposals. If you have any questions regarding eligibility, please contact the Sea Grant Director (see section VIII).

B. Submission Types

Proposers must submit either a *Qualification Request* or a *Full Proposal Request*, depending on the type of work they intend to propose.

B.1) A *Qualification Request* will focus on data collection in combination with analysis of existing historical data for priority habitat types and human uses, evaluation questions, sites, measures and metrics, and species.

This type of submission focuses on Phase 2 statewide long-term monitoring, including gathering the required information necessary to assess MPA Network performance over time. Major components include:

[10] See the California MLPA Master Plan for Marine Protected Areas. https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Master-Plan

- Maintaining or expanding the geographic scope of data collection in selected priority habitats and human uses,
- Conducting integrated analyses across sites, regions, and scientific disciplines to assess MPA performance and inform adaptive management.

Applicants should focus on designing a project that balances data collection with ample resources and time allocated for comprehensive analyses needed to determine MPA effects and Network performance. This will require access and knowledge of both current and historical datasets. The successful grantee will be required to present comprehensive analyses, in both temporal and spatial scope, addressing MPA Network performance as defined by the MLPA (Appendix 1).

MPA Network performance analysis is an emerging discipline and the Monitoring Program partners are actively working with the Commission and the broader scientific community to refine an approach and requirements for the first decadal management review anticipated in 2022. We do not have detailed information on the exact types of analyses that will be required and most useful for the management review. However, Appendix 1 should be used as a guide for applicants to budget ample time in their project for MPA Network performance analyses. Some habitats have over a decade of available data and additional physical and chemical monitoring data is becoming more widespread and available. We strongly encourage applicants to plan adequate time, which in some cases may be the majority of the project budget, to perform complex multivariate cross-disciplinary analyses across habitats and human uses.

It is expected that a Qualification Request will focus on a specific habitat type(s), or human use type, and should cover that habitat or use type statewide, most probably including teams of researchers based at multiple institutions to achieve statewide coverage. A lead Principal Investigator (PI) will submit the request, including multiple institutional co-PIs and budgets as appropriate to the work proposed. Qualification Requests that focus on a habitat or human-use type only within a subregion of the state will not be viewed as favorably as requests which cover that type statewide.

We seek Qualification Requests from PIs/teams with most of the following qualifications:

- Familiarity with California's MPA Network and Monitoring Program priorities outlined in the Action Plan.
- Five (5) or more years of experience successfully implementing and overseeing an MPA monitoring project(s) in one or more of the priority habitats or two human use types identified.
- Proven experience building broad collaborations with state, federal, and California Native American Tribes, and across disciplines.
- Ability to collaborate with experienced scientific staff to ensure the monitoring project can occur statewide.

- Familiarity with existing data streams related to the California ocean and coastal ecology, biology, oceanography and/or economy.
- Experience working with California fishermen and/or fishing communities, and/or community/citizen scientists
- Familiarity with California's MPA Network and the different stakeholders that interact with MPAs (e.g., recreation and commercial consumptive users, recreation and commercial non-consumptive users, Tribes, harbors, local governments)
- Ability to address the challenges of aggregating disparate data sources from a wide range of governmental and non-governmental sources
- Experience with biological, oceanographic, ecological, and/or economic modeling
- Existing administrative capacity and knowledge to develop, manage, and implement a statewide MPA monitoring project successfully.
- Proven success and rigorous theoretical grounding in incorporating both quantitative and expert informed approaches for evaluation of ecological, oceanographic, and/or economic trends relating to California's MPA Network.
- Ability to deliver complete raw and refined data streams at a range of spatial and temporal scales, as well as interpretive analyses.

B.2) A *Full Proposal Request* will be submitted by those who propose to focus on developing a broadly supported and inclusive process to advance the statewide collection and use of TEK to help inform the adaptive management of California's MPA Network. The submission requirements and format are only slightly different from Qualification Requests, primarily because the state has not specified priority sites, species, and metrics for work with Tribes as it has done for other monitoring work.

An important component of the Monitoring Program is to incorporate TEK. Since time immemorial, California Native American Tribes have stewarded and utilized marine and coastal resources in California, including offshore islands. The foundation of their management is a collective storehouse of knowledge about the natural world, acquired through direct experience and contact with the environment, and gained through many generations of learning passed down by elders about practical, as well as, spiritual practices. This knowledge, which is the product of keen observation, patience, experimentation, and long-term relationships with the resources, today is commonly called TEK[11].

The Monitoring Program is committed to learning from and collaborating formally with California Native American Tribes on ways to integrate TEK into long-term MPA monitoring and to inform adaptive management of MPAs. Applicants should design a project that works directly with Tribes to understand how they would like to participate in helping to inform adaptive management. Some areas to explore with Tribal guidance and adequate protection for confidentiality of TEK includes assessing historical and present-day Tribal uses of marine

[11] Anderson K. 2005. Trending the Wild: Native American Knowledge and the Management of California's Natural Resources. Berkeley and Los Angeles: University of California Press.

resources and environmental conditions in priority habitat types throughout California's coastal waters including offshore islands. This could include data collection and analyses identifying ecological features, species observations and locations, and areas of concerns/threats; attitudes and perceptions of California Native American Tribes on species use; and documented use and stewardship practices of marine resources by California Native American Tribes. This will potentially require access and knowledge of both current and historical information; data collection in a manner that is culturally appropriate, ensures the protection of sensitive information, and provides analyses that can inform long-term monitoring of MPAs; and establishing methods that are standardized and strictly followed by participating California Native American Tribes.

We seek Full Proposal Requests with the following qualifications:

- Established working history with California Native American Tribes
- Knowledgeable of California's coastal marine resources throughout the state
- Experience with communication and collaboration between California state government and California Native American Tribes
- Experience with presenting traditional knowledge to the public and a scientific audience in both oral and written form
- Experience connecting traditional ecological knowledge to inform resource management decisions

The required content for each type of request is detailed in the following two sections.

C. Required Submission Content – Qualification Request

1) Signed and institutionally endorsed cover page(s). The lead PI should include the summary (total project) budget information on the lead institutional cover page. Additional cover pages may be included after the lead institutional cover page that lists other participating institutions and co-PIs.

2) Project Narrative/Project Description (15-page limit), to include:

- *Brief Project Summary*
- *Project Description* – to include, in some order:
    - Work Plan – including Project Goals & Objectives, and Approach
    - A complete list of MPA sites and reference sites including rationale for sites selected that will be included in the project, including sampling frequency, metrics and measures, and species for each location
    - A list of the data sources and date ranges covered for the final analyses

    - Statement of research experience within the key habitat(s) or use types related to the proposed monitoring project. Please highlight any California specific or MPA specific projects
    - Statement of qualifications, including selected experience with similar projects
- *Tables, Figures and Illustrations*, if any

Other **required** information to be included in the Project Narrative – not subject to the 15-page limit:

- *Data Sharing and Confidentiality Concerns (if applicable)* – It is expected that teams will provide OPC/CDFW with all data collected by the end of the project by data upload to a platform not yet completed. The PI should explicitly state a willingness to do this, and within this section explicitly note privacy issues or other sensitivities arising from proposed methods, and describe remedies proposed to enable sharing and delivery of data with appropriate accommodations to account for the sensitivity. Also see "Data and Metadata" in section IV.E, below.
- *Outcomes and Deliverables* – Project outcomes should be clearly related to the initial project goals, which in turn should be linked to the Monitoring Program purposes and priorities. A clear description of the intended project deliverables should be provided, including description of data and other products, and associated timelines for development and delivery. CASG will expect annual reports to be submitted and a final report (first in draft, then in revised form, based upon comments of a review panel). The lead PI must acknowledge willingness to provide these reports in a timely manner.
- *Milestones Chart* – Projects may be proposed for any duration within the time period between 16 May 2019 and 15 May 2022. A graphical representation of the total project duration and sequence of key steps or tasks over the course of the project, with associated timing, should be provided.
- *Permits and Permissions* – discuss any permits (federal or state, or other) required to complete the work proposed and the status of these permits (see Section IV.E, following).
- *References* – List all included references alphabetically.
- *CVs* of PI and other Key Personnel – CVs of PIs and co-PIs will be created and uploaded within eSeagrant. However, CVs of additional key personnel may be appended to the Project Narrative.

All the above components of this section (2) of the proposal should be combined into a single PDF file for submission.

3) Project Budget(s) – use the downloadable Budget Worksheet to create annual and cumulative budget requests, and itemized justifications, for each institution requesting funds.

As per agreement between the University of California and OPC, F&A (i.e. Indirect Costs) are set to 25% of modified total direct costs.

Please also include other current and pending projects associated with investigators. PIs may fill in the worksheet "Current Research Support" included in the Excel budget file and upload a pdf of that worksheet, upload a separate document, or enter it directly into eSeaGrant.

4) (Optional) Letters of Support – teams are welcome to include letters from individuals, groups, agencies, etc. in support of the proposed work. Please combine them into one PDF for submission. However, these are not required.

D. Required Submission Content – Full Proposal Request

1) Signed and institutionally endorsed cover page(s). The lead PI should include the summary (total project) budget information on the lead institutional cover page. Additional cover pages may be included after the lead institutional cover page that lists other participating institutions and co-PIs.

2) Project Narrative/Project Description (15-page limit), to include:

- *Brief Project Summary*
- *Project Description* – to include, in some order:
    - Work Plan – including Project Goals & Objectives, Rationale, and Approach
    - Statement detailing a) the working relationship with California Native American Tribes, b) experience with traditional resource use and management, and c) experience providing written documentation of resource management outcomes to management agencies for the purpose of long-term management and evaluation
    - Statement of Qualifications - including selected experience with similar types of projects, and specific qualifications of key team members such as proposed Project Manager, Project Principal, sub consultant firms, etc., arranged in a Team Organizational Chart
- *Examples* of up to three (3) similar projects in which the lead PI/team has engaged (short one paragraph summaries and an associated reference that includes full name, title, phone, and email)
- *Tables, Figures and Illustrations*, if any

Other **required** information to be included in the Project Narrative – not subject to the 15-page limit:

- *Data Sharing and Confidentiality Concerns (if applicable)* – It is expected that teams will provide OPC/CDFW with all data collected by the end of the project by data upload to a platform not yet completed. The PI should explicitly state a willingness to do this, and within this section explicitly note privacy issues or other sensitivities arising from proposed methods, and describe remedies proposed to enable sharing and delivery of data with appropriate accommodations to account for the sensitivity. Also see "Data and Metadata" in section IV.E, below.

- *Outcomes and Deliverables* – Project outcomes should be clearly related to the initial project goals, which in turn should be linked to the Monitoring Program purposes and priorities. A clear description of the intended project deliverables should be provided, including description of data and other products, and associated timelines for development and delivery. CASG will expect annual reports to be submitted and a final report (first in draft, then in revised form, based upon comments of a review panel). The lead PI must acknowledge willingness to provide these reports in a timely manner.
- *Milestones Chart* – Projects may be proposed for any duration within the time period between 16 May 2019 and 15 May 2022. A graphical representation of the total project duration and sequence of key steps or tasks over the course of the project, with associated timing, should be provided.
- *Permits and Permissions* – discuss any permits (federal or state, or other) required to complete the work proposed and the status of these permits (see Section IV.E, following).
- *References* – List all included references alphabetically.
- *CV's* of PI and other Key Personnel – CVs of PIs and co-PIs will be created and uploaded within eSeaGrant. However, CVs of additional key personnel may be appended to the Project Narrative.

All the above components of this section (2) of the proposal should be combined into a single PDF file for submission.

3) Project Budget(s) – use the downloadable Budget Worksheet to create annual and cumulative budget requests, and itemized justifications, for each institution requesting funds.

As per agreement between the University of California and OPC, F&A (i.e. Indirect Costs) are set to 25% of modified total direct costs.

Please also include other current and pending projects associated with investigators. PIs may fill in the worksheet "Current Research Support" included in the Excel budget file and upload a pdf of that worksheet, upload a separate document, or enter it directly into eSeaGrant.

4) (Optional) Letters of Support – teams are welcome to include letters from individuals, groups, agencies, etc. in support of the proposed work. Please combine them into one PDF for submission. However, these are not required.

E. Additional Information

BUDGETS - For purposes of formulating budgets, proposers should recognize that a total of $9.5M is available to cover collection and use of TEK, monitoring of multiple habitats, sites and species of interest, and measuring multiple metrics, over the entire 3-year period of the projects. Proposers should request what is necessary to accomplish the work and analyses they propose, but it is important for proposers to recognize that a large portion of the budget probably cannot be allocated to any single project.

Also, there is no requirement to include matching funds in any project's budget (as is required for many other Sea Grant awards). Nevertheless, PIs are encouraged to discuss other sources of support in hand that may complement/leverage funds requested here.

PROJECT PERMITS AND PERMISSIONS - Project Leaders are responsible for to determine what, if any, permits or permissions are required to carry out the proposed work. Applicants are not required to apply for permits or permissions in advance of submitting proposals. Permitting fees can be included within projects budgets. (Please note that permitting fees paid before awards are issued cannot be reimbursed.)

Project proposals that require the handling of organisms, disturbing or placing sampling equipment on the seafloor, require entry into special closures, or accessing an area via state or county park lands must acquire the appropriate state, local or federal permits. If your proposed project is likely to require state and/or federal permits or other permissions, please note that these can take considerable time to obtain. We encourage applicants to contact CDFW with questions related to state permits, such as a Scientific Collecting Permit (SCP). An SCP is required to take, collect, capture, mark, or salvage for scientific, educational, and non-commercial propagation purposes, mammals, birds and their nests and eggs, fishes, and invertebrates. For more information about permits that may be required by the CDFW, please visit the Collecting and Research Take Permits section of the CDFW website:

https://www.wildlife.ca.gov/Licensing/Scientific-Collecting

Project proposals that include working with individuals providing information related to TEK may be required to acquire permits and other permissions (e.g., informed consent agreements) from those individuals and from the Tribal Council(s) of affected Tribe(s), and from Institutional Review Board(s). We encourage applicants to contact the Tribes included in the proposal with questions related to permissions and permits that may be required.

Please note that additional permits may be required from other agencies. Applicants are responsible for identifying all permits and permissions required for their proposed projects. Applicants should also ensure that they have permission from appropriate landowners to access or pass through private land(s). In recognition of the importance of coastal lands to Tribes and Tribal communities within the North Coast region, proposed projects that include sites within tribal lands, or that involve entering such lands to gain access to coastal sites, are strongly encouraged to reach out to and partner with the associated Tribe(s) to request any permits and/or permissions required to access such lands.

DATA AND METADATA - Data and associated metadata (see metadata standards here; standards are being updated to align with California Natural Resources Agency's Open Data Platform[12] but the core standards will remain the same) must be delivered to OPC at the completion of the project, if not before. California Natural Resources Agency's Open Data

[12] https://data.cnra.ca.gov/

Platform shall serve as the formal vehicle for delivery of all data associated with funded projects. Final project payment will not be made until data and metadata have been received. The data upload function is currently being developed and successful applicants will be part of the beta testing to ensure the function is easy to use.

All projects should employ a standardized reporting protocol, which will be developed following project selection with awarded applicants and with guidance from OPC. Data deliverables may include still or video images, text reports, databases, spreadsheets, maps and GIS layers. We anticipate that projects may develop multiple data deliverables; each should be clearly identified in the proposal. Sufficient metadata should also be provided to fully describe the data, collection methods and data reporting structure.

Upon delivery to CDFW, OPC, and CASG and thereafter, all data and metadata will be available to the public and other researchers in accordance with confidentiality and sensitive information protection practices described below. Investigators, however, will retain the right to publish results before and after project completion. Project data may be used to support additional analyses of other concurrent projects, and may be included or summarized in subsequent reports and other materials, in print and/or electronically.

CONFIDENTIALITY - Where privacy issues or other sensitivities will or may arise, these must be noted explicitly in project proposals, along with a proposed remedy to enable delivery of data with appropriate accommodations to account for the sensitivity. This may include, for example, delivering data only to CDFW and under protection of a signed non-disclosure agreement, or developing a protocol to anonymize observations as needed to enable sharing collected data with researchers and government agencies. Confidentiality is especially important to consider when working with socioeconomic information (i.e., produced through interviews with fishermen), locations of California Native American Tribes cultural places (i.e., gathered through TEK), and locations of populations of protected or sensitive organisms (i.e., noted during field surveys). Applicants should include a description of their anticipated method for protecting confidential and/or sensitive information, if relevant to their proposed project.

Note: Project Leader(s) will be required to execute a non-disclosure agreement with CDFW for awarded projects that require CDFW confidential information (e.g., landings, license information) and/or may be asked to sign a mutually agreed-upon memorandum of understanding (MOU) regarding data expectations (e.g., data housing, maintenance, protection) for awarded projects that generate their own confidential information as part of the scope of work. Projects will also be required to accept the Data Policy on California Natural Resources Agency's Open Data Platform[13] upon data delivery.

ANNUAL PROGRESS REPORTS - For projects exceeding 16 months duration, annual progress reports are required to be submitted to CASG at 12-month intervals following the contract start date. Annual progress reports should briefly describe progress towards specific project goals,

[13] https://data.cnra.ca.gov/

and provide timelines (progress in meeting milestones) for work completed and remaining. They should also provide updated financial information including budgeted costs and actual expenditures and justifications for variances. Incurred or anticipated budget (positive or negative) variances in excess of 10% of the category (e.g., salaries, supplies, etc.) budgeted amount must be approved by the Sea Grant Office.

COMMUNICATION OUTREACH - Funded projects will be required to coordinate with CDFW and OPC to create and disseminate quarterly social media postings through various social media channels (Facebook, Twitter, Instagram, etc.) regarding the proposed project, including authoring at least one blog post (500 - 1000 words) annually over the course of the project to include in CDFW's Marine Protected Area Management e-newsletter[14].

NETWORK PERFORMANCE ANALYSES - California has set a decadal management review cycle as a mechanism to gather sufficient information for evaluating network efficacy at meeting the goals of the MLPA and to inform the adaptive management of the MPA Network[15]. Identifying and conducting rigorous statistical analyses needed to inform the first decadal management review anticipated in 2022, as well as further advance long-term monitoring strategies and the evaluation of the performance of the Network at meeting the goals of the MLPA, will be a critical component of funded projects.

CDFW and OPC will convene a workshop(s) in June 2019 with funded project PIs (and other project partners) to identify, refine, and prioritize: a) network performance evaluation questions, and b) the appropriate analyses to conduct in order to address prioritized evaluation questions for both key habitats and human uses. A comprehensive list of prioritized evaluation questions and analyses required for the first decadal management review will be developed no later than December 31, 2019.

FINAL REPORT - Each project is required to produce and deliver a final report to CASG. Final reports must include the following sections:

1) A narrative accounting of the project's progress towards Monitoring Program purposes and project goals.
2) A financial report showing budgeted and actual costs and variances, with explanations of any positive or negative variances of greater than 10% of the budgeted amount.
3) A technical report, which shall include an introduction, appropriate descriptions of methods and analytical approaches, data summaries, analyses and interpretation, and management recommendations. Reports shall include explicit reference to the MPA Monitoring Program purposes and priorities and the supporting results, analyses and interpretation required to meet each program priority.

[14] To subscribe, visit CDFW's MPA Management Mailing list

[15] See the California MLPA Master Plan for Marine Protected Areas. https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Master-Plan

4) An Executive Summary, summarizing methods, key findings and conclusions in 1-2 pages of text and, if needed, an additional 1-2 pages of figures. The Executive Summary should be written for a broad public release.

Draft Final Technical Reports will be reviewed by Sea Grant, CDFW, and OPC. The final technical reports will also be subject to scientific peer review. Final reports shall be revised in accordance with reviewer comments before final submission and acceptance by Sea Grant, in consultation with program partners. Final project payments will be made upon receipt and acceptance of all deliverables.

Following completion of all projects and receipt and acceptance of all final project reports, a synthesis of major findings will be prepared and a final public summary report will be produced. Project Leaders will be given the opportunity to review a draft of the summary report.

V. Informational Webinar and Proposal Submission Guidance

For interested parties, OPC, CDFW and CASG will host an optional, informational webinar on Thursday, 15 November 2018 from 1:00 pm – 2:30 pm.

Registration Link: https://ucsd.zoom.us/j/839453585
Call – In Number:1-669-900-6833 or 1-646-558-8656
Meeting ID: 839 453 585

The webinar will be recorded and posted online afterwards along with a copy of the presentation on California Sea Grant's webpage: https://caseagrant.ucsd.edu/grants-and-funding/mpa19-call-for-submissions

Electronic Submission

Whether submitting a Full Proposal Request or Qualification Request, completed applications **must be submitted by 5:00 pm, Thursday 20 December, using eSeagrant**. CASG's electronic submission portal will close at that date/time and applications after that time and via any other mechanism of transmission will not be accepted. If applicants (i.e. lead PI or his/her institutional representative) have not already registered in eSeaGrant, you will need to register via the online submission "portal" (http://eseagrant2.ucsd.edu).

Once you login, you can change your password if you would like. To change your password, click on your name in the upper-right corner of the screen, and select "My Profile". To start a proposal, or revisit/edit an existing proposal, click on "RFP (Request for Proposals)" on the banner head. Then click on "Add Proposal" under "2019 Marine Protected Area Monitoring".

In order to submit a proposal, you must work down the sequence of sections ("Start Here" through "Submission Preview") listed on the left side of the proposal window. eSeaGrant provides sections to upload signed (endorsed) title pages, CVs of PIs and co-PIs, budget, project

narrative, and optional support letters. Some of these pages may require additional calculations and pop-up pages, so please allow your browser to display pop-up windows and enable Javascript. Files to upload must be converted to PDFs before uploading to eSeaGrant (except the budget spreadsheets). Multiple documents must be consolidated into one PDF for each section (except for CVs).

We recommend that eSeaGrant users access the system, review submission requirements within it, and start to upload necessary documents well in advance of the submission deadline. This will give users the opportunity to obtain any necessary clarification or assistance before the deadline. **The submission deadline will not be extended.**

For questions regarding use of eSeaGrant, please contact Miho Ligare at (858) 534-1160; email: sgproposal@ucsd.edu.

VI. Proposal Review Process

All proposals will be evaluated against the criteria that are derived directly from the Action Plan, which emphasize alignment with Monitoring Program purposes, scientific and technical merit, demonstration of partnerships, incorporation of local expertise, costs, funding leveraging, and qualifications of project leads. Evaluations will be based on these criteria:

1) Project relevance and applicability to the objectives of the Monitoring Program and MPA Monitoring Action Plan (Action Plan), including:

- Efficiencies in data collection to address multiple Monitoring Program priorities
- Inclusion of community/citizen science, fisherman, and/or California Native American Tribes or Tribal Governments
- Ability to conduct monitoring and analyses inside and outside of priority MPAs at the sampling frequency and scope identified for the priority habitats or human uses. This includes assessment of description of methods used to identify reference sites.

2) Data management, accessibility, and usability: Assessment of data management strategy; integration with the California Natural Resources Agency's Open Data Platform (https://data.cnra.ca.gov/) ; scalability; and stakeholder accessibility.

3) Scientific/technical merit: Assessment of the conceptual framing and technical approaches proposed to achieve project goals.

4) Partnerships, collaborations, and local expertise: Assessment of whether the proposal takes best advantage of the knowledge and capacity existing within the California Department of Fish and Wildlife and other state agencies, and the leveraging of other broad partnerships (e.g., Tribes, citizen/community scientists, fishermen) across diverse disciplines.

5) Project costs and funding leverage: Assessment of cost-effectiveness, including project cost relative to Monitoring Program objectives (see above), and ability to leverage other available funds and capacity to conduct the project

6) Assessment of qualifications of project lead(s), demonstrated capacity of project support teams, access to facilities, and resources to complete the project.

7) Project management experience, expertise, and skills: Assessment of multiple facets of project management, including a proven track record in completing contracts on time and within budget; experience managing and working in multi-party, multidisciplinary teams; and evidence of good communication skills. Communication skills include the ability to provide clear and effective communication of project goals, approaches, and results to diverse audiences interested in monitoring information.

The evaluation process will involve evaluation by a review panel composed of expert scientists familiar with MPA monitoring and function, working in consultation with relevant staff from CDFW and OPC. In the case of Full Proposal Requests, the panel will include persons familiar with the collection and use of TEK. Panel members will be chosen based on scientific, technical and local expertise relevant to the proposals received and will be selected by Sea Grant in collaboration with CDFW and OPC. The review panel will be convened to review all proposals and recommend the specific proposals or proposal elements to fund, along with the level of funding for each. Final decisions on the projects recommended for funding will be made jointly by staff of Sea Grant, CDFW and OPC. Those recommendations will be brought to the OPC for approval in February of 2019.

Final Project selection will consider the individual and collective contribution of each project to achieving the Monitoring Program purposes. CASG, CDFW and OPC may work with proposers to modify project scopes and budgets originally submitted so as to accommodate the collective need to achieve maximum coverage in use of TEK, Priority Habitats and Human Uses, Sites, Measures and Metrics, and Species.

VII. Timetable for Program

December 20, 2018, 5:00 pm – deadline for submissions using eSeagrant
Mid-February 2019 – panel(s) convene to review submissions
Mid-late February 2019 – OPC, CDFW, CASG work with PIs to modify projects, as required
Mid-March 2019 – Project selection completed and PIs notified of provisional award intent
Late March - mid-May 2019 - CASG works with provisional awardees to set up awards
May 15, 2019 - Ocean Protection Council formally approves award recommendations
May 16, 2019, and later (approximately) – Awards to PIs/teams start, work begins
May 15, 2020, 2021 – annual reports from PIs due to CASG
October 31, 2021 – draft final report due to CASG
Nov-Dec 2021 – review of draft final technical reports by CASG, OPC and CDFW

February 1, 2022 – revised final reports due to CASG
May 15, 2022 - all projects completed

VIII. Key Contact Information

For questions about the MPA Monitoring Program –
Becky Ota (CDFW) – Becky.Ota@wildlife.ca.gov or 650-631-6789
Stephen Wertz (CDFW) - Stephen.Wertz@wildlife.ca.gov or 562-342-7184
Mike Esgro (OPC) – Michael.Esgro@resources.ca.gov or 916-651-2497

For questions about California Sea Grant's role in this program –
Jim Eckman (CASG) – jeckman@ucsd.edu or 858-534-4447

For questions about using eSeagrant –
Miho Ligare (CASG) – mligare@ucsd.edu or 858-534-1160

For questions about budget issues –
Rose Madson (CASG) – rmadson@ucsd.edu or 858-534-4601

APPENDIX 1 – PERFORMANCE EVALUATION QUESTIONS

Performance objectives, questions, and metrics for network evaluation at meeting the goals of the MLPA.

MLPA GOAL 1: PROTECT THE NATURAL DIVERSITY AND ABUNDANCE OF MARINE LIFE, AND THE STRUCTURE, FUNCTION, AND INTEGRITY OF MARINE ECOSYSTEMS		
PERFORMANCE OBJECTIVE	**MEASURABLE QUESTION**	**LONG-TERM MONITORING INDICATOR**
Protect areas of high species diversity and maintain species diversity and abundance, consistent with natural fluctuations of populations in representative habitats	Do focal and/or protected species inside of MPAs differ in size, numbers, and biomass relative to reference sites?	Size/age structure of focal species, abundance, and biomass measures
	Does functional diversity differ in MPAs relative to reference sites?	Functional diversity metrics
	Do MPAs that include multiple habitat types harbor higher species abundance or more diverse communities than those that encompass a single habitat type or less diverse habitat types?	Size/age structure, abundance, and biomass of focal species, community diversity measures in MPAs with high habitat diversity and low habitat diversity
Protect natural trophic structure and food webs in representative habitats	Do the abundance, size/age structure, and/or diversity of predator and prey species differ inside MPAs, or outside areas of comparable habitat?	Trophic structure metrics
Protect ecosystem structure, function, integrity, and ecological processes to facilitate the recovery of communities from both natural and human disturbances	Does the nature or timing of recovery of natural communities from disturbance events differ in different types of MPAs relative to outside areas?	Ecosystem structure and function metrics and their diversity

MLPA GOAL 2:

HELP SUSTAIN, CONSERVE, AND PROTECT MARINE LIFE POPULATIONS, INCLUDING THOSE OF ECONOMIC VALUE, AND REBUILD THOSE THAT ARE DEPLETED

PERFORMANCE OBJECTIVE	MEASURABLE QUESTION	LONG-TERM MONITORING INDICATOR
Protect, sustain, and conserve regional populations of selected harvested or non-harvested species and the habitats on which they depend	How does spatial variability in fishing effort and fishing mortality rates prior to and after MPA implementation affect the abundance and/or size/age structure of harvested species in MPAs?	Logbook data, California Recreational Fisheries Survey (CRFS) data, local fishing mortality rates, size/age structure of focal species, abundance and biomass measures
	How do species differ in their rate of response to MPA implementation?	Population models, size/age structure of focal species, abundance and biomass measures
	What is the relationship between MPAs and the displacement, compaction, and concentration of nearshore fishing efforts? Did overall fishing effort/mortality rates and yield change since MPA implementation?	Fishing effort and catch data, local fishing mortality rates, catch-per-unit-effort
	Do differences in fishing distribution, magnitude, and mortality rates prior to MPA implementation affect changes in the abundance and/or size/age structure of populations of focal species within MPAs relative to reference sites over time?	Fishing effort and catch data, local fishing mortality rates, size/age structure of focal species, abundance, and biomass measures
	What is the rate and distribution of adult spillover of targeted fishery species from MPAs into adjacent areas?	Tagging studies, density patterns relative to distance across MPA boundaries
	Is the implementation of MPAs as a habitat-based approach to marine fisheries management more or less effective in maintaining sustainable fisheries than traditional management strategies such as limiting harvest in a non-spatially explicit manner?	Logbook data, CRFS data, local fishing mortality rates, stock assessments
	What are the economic effects of MPA placement; specifically distance from ports and location relative to fishing grounds?	Fishing effort and catch data, local fishing mortality rates, catch-per-unit effort, distance from port to fishing grounds
	What is the value of the ecosystem services provided by California's MPAs?	Examples include measures of the role MPAs play in climate change resilience, recreation and tourism, cultural uses, science and educational uses, and conservation of economically important fisheries

MLPA GOAL 3:

TO IMPROVE RECREATIONAL, EDUCATIONAL, AND STUDY OPPORTUNITIES PROVIDED BY MARINE ECOSYSTEMS THAT ARE SUBJECT TO MINIMAL HUMAN DISTURBANCES, AND TO MANAGE THESE USES IN A MANNER CONSISTENT WITH PROTECTING BIODIVERSITY

PERFORMANCE OBJECTIVE	MEASURABLE QUESTION	LONG-TERM MONITORING INDICATOR
Ensure MPAs are accessible for recreational, educational, and study opportunities	Are researchers accessing MPAs, and has research increased over time in MPAs?	Trends in number of research studies conducted in MPAs over time; dissemination of results of research studies within MPAs
	Has the magnitude and variety of recreational/educational use increased over time in MPAs?	Visitor use surveys
	How has non-consumptive use and enjoyment of marine ecosystems changed since MPA implementation? Has the public's perceived value or desire to visit the areas where the MPAs have been implemented changed due to their presence?	Contingent valuation studies (willingnes to pay for access to MPAs)
	Are recreational consumptive users able to mitigate short-term costs of displacement from MPAs by conducting activities along the edge of MPAs? Will there be long-term benefits from the edge effect?	Changes in use patterns and catch of targeted species by consumptive users over time
	How are knowledge, attitudes, and perceptions regarding the MPAs changing over time?	Public and user group knowledge, attitudes, and perceptions of MPAs
Protect or enhance recreational experience by ensuring natural size and age structure of marine populations	Are non-consumptive recreational experiences in areas subject to reduced fishing improving? What are the attitudes and perceptions of users and their recreational experience and how has that changed over time?	Predicted increase in user group satisfaction based on user group surveys
	Is the size/age structure of recreationally valued species increasing in MPAs over time?	Differential size/age structure of selected species inside and outside MPAs over time; onboard and dockside sampling of recreational catch, location and effort

MLPA GOAL 4:

PROTECT MARINE NATURAL HERITAGE, INCLUDING PROTECTION OF REPRESENTATIVE AND UNIQUE MARINE LIFE HABITATS IN CALIFORNIA WATERS FOR THEIR INTRINSIC VALUE

PERFORMANCE OBJECTIVE	MEASURABLE QUESTION	LONG-TERM MONITORING INDICATOR
Protect representatives of all marine habitats identified in the MLPA across a range of depths	Have unique habitats been adequately represented and protected by the current distribution and designation of MPAs?	Habitat mapping within MPAs to groundtruth what is captured in MPAs
	Does the abundance or quality of habitat (geologic, oceanographic, biogenic) increase or remain the same within an MPA?	Habitat metrics (e.g., derived from seafloor maps, water quality, and species that form biogenic habitat)
Protect marine natural heritage	Have endangered species and/or culturally significant species benefited from the presence of California's MPAs?	Population trends of special status species (Section 2.3, Indicator Species Selection)
	Do MPAs limit the spread of invasive species?	Comparison of the presence and abundance of invasive species inside and outside of MPAs (Refer to list of current invasive species in California)[1]

MLPA GOAL 5:

ENSURE CALIFORNIA'S MPAS HAVE CLEARLY DEFINED OBJECTIVES, EFFECTIVE MANAGEMENT MEASURES, AND ADEQUATE ENFORCEMENT, AND ARE BASED ON SOUND SCIENTIFIC GUIDELINES

PERFORMANCE OBJECTIVE	MEASURABLE QUESTION	LONG-TERM MONITORING INDICATOR
For the MPA Network, develop objectives and a long-term monitoring plan that includes a strategy for MPA evaluation	Are efforts to collect long-term monitoring data coordinated sufficiently such that cohesive conclusions can be formed about MPA Network performance?	Results from funded long-term monitoring studies
	Does the MPA Monitoring Action Plan produce sufficient information that enables the evaluation of Network performance and informs adaptive management?	Peer review of the MPA Monitoring Action Plan; cost-efficient spending and funding
Ensure adequate enforcement and compliance with MPA regulations	Is monitoring of human activity and enforcement adequate for preventing illegal take in MPAs?	Trends in number of citations/enforcement actions for violations of MPA regulations
	Do penalties for non-compliance deter users from violating regulations?	Trends in number of citations/enforcement actions for violations of MPA regulations
	How has the level of compliance changed over time since the MPAs were first implemented and what factors influence variation in compliance within and among MPAs?	Trends in number of citations/enforcement actions for violations of MPA regulations as a function of MPA features (e.g., size, location, level of protection, enforcement), socioeconomic factors, and human uses in proximity to MPAs
	Does locating a boat ramp or other access point affect the level of enforcement and compliance with MPA regulations?	Trends and spatial distribution of number of citations/enforcement actions for violations of MPA regulations
	Are there incentives that can help reduce noncompliant behavior inside MPAs?	Evaluate if incentive programs exist for ensuring compliance with MPA regulations
	Do State Marine Reserve (SMR)/State Marine Conservation Area (SMCA) clusters provide greater protection than stand-alone SMRs?	Size/age structure of focal species, abundance and biomass measures; evaluate clusters in comparison to stand-alone MPAs as part of Network evaluation
	Does the level of compliance differ between SMRs and SMCAs?	Trends and spatial distribution of number of citations/enforcement actions for violations of MPA regulations

MLPA GOAL 6:

ENSURE THAT THE STATE'S MPAS ARE DESIGNED AND MANAGED, TO THE EXTENT POSSIBLE, AS A NETWORK

PERFORMANCE OBJECTIVE	MEASURABLE QUESTION	LONG-TERM MONITORING INDICATOR
Evaluate network functionality and MPA sizing and spacing guidelines that were implemented under the MLPA	What are the demographic effects of siting MPAs in larval source or sink locations, and how do demographic responses to MPAs contribute to larval production and connectivity of MPAs in the network?	Demographic-connectivity model for determining linkages of MPAs in the network and their effects on population; evaluation of demographic-connectivity projections with size/age structure of focal species, abundance and biomass data collected through long-term monitoring
	How does the distance and larval contribution between a source MPA and sink MPA influence the ecosystem response inside the sink MPA?	Evaluation of demographic-connectivity model with size/age structure of focal species, abundance and biomass data collected through long-term monitoring
	How does the level of connectivity and larval supply from an MPA to areas outside of MPAs affect fisheries?	Demographic-connectivity model projections of larval supply from MPAs to areas outside MPAs
	Are MPAs with higher connectivity more r esilient to sudden environmental disturbance as compared to more isolated MPAs with higher self-retention?	Size/age structure of focal species, abundance and biomass data, evaluation dependent on stressor
	How do other stressors impact the management of MPAs over time (e.g., water quality, oil spills, desalination plants, ocean acidification, sea level rise)?	Size/age structure of focal species, abundance and biomass data, evaluation dependent on stressor
	Do MPAs with higher connectivity have lower variability in population trends compared to more isolated MPAs?	Evaluation of demographic-connectivity model with size/age structure of focal species, abundance and biomass data collected through long-term monitoring

APPENDIX 2 – MPA AND REFERENCE SITE PRIORITIES

Table 1. Recommended MPA tiers within each bioregion (MPAs listed north to south).
Abbreviations: SMR = state marine reserve, SMCA = state marine conservation area, SMRMA = state marine recreational management area.

TIER 1	TIER II	TIER III
NORTH COAST		
Reading Rock SMCA	Point St. George Reef Offshore SMCA	Pyramid Point SMCA
Reading Rock SMR	South Cape Mendocino SMR	Samoa SMCA
Sea Lion Gulch SMR	Big Flat SMCA	Mattole Canyon SMR
Ten Mile SMR	Double Cone Rock SMCA	Ten Mile Beach SMCA
MacKerricher SMCA	Point Cabrillo SMR	Russian Gulch SMCA
Saunders Reef SMCA	Point Arena SMR	Van Damme SMCA
Stewarts Point SMR	Point Reyes SMCA	Point Arena SMCA
Salt Point SMCA	Duxbury Reef SMCA	Sea Lion Cove SMCA
Bodega Head SMR	North Farallon Islands SMR	Del Mar Landing SMR
Bodega Head SMCA	Southeast Farallon Island SMR	Stewarts Point SMCA
Point Reyes SMR	Southeast Farallon Island SMCA	Gerstle Cove SMR
		Russian River SMCA
CENTRAL COAST		
Montara SMR	Pillar Point SMCA	Portuguese Ledge SMCA
Año Nuevo SMR	Natural Bridges SMR	Edward F. Ricketts SMCA
Greyhound Rock SMCA	Soquel Canyon SMCA	Lovers Point - Julia Platt SMR
Carmel Bay SMCA	Pacific Grove Marine Gardens SMCA	Carmel Pinnacles SMR
Point Lobos SMR	Asilomar SMR	Point Lobos SMCA
Piedras Blancas SMR	Point Sur SMR	Point Sur SMCA
Point Buchon SMR	Big Creek SMR	Big Creek SMCA
Point Buchon SMCA	Cambria SMCA	Piedras Blancas SMCA
Vandenberg SMR		White Rock SMCA
SOUTH COAST		
Point Conception SMR	South Point SMR	Kashtayit SMCA
Campus Point SMCA	Gull Island SMR	Naples SMCA
Harris Point SMR	Begg Rock SMR	Richardson Rock SMR
Carrington Point SMR	Santa Barbara Island SMR	Judith Rock SMR
Scorpion SMR	Point Vicente SMCA	Skunk Point SMR
Anacapa Island SMCA	Abalone Cove SMCA	Painted Cave SMCA
Anacapa Island SMR	Arrow Point to Lion Head Point SMCA	Footprint SMR
Point Dume SMCA	Long Point SMR	Blue Cavern Offshore SMCA
Point Dume SMR	Crystal Cove SMCA	Casino Point SMCA
Blue Cavern Onshore SMCA	Laguna Beach SMCA	Lover's Cove SMCA
Laguna Beach SMR	San Diego-Scripps Coastal SMCA	Farnsworth Onshore SMCA
Dana Point SMCA	Matlahuayl SMR	Farnsworth Offshore SMCA
Swami's SMCA	South La Jolla SMCA	Cat Harbor SMCA
South La Jolla SMR	Cabrillo SMR	Tijuana River Mouth SMCA

REFERENCE SITE CRITERIA

Comparison of ecological metrics between MPA index sites and reference sites outside of MPAs, or inside/outside comparison, has been well established as a method of assessing the progress of MPAs toward conservation goals (see Action Plan). However, differences between MPA sites and sites outside of MPAs unrelated to protection status (e.g. habitat quality, physical oceanographic conditions) are also identified as common confounding factors when assessing the effects of protection (Charton & Ruzafa 1999, Charton et al. 2000). Therefore, effective MPA monitoring requires informed selection of reference sites outside of MPAs so that inside/outside comparison is meaningful. For long-term monitoring, selection of reference sites will be the responsibility of individual PIs. Although this Action Plan does not mandate monitoring at specific reference sites, the state requires that reference sites be selected, and data be provided, that supports compatibility with the corresponding MPA index sites they are being compared to. Compatibility is based on the following criteria:

Biotic Factors

- Ecological conditions at the time of MPA implementation: Detection of ecological divergence between MPA and reference sites requires similar initial conditions at both sites (Starr et al. 2015). Key metrics to consider include
- Functional biodiversity, species composition, species density and biomass, and size frequency distributions.
- Human Uses
- Fishing pressure at time of MPA implementation: Responses of fished populations to MPA implementation are highly dependent on the level of fishing pressure to which those populations were exposed before being protected (Micheli et al. 2004, Kaplan et al. in prep, Yamane et al. in prep). Key metrics to consider include: local fishing mortality (F) for targeted species, if available; historical fishing effort; and/or regional proxies for fishing effort (e.g., distance from port).
- Non-consumptive human use: While generally less significant than fishing, non-consumptive human use (e.g,. boating, tidepooling, scuba diving) affects marine ecosystems. Examples of deleterious effects associated with nonconsumptive use include trampling, accidental take, and habitat alteration (Tratalos & Austin 2001, Davenport & Davenport 2006, Lloret et al. 2008). Key metrics to consider include: type and level of non-consumptive use (e.g. from MPA Watch beach surveys), water quality, and frequency of boat anchoring.

Abiotic Factors

- Geography: Biogeographic boundaries play an important role in driving marine community structure, and California's coastline encompasses several distinct marine ecoregions. It is therefore crucial to group index sites and reference sites at the correct geographic scale (Hamilton et al. 2010). Furthermore, a reference site adjacent
- or proximate to an MPA may be ecologically connected to that MPA through larval dispersal or spillover of adult organisms, potentially confounding inside/outside comparison (Moffitt et al. 2013). Key metrics to consider include: presence of biogeographic barriers and distance between MPA and reference sites.

- Habitat features: Habitat/microhabitat type, quality, and availability are critical drivers of marine species distribution and community composition, in some cases more influential than the presence or absence of protection (Lindholm et al. 2004, Oliver et al. 2010, Starr et al. 2015, Fulton et al. 2016). Key metrics to consider
- include: depth, percent rock, rugosity, habitat complexity, macroalgal cover, and distribution of habitat types.
- Geology: Seafloor sediment and benthic communities both play important roles in driving marine community structure (Snelgrove 1997). Key metrics to consider include: underlying rock type (e.g. shale, granite), grain size, benthic community structure, and proximity to major geologic features such as submarine canyons.
- Physical and chemical oceanography: Physical and chemical oceanographic conditions have significant impacts on marine communities. For example, by driving patterns of larval dispersal or influencing nutrient availability in an ecosystem (Menge et al. 1997, Ruzicka et al. 2012, Nickols et al. 2013). Key metrics to consider include: primary productivity/nutrient availability, wave exposure (including direction, extent, and intensity), and variability and spatial distribution of relevant dynamics and processes, such as upwelling, fronts, river plumes, ocean acidification, and hypoxia.

APPENDIX 3 - PRIORITY MEASURES AND METRICS TO EVALUATE MPA NETWORK PERFORMANCE

Species-level

- Abundance
- Density/cover
- Size/age frequency
- Biomass
- Community-level
- Functional diversity--tracking the population dynamics of those species and organismal traits that influence ecosystem functioning
- Stability

Physical

- Temperature
- Depth
- Substrate (e.g., rock or sediment size, type, and rugosity)
- Wave exposure

Chemical

- pH
- Total alkalinity
- Dissolved oxygen

Human Use

- Commercial Passenger Fishing Vessel
- Annual license renewal and vessel registration
- Port of departure
- Number of anglers
- Target species
- Trip length
- Fishing location
- Average price paid per angler
- Number and pounds of fish caught by species
- Number of crew on trip
- Effort and catch per unit effort (CPUE)
- Annual operating costs
- Number of crew employed

Commercial Fisheries

- Annual license and vessel renewal
- Number of fishermen making landings
- Landings: catch, price, and revenue by species
- Gear type
- Landings port location
- CPUE
- Harvest location
- Annual operating costs
- Number of crew employed

Recreational Fisheries

- License purchases
- Catch amount
- Catch location
- Catch effort
- Type of gear/mode

Coastal Recreation and Tourism

- Location of residence
- Demographic information (i.e. age, gender, education, etc. See Appendix D of the Action Plan for further detail)
- Income
- Employment status
- Frequency and type of visit
- Location of visit
- Type of activities
- Trip expenditures

Enforcement (location specific)

- Patrol hours
- Citations
- Warnings
- Cal TIPs received related to potential MPA violations

APPENDIX 4 - PRIORITY SPECIES FOR MPA MONITORING PROGRAM

Indicator fish species:

COMMON NAME	SCIENTIFIC NAME	Regional Monitoring Plans				DEEPWATER WORKSHOP	MLMA SPECIES
		NORTH	NORTH CENTRAL	CENTRAL	SOUTH		
ANCHOVY, NORTHERN	*Engraulis mordax*	N	N	Y	N	N	N
BASS, BARRED SAND	*Paralabrax nebulifer*	N	N	N	Y	Y	Y
BASS, GIANT SEA [1]	*Stereolepis gigas*	N	N	N	Y	Y	N
BASS, KELP	*Paralabrax clathratus*	N	N	N	Y	N	Y
BASS, SPOTTED SAND	*Paralabrax maculatofasciatus*	N	N	N	Y	N	Y
BLACKSMITH	*Chromis punctipinnis*	N	N	N	Y	N	N
CABEZON	*Scorpaenichthys marmoratus*	Y	Y	Y	Y	N	N
CROAKER	Sciaenidae	N	N	N	Y	N	N
CROAKER, WHITE SEABASS	*Atractoscion nobilis*	N	N	N	Y	N	Y
FLATFISH	Multiple spp.	Y	Y	Y	Y	Y	N
FLATFISH, CALIFORNIA HALIBUT	*Paralichthys californicus*	N	Y	Y	Y	N	Y
FLATFISH, DIAMOND TURBOT	*Pleuronichthys guttulatus*	N	N	Y	N	N	N
FLATFISH, DOVER SOLE	*Microstomus pacificus*	N	N	Y	N	N	N
FLATFISH, ENGLISH SOLE	*Parophrys vetulus*	N	N	Y	N	N	N
FLATFISH, PACIFIC HALIBUT	*Hippoglossus stenolepis*	Y	N	N	N	N	N
FLATFISH, PACIFIC SANDDAB	*Citharichthys sordidus*	N	N	Y	N	N	N
FLATFISH, PETRALE SOLE	*Eopsetta jordani*	N	N	Y	N	N	N
FLATFISH, STARRY FLOUNDER	*Platichthys stellatus*	Y	Y	Y	N	Y	N
GOBY	Gobiidae	N	N	Y	Y	N	N
GOBY, BLACKEYE	*Rhinogobiops nicholsii*	N	N	Y	N	N	N
GREENLING, KELP	*Hexagrammos decagrammus*	Y	Y	Y	N	N	N
GREENLING, PAINTED	*Oxylebius pictus*	N	Y	Y	N	N	N
GUITARFISH, SHOVELNOSE	*Rhinobatos productus*	N	N	N	Y	N	N
HAGFISH, PACIFIC	*Eptatretus stoutii*	N	N	Y	Y	N	Y
HERRING, PACIFIC	*Clupea pallasii*	Y	N	N	N	N	Y
LINGCOD	*Ophiodon elongatus*	Y	Y	Y	Y	Y	N
OCEAN WHITEFISH	*Caulolatilus princeps*	N	N	N	Y	Y	Y
PERCH	Embiotocidae	Y	Y	Y	Y	N	N
PERCH, BLACK	*Embiotoca jacksoni*	N	N	Y	N	N	N
PERCH, PILE	*Rhacochilus vacca*	N	N	Y	N	N	N
PERCH, SHINER	*Cymatogaster aggregata*	N	Y	Y	N	N	Y
PERCH, STRIPED SEA	*Embiotoca lateralis*	Y	Y	Y	N	N	N
PRICKLEBACK, MONKEYFACE	*Cebidichthys violaceus*	N	Y	Y	N	N	N
PRICKLEBACK, ROCK	*Xiphister mucosus*	N	Y	N	N	N	N
RATFISH, SPOTTED	*Hydrolagus colliei*	N	N	Y	N	Y	N
RAY, BAT	*Myliobatis californicus*	N	Y	Y	Y	N	N
ROCKFISH	*Sebastes* spp.	Y	Y	Y	Y	Y	N
ROCKFISH, AURORA	*Sebastes aurora*	N	N	N	N	Y	N
ROCKFISH, BANK	*Sebastes rufus*	N	N	Y	Y	N	N
ROCKFISH, BLACK	*Sebastes melanops*	Y	Y	Y	N	N	N
ROCKFISH, BLACK-AND-YELLOW	*Sebastes chrysomelas*	Y	Y	Y	N	N	N

COMMON NAME	SCIENTIFIC NAME	Regional Monitoring Plans				DEEPWATER WORKSHOP	MLMA SPECIES
		NORTH	NORTH CENTRAL	CENTRAL	SOUTH		
ROCKFISH, BLUE	*Sebastes mystinus*	Y	Y	Y	Y	N	N
ROCKFISH, BOCACCIO [2]	*Sebastes paucispinis*	N	Y	Y	Y	Y	N
ROCKFISH, BROWN	*Sebastes auriculatus*	Y	Y	N	N	Y	N
ROCKFISH, CANARY	*Sebastes pinniger*	Y	Y	Y	N	Y	N
ROCKFISH, CHINA	*Sebastes nebulosus*	N	Y	Y	N	N	N
ROCKFISH, COPPER	*Sebastes caurinus*	Y	Y	Y	N	Y	N
ROCKFISH, COWCOD [2,3]	*Sebastes levis*	N	N	Y	Y	Y	N
ROCKFISH, DWARF	*Sebastes spp.*	Y	Y	Y	Y	Y	N
ROCKFISH, GOPHER	*Sebastes carnatus*	N	Y	Y	N	Y	N
ROCKFISH, GREENSPOTTED	*Sebastes chlorostictus*	N	N	N	N	Y	N
ROCKFISH, GREENSTRIPED	*Sebastes elongatus*	Y	N	N	N	Y	N
ROCKFISH, KELP	*Sebastes atrovirens*	Y	Y	Y	Y	N	N
ROCKFISH, OLIVE	*Sebastes serranoides*	N	N	N	Y	N	N
ROCKFISH, QUILLBACK	*Sebastes maliger*	N	N	N	N	Y	N
ROCKFISH, ROSY	*Sebastes rosaceus*	N	N	Y	N	N	N
ROCKFISH, SHORTBELLY	*Sebastes jordani*	Y	Y	Y	Y	N	N
ROCKFISH, SPLITNOSE	*Sebastes diploproa*	N	N	N	N	Y	N
ROCKFISH, VERMILION	*Sebastes miniatus*	Y	Y	Y	Y	Y	N
ROCKFISH, WIDOW	*Sebastes entomelas*	Y	Y	Y	Y	Y	N
ROCKFISH, YELLOWEYE [3]	*Sebastes ruberrimus*	Y	Y	Y	N	Y	N
ROCKFISH, YELLOWTAIL	*Sebastes flavidus*	Y	Y	Y	N	N	N
SABLEFISH	*Anoplopoma fimbria*	Y	N	Y	Y	Y	N
SALMONIDS	*Oncorhynchus spp.*	Y	N	Y	N	N	N
SARDINE, PACIFIC	*Sardinops sagax*	N	N	Y	N	N	N
SCORPIONFISH, CALIFORNIA	*Scorpaena guttata*	N	N	N	Y	Y	N
SCULPIN	Cottidae	Y	N	Y	N	N	N
SEÑORITA	*Oxyjulis californica*	N	N	Y	Y	N	N
SHARK, LEOPARD	*Triakis semifasciata*	Y	Y	Y	Y	N	N
SHARK, PACIFIC ANGEL	*Squatina californica*	N	N	N	Y	Y	Y
SHEEPHEAD, CALIFORNIA	*Semicossyphus pulcher*	N	N	N	Y	Y	Y
SILVERSIDE, CALIFORNIA GRUNION	*Leuresthes tenuis*	N	N	Y	Y	N	N
SILVERSIDE, JACKSMELT	*Atherinopsis californiensis*	N	N	N	Y	N	Y
SILVERSIDE, TOPSMELT	*Atherinops affinis*	Y	N	Y	Y	N	N
SKATE, CALIFORNIA	*Raja inornata*	N	N	Y	N	N	N
SKATE, LONGNOSE	*Raja rhina*	N	N	Y	N	Y	N
SMELT, NIGHT	*Spirinchus starksi*	N	N	Y	N	N	Y
SMELT, SURF	*Hypomesus pretiosus*	Y	Y	Y	N	N	N
STICKLEBACK, THREESPINE	*Gasterosteus aculeatus*	Y	N	N	N	N	N
THORNYHEAD	*Sebastolobus spp.*	Y	N	Y	N	N	N
TUBESNOUT	*Aulorhynchus flavidus*	N	N	Y	N	N	N
YOUNG-OF-YEAR	Multiple spp.	Y	Y	Y	Y	N	N

1. Special status: Fishing moratorium (no direct commercial or recreational fishing allowed)
2. Special status: Identified as a species of concern by the National Marine Fisheries Service
3. Special status: Listed as overfished by the Pacific Fishery Management Council, as of 8/24/2018

Indicator invertebrate species:

COMMON NAME	SCIENTIFIC NAME	Regional Monitoring Plans				DEEPWATER WORKSHOP	MLMA SPECIES
		NORTH	NORTH CENTRAL	CENTRAL	SOUTH		
ABALONE	Haliotidae	N	N	N	Y	N	N
ABALONE, BLACK [1,2]	*Haliotis cracherodii*	N	Y	Y	Y	N	N
ABALONE, RED [2]	*Haliotis rufescens*	Y	Y	Y	N	N	Y
AMPHIPOD, GAMMARID	Gammaridae	N	N	Y	N	N	N
ANEMONE, FISH-EATING	*Urticina piscivora*	N	N	Y	N	N	N
ANEMONE, LARGE SOLITARY	Multiple spp.	N	N	N	N	Y	N
ANEMONE, PLUMOSE	*Metridium* spp.	Y	Y	Y	Y	Y	N
BARNACLE	*Balanus* spp. *Chthamalus fissus/dalli*	Y	N	Y	Y	N	N
BARNACLE, ACORN	*Balanus glandula*	N	N	Y	N	N	N
BARNACLE, GOOSENECK	*Pollicipes polymerus*	N	N	Y	N	N	N
BARNACLE, PINK VOLCANO	*Tetraclita rubescens*	N	N	Y	N	N	N
BARNACLE, THATCHED	*Semibalanus cariosus*	N	N	Y	N	N	N
CLAM	Multiple spp.	Y	N	N	N	N	N
CLAM, BEAN	*Donax gouldii*	N	N	N	Y	N	N
CLAM, GEODUCK	*Panopea generosa*	Y	Y	Y	N	N	Y
CLAM, PACIFIC GAPER	*Tresus nuttallii*	Y	Y	Y	Y	N	N
CLAM, PACIFIC LITTLENECK	*Leukoma staminea*	Y	Y	Y	Y	N	N
CLAM, PACIFIC RAZOR	*Siliqua patula*	Y	Y	N	N	N	N
CLAM, PISMO	*Tivela stultorum*	N	N	N	Y	N	Y
CLAM, WASHINGTON	*Saxidomus nuttalli*	N	N	N	Y	N	N
CORAL, BLACK	*Antipathes* spp.	N	N	Y	N	N	N
CORAL, LOPHELIA	Lophelia	N	N	N	N	Y	N
CORAL, MUSHROOM SOFT	*Anthomastus ritteri*	Y	N	N	N	N	N
CORAL, SOFT	Octocorallia	N	N	Y	N	N	N
CRAB, BROWN BOX	*Lopholithodes foraminatus*	N	Y	Y	N	Y	N
CRAB, DUNGENESS	*Metacarcinus magister*	Y	Y	Y	N	N	Y
CRAB, GALATHEID (SQUAT LOBSTER)	*Munida quadrispina*	N	N	Y	N	N	N
CRAB, ROCK	*Cancer* spp. *Metacarcinus* spp.	Y	Y	Y	Y	Y	N
CRAB, SAND	*Emerita* spp.	Y	Y	Y	Y	N	N
CRAB, SHEEP	*Loxorhynchus grandis*	N	Y	Y	N	Y	N
CRAB, YELLOW SHORE	*Hemigrapsus oregonensis*	Y	N	N	N	N	N
CRINOID	Crinoidea	N	N	Y	N	Y	N
GORGONIAN, SHORT RED	*Muricea* spp.	Y	N	N	N	N	N
HYDROCORAL [2]	*Stylasterina* spp.	N	Y	Y	Y	N	N
ISOPOD, EELGRASS	*Pentidotea resecata*	N	N	Y	N	N	N
LIMPET, GIANT KEYHOLE	*Megathura crenulata*	N	N	N	Y	N	N
LIMPET, OWL	*Lottia gigantea*	N	Y	Y	Y	N	N
LOBSTER, CALIFORNIA SPINY	*Panulirus interruptus*	N	N	N	Y	N	Y
MUSSEL	*Mytilus* spp.	Y	Y	Y	Y	N	N

COMMON NAME	SCIENTIFIC NAME	*Regional Monitoring Plans*				DEEPWATER WORKSHOP	MLMA SPECIES
		NORTH	NORTH CENTRAL	CENTRAL	SOUTH		
OCTOPUS, RED	*Octopus rubescens*	Y	N	N	N	N	N
OYSTER, OLYMPIA	*Octopus rubescens*	Y	Y	Y	N	N	N
PRAWN, RIDGEBACK	*Sicyonia ingentis*	N	N	N	Y	Y	Y
PRAWN, SPOT	*Pandalus platyceros*	N	N	Y	Y	N	Y
SAND DOLLAR	*Dendraster excentricus*	N	Y	Y	N	N	N
SEA CUCUMBER, CALIFORNIA	*Parastichopus californicus*	Y	N	Y	Y	Y	Y
SEA CUCUMBER, WARTY	*Parastichopus parvimensis*	N	N	N	N	Y	Y
SEA PEN	Multiple spp.	Y	N	Y	N	N	N
SEA WHIP	Multiple spp.	Y	N	Y	N	N	N
SHRIMP, BAY GHOST	*Neotrypaea californiensis*	N	Y	Y	Y	N	N
SHRIMP, MUD	*Upogebia pugettensis*	N	Y	Y	Y	N	N
SNAIL, EMARGINATE DOG WINKLE	*Nucella emarginata*	N	N	Y	N	N	N
SNAIL, TURBAN	*Tegula* spp.	Y	N	Y	Y	N	N
SNAIL, WAVY TURBAN	*Megastraea undosa*	N	N	N	Y	N	N
SPONGE	*Porifera* spp.	N	N	Y	N	Y	N
SQUID, MARKET	*Doryteuthis opalescens*	N	N	Y	Y	N	Y
STAR	Multiple spp.	Y	Y	Y	Y	Y	N
STAR, BASKET	Multiple spp.	Y	N	Y	N	N	N
STAR, BAT	*Patiria miniata*	Y	N	Y	N	N	N
STAR, BRITTLE	Ophiuroidea	N	N	Y	Y	Y	N
STAR, DEEP SAND	*Thrissacanthias penicillatus*	N	N	Y	N	N	N
STAR, OCHRE SEA	*Pisaster ochraceus*	Y	Y	Y	Y	N	N
STAR, RED SEA	*Mediaster aequalis*	N	N	Y	N	N	N
STAR, SAND	*Luidia foliolata*	N	N	Y	N	N	N
STAR, SUNFLOWER SEA	*Pycnopodia helianthoides*	Y	Y	Y	Y	N	N
TUNICATE, COMPOUND	Multiple spp.	N	Y	N	N	N	N
URCHIN, FRAGILE PINK SEA	*Strongylocentrotus fragilis*	N	N	Y	N	N	N
URCHIN, PURPLE SEA	*Strongylocentrotus purpuratus*	Y	Y	Y	Y	N	N
URCHIN, RED SEA	*Mesocentrotus franciscanus*	Y	Y	Y	Y	N	Y
URCHIN, WHITE SEA	*Lytechinus pictus*	N	N	N	N	Y	N
WHELK, KELLET'S	*Kelletia kelletii*	N	N	N	Y	N	Y
WORM, FAT INNKEEPER	*Urechis caupo*	N	Y	Y	N	N	N
WRACK ASSOCIATED INVERTEBRATES	Multiple spp.	Y	N	Y	Y	N	N

1. Special status: Listed as federally endangered under the Federal Endangered Species Act
2. Special status: Fishing moratorium (no direct commercial or recreational fishing allowed)

Indicator algae and plant species:

COMMON NAME	SCIENTIFIC NAME	Regional Monitoring Plans				DEEPWATER WORKSHOP	MLMA SPECIES
		NORTH	NORTH CENTRAL	CENTRAL	SOUTH		
ALGAE, CORALLINE	*Corallina* spp.	Y	N	Y	Y	N	N
ALGAE, ENCRUSTING NON-CORALLINE	Multiple spp.	Y	N	N	Y	N	N
ALGAE, FOLIOSE RED	Multiple spp.	Y	Y	N	Y	N	N
ALGAE, GOLDEN ROCKWEED	*Silvetia compressa*	N	N	Y	N	N	N
ALGAE, RED	Multiple spp.	Y	N	Y	N	N	N
ALGAE, ROCKWEED	*Fucaceae* spp.	Y	Y	Y	Y	N	N
ALGAE, SEA LETTUCE	*Ulva* spp.	Y	Y	Y	N	N	N
ALGAE, SUB CANOPY	Multiple spp.	Y	Y	N	Y	N	N
ALGAE, TURF	Multiple spp.	Y	Y	Y	Y	N	N
BEACH WRACK	Multiple spp.	Y	N	Y	Y	N	N
EELGRASS	*Zostera marina*	Y	Y	Y	Y	N	N
KELP, BROAD-RIBBED	*Pleurophycus gardneri*	N	N	Y	N	N	N
KELP, BULL	*Nereocystis luetkeana*	Y	Y	Y	N	N	N
KELP, ELK	*Pelagophycus porra*	N	N	N	Y	N	N
KELP, FEATHER BOA	*Egregia menziesii*	Y	Y	N	Y	N	N
KELP, GIANT	*Macrocystis pyrifera*	N	Y	Y	Y	N	N
KELP, KOMBU	*Laminaria setchellii*	N	N	Y	N	N	N
KELP, SEA PALM	*Postelsia palmaeformis*	Y	N	Y	N	N	N
KELP, SOUTHERN SEA PALM	*Eisenia arborea*	N	N	Y	N	N	N
KELP, STALKED	*Pterygophora californica*	Y	N	Y	N	N	N
PICKLEWEED	*Salicornia* spp.	Y	Y	N	Y	N	N
SURFGRASS	*Phyllospadix* spp.	Y	Y	Y	Y	N	N

Indicator bird species:

COMMON NAME	SCIENTIFIC NAME	Regional Monitoring Plans				DEEPWATER WORKSHOP	MLMA SPECIES
		NORTH	NORTH CENTRAL	CENTRAL	SOUTH		
AUKLET, CASSIN'S	*Ptychoramphus aleuticus*	N	Y	N	Y	N	N
BIRD, PISCIVOROUS	Multiple spp.	Y	Y	Y	Y	N	N
BIRD, PREDATORY	Multiple spp.	Y	Y	N	N	N	N
BIRD, SHORE	Multiple spp.	Y	Y	Y	Y	N	N
CORMORANT, BRANDT'S	*Phalacrocorax penicillatus*	Y	Y	Y	Y	N	N
CORMORANT, PELAGIC	*Phalacrocorax pelagicus*	Y	Y	Y	Y	N	N
GUILLEMOT, PIGEON	*Cepphus columba*	Y	Y	Y	Y	N	N
MURRE, COMMON	*Uria aalge*	Y	Y	N	N	N	N
OYSTERCATCHER, BLACK	*Haematopus bachmani*	N	Y	Y	N	N	N
PELICAN, BROWN	*Pelecanus occidentalis*	N	N	N	Y	N	N
PLOVER, WESTERN SNOWY [1,2]	*Charadrius nivosus nivosus*	N	N	Y	N	N	N
SHEARWATER, SOOTY	*Puffinus griseus*	N	N	N	Y	N	N
SURFBIRD	*Calidris virgata*	N	N	Y	N	N	N
TERN, CALIFORNIA LEAST [3,4]	*Sterna antillarum browni*	N	N	N	Y	N	N
TURNSTONE, BLACK	*Arenaria melanocephala*	N	N	Y	N	N	N
WATERFOWL (DABBLING AND DIVING DUCKS)	Multiple spp.	N	N	Y	N	N	N

1. Special status: Listed as federally threatened under the Federal Endangered Species Act
2. Special status: CDFW Species of Special Concern
3. Special status: Listed as federally endangered under the Federal Endangered Species Act
4. Special status: Listed as state endangered under the California Endangered Species Act