

EXECUTIVE SUMMARY

ROLE OF THIS PLAN

The 1999 California Marine Life Protection Act (MLPA, Chapter 10.5 of the California Fish & Game Code, §2850-2963) directs the state to complete a statewide network of marine protected areas (MPAs). The MLPA also requires monitoring of MPAs to facilitate adaptive management of MPAs and ensure that the MPA network meets the goals of the Act. On August 5, 2009, the California Fish and Game Commission adopted a regional MPA network for a section of California's waters called the North Central Coast region. This region extends from Alder Creek, near Point Arena, to Pigeon Point, and includes waters surrounding the Farallon Islands. The network comprises 24 MPAs, which include 'no-take' State Marine Reserves and other designations that allow various types fishing or other take of marine life.

This plan has been developed to guide monitoring of MPAs in the North Central Coast region that will meet MLPA requirements. It presents a framework for MPA monitoring, and monitoring elements and approaches for implementing the framework. The plan provides a flexible, scalable approach to implementing MPA monitoring, to make best use of available resources and potential partners.

This is not a monitoring workplan, or a monitoring implementation plan. The framework and approaches described in this plan will be implemented in two complementary stages: 1) the North Central Coast MPA Baseline Monitoring Program, which will begin in 2010 and continue through 2013; and 2) long-term monitoring, which will build on the foundation established through baseline monitoring and is the primary focus of this document. Implementation of long-term monitoring will require selecting the monitoring elements to implement and the levels at which to implement them, and designing the sampling or monitoring data collection plan accordingly. This plan provides guidance for making those decisions.

This plan has been developed by the MPA Monitoring Enterprise, in close collaboration with the California Department of Fish and Game, and through consultations with stakeholders and scientists. The primary intended audiences for this plan are the Department of Fish and Game and the Fish and Game Commission, as well as MPA stakeholders, existing and potential partners in conducting MPA monitoring, and existing and potential funders of MPA monitoring.

This plan is intended to be a living document. Just as the MPAs will be managed adaptively, so should monitoring be evaluated and refined to ensure it continues to meet management needs, and this plan updated accordingly.

SETTING THE SCOPE OF MPA MONITORING

Under the MLPA, the North Central Coast regional MPA network must meet six goals, which include both ecological and socioeconomic goals. The broad scope of the MLPA goals leads to an ecosystems-based focus to MPA monitoring, which allows assessment of effectiveness of the MPAs in protecting populations, species, habitats, and ecosystems and explicitly includes humans.

The MLPA Master Plan for Marine Protected Areas, the principal policy document guiding implementation of the MLPA, recommends reviews of the MPAs at five-year intervals following their establishment, and calls for monitoring designed to support these reviews, so that monitoring is useful to managers and stakeholders for improving MPA management. The MLPA Master Plan further notes that to meet this role, the results of monitoring and evaluation must be communicated to decision makers and the public in terms that they can understand and act upon. Accordingly the monitoring plan has been designed to meet these requirements.

The North Central Coast MPA planning process included development of regional goals and objectives, as well as objectives for each individual MPA. Further, guidelines were developed for MPA size, spacing and other aspects of site and network design. These decisions also inform the scope of MPA monitoring.

To reflect these various policy elements, MPA monitoring should incorporate several design characteristics. It should be hierarchical, efficient, designed to generate interpretable and synthesizable data, and adaptable to reflect available resources and evolving management priorities. The monitoring framework and approaches described in this plan have these features, and consist of two core monitoring elements: 1) assessing the condition of North Central Coast ecosystems and how conditions change over time; and 2) evaluating specific MPA design and management decisions. These core monitoring elements will guide implementation of monitoring inside and outside MPAs, throughout the North Central Coast region.

DEVELOPING AN ECOSYSTEMS APPROACH

Nine ‘Ecosystem Features’ have been selected to collectively represent and encompass the North Central Coast region’s ecosystems, including their human inhabitants, for the purposes of MPA monitoring. The Ecosystem Features provide the overarching structure for MPA monitoring, and are:

- Kelp and shallow rock ecosystems
- Deep rock ecosystems
- Rocky intertidal ecosystems
- Subtidal soft-bottom ecosystems
- Estuarine ecosystems
- Beaches and soft-bottom intertidal ecosystems
- Pelagic ecosystems (i.e., the water column habitat within state waters)
- Consumptive uses
- Non-consumptive uses

The Ecosystem Features provide the basis for assessing the condition of North Central Coast ecosystems, and how conditions change over time. They also guide the evaluation of MPA design and management decisions.

ASSESSING ECOSYSTEM CONDITION & TRENDS

Tracking ecosystem conditions over time will employ a ‘status and trends’ monitoring approach focused on the nine Ecosystem Features. Accordingly, nine ecosystem condition monitoring modules have been developed, one for each Ecosystem Feature. For each module, two implementation options have been developed. Ecosystem Feature Assessments require technically demanding or otherwise comparatively resource-intensive monitoring methods, and use a hierarchical system of key attributes and indicators or focal species. For each Ecosystem Feature, key attributes have been identified that will be used collectively to assess Feature condition. For each key attribute, selected indicators and, where appropriate, focal species, have been identified that collectively allow assessment of that attribute. A second implementation option, which may be used instead of or in combination with Ecosystem Feature Assessment, is Ecosystem Feature Checkup. The Checkup option has been developed to take best advantage of potential community-based or citizen-scientist monitoring partnerships, and uses comparatively simpler sampling protocols and methods to monitor a set of vital signs.

EVALUATING MPA DESIGN & MANAGEMENT DECISIONS

Evaluation of design and management decisions will employ a ‘management effectiveness’ monitoring approach that uses structured assessments of the effects of specific MPA and MPA network design and management decisions on Ecosystem Features or Feature components. This monitoring element consists of two monitoring modules. Short-term evaluations are those expected to generate conclusive findings within four years that can be used with confidence to inform MPA management decisions. Many of the short-term evaluations are likely to focus on day-to-day MPA management decisions, such as those relating to visitor management, or on tightly focused evaluations of a particular MPA design decision on a specific and readily measured ecosystem component, such as the bycatch rates of a particular fishery that is allowed within an MPA. Long-term evaluations are those expected to take more than four years to generate conclusive findings, and are likely to include evaluations of fundamental site and network design decisions, such as those relating to MPA size and network connectivity.

REPORTING MONITORING RESULTS

To facilitate adaptive MPA management, monitoring reports should include highly synthesized and interpretable results, presented as key conclusions or findings that clearly pertain to MLPA requirements, including assessing the regional MPA network’s effectiveness in meeting MLPA goals and facilitating adaptive MPA management. Monitoring reporting should present key findings in intuitive ways, appropriately incorporate expert judgment needed to interpret complex and multidisciplinary data, and be timely relative to MPA management decisions and processes, such as the five-year reviews recommended in the MLPA Master Plan. Analysis and reporting of monitoring results should be transparent, with analytical methods and assumptions, as well as supporting data, made available for independent analysis.

Example ‘mock-up’ pages showing possible approaches to future monitoring reports are included in the monitoring plan to illustrate the general reporting approach, designed to facilitate adaptive MPA management.

DEVELOPING MONITORING PARTNERSHIPS

This monitoring plan has been designed to facilitate development of partnerships to conduct and support monitoring of the North Central Coast regional MPA network. Potential partners are many, and include state and federal agencies, research institutions, and citizen-science and community programs and organizations, among others. Partnerships may greatly assist with conducting MPA monitoring, interpreting monitoring results, and disseminating monitoring information, but must be carefully developed and maintained to be effective. This will require the development of monitoring partnership agreements, to clearly document the roles and responsibilities of each partner. As appropriate, partnership agreements should specify the monitoring data to be collected, methods to be employed, standards and formats for information to be provided, content and timing of reports, training of data collectors, and other details necessary to protect information quality.

ESTIMATING COSTS OF MONITORING COMPONENTS

A key consideration for the implementation of this monitoring plan is financial cost. Existing monitoring programs provide a basis for estimating some of the potential costs of monitoring North Central Coast MPAs. Many of the MPA monitoring activities conducted in the Channel Islands and Central Coast MPAs are similar to some that are included in this monitoring plan. Other MPA and non-MPA programs in California also conduct activities that are similar to some of those included in this plan.

The financial costs of implementing many of the potential monitoring components have been estimated based on information from these existing programs. These estimates are used to develop recommended monitoring priorities and guide development of effective and coherent MPA monitoring that will meet MLPA requirements cost-effectively.

BUILDING AN EFFECTIVE MPA MONITORING PROGRAM

The monitoring plan elements have been designed as stand-alone modules, including the nine ecosystem assessment modules (one for each Ecosystem Feature) and the two MPA design and management decision evaluation modules (short- and long-term evaluations). Each module may be scaled to reflect available resources, and implementation may prioritize a limited number of modules.

Two example monitoring programs have been developed, illustrating the selection and scaling of monitoring modules. The programs have been designed to reflect two hypothetical regional MPA monitoring budget scenarios, of \$1,000,000 and \$2,000,000 annually. A 'spending plan' has been developed for each scenario, depicting the monitoring activities to be conducted in each of four data collection years, leading to analysis and reporting in the fifth year, in order to inform the five-year reviews recommended by the MLPA Master Plan. The spending plans allocate the available budget (\$1,000,000 or \$2,000,000 annually) to collect, analyze and report monitoring results, but do not include all possible costs of monitoring implementation. For example, Department of Fish and Game core costs, such as for staff, are not included. Nonetheless, the spending plans include the majority of anticipated new costs of MPA monitoring in the North Central Coast region, tailored to take best advantage of the two hypothetical budget scenarios.

Both spending plans implement only strategically selected portions of the full scope of MPA monitoring included in this monitoring plan. Nonetheless, both include assessment of priority Ecosystem Features and provide for select short- and long-term evaluations of MPA design and management decisions. Thus both spending plans meet MLPA requirements, as they will enable assessment of the MPA network's effectiveness in meeting MLPA goals and facilitate adaptive MPA management.