California MLPA Master Plan Science Advisory Team
Consideration of Fish Stocks and Fisheries in Science Guidelines and Evaluation of MPA Proposals

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This document has been prepared in response to a question from the MLPA Blue Ribbon Task Force, which is, "How does the SAT use or consider the status of fish stocks and fisheries in its science and evaluation methods for marine protected area (MPA) planning under the Marine Life Protection Act (MLPA)?"

Consideration of the current state of fisheries and their management relates potentially to five aspects of the MLPA Master Plan Science Advisory Team (SAT) effort to inform the MLPA: (1) development of design guidelines (e.g., size and spacing), (2) identification of "species likely to benefit" from the establishment of MPAs, (3) designation of "levels of protection" for proposed activities within an MPA, (4) survey-based assessment of "worst-case" economic effects of alternative MPA proposals on existing fisheries, and (5) model-based evaluation of alternative MPA proposals in terms of conservation metrics (biomass, sustainability) and economic performance. Each of these five aspects is summarized in this document.

In developing past and existing guidelines for the design of individual MPAs and alternative MPa proposals within each study region, the current or future (anticipated) state of fisheries and their management has not been directly taken into account for three reasons. First, size and spacing guidelines rest on biological characteristics of species (e.g., home range, larval dispersal patterns) and are considered independent of stock status. Moreover, MPAs designated under the MLPA are to focus on the protection of whole ecosystems, including species for which fisheries do not currently exist but may develop in the future, species that are fished currently but may not be in the future, and species affected by disturbance or bycatch associated with existing or future fisheries. Size and spacing guidelines have therefore been designed to afford protection to a substantial, but less than comprehensive, suite of species that comprise assemblages within each study region. Nonetheless, the range of possible sizes and spacing of MPAs identified in the science guidelines does allow stakeholders to consider future states of fish stocks and fisheries regulations by allowing them to adjust these criteria if deemed necessary or appropriate (i.e., the area of habitat set aside in MPAs can scale with the level of concern for that habitat or associated species).

Second, analysis of spatially explicit models—models that have been developed to complement existing size and spacing guidelines—has focused on long-term, "steady-state" conditions in evaluating the biological and economic consequences of implementing MPAs. These models necessarily focus on species that are currently fished (i.e., species for which there is substantial biological data, and for which fishing has a measurable effect). Results from these analyses clearly indicate the strong interdependencies between ecosystems inside and outside of MPAs and the consequences of variation in fishing intensity outside of MPAs for the system as a whole. However, because of the uncertainty in the future state of fisheries regulation and management, model results are presented for a suite of fishing mortality rates to allow evaluation of MPA performance under management scenarios ranging from conservative (i.e., fishing at well below maximum sustainable rates) through approximately maximum sustainable rates, to overfishing. Current status of populations and existing fisheries

is of limited use in this assessment, primarily because current regulations are almost certain to change going forward, and to do so during the expected lifetime of proposed MPAs. Looking forward to monitoring and evaluating the statewide MPA network, information on current status and regulations will provide necessary initial conditions for simulations designed to develop predictions of short-term, transient responses of populations and ecosystems to implementing MPAs.

Third, the current degree of uncertainty in assessments for coastal species (where such assessments even exist) translates into uncertainty regarding where exactly existing regulations actually lie on the continuum of management approaches, and how well the current status of populations reflects responses to recent changes in regulations and management. Moreover, and when possible, alternative MPA proposals should be designed to enhance their contribution to larval replenishment of populations across the study region, regardless of the state of populations at any particular time (now or in the future).

In identifying “species likely to benefit” from MPAs, the SAT has explicitly considered current fishing practices and catch (of target and associated species) as well as estimates of the current state of specific stocks. Species currently taken by commercial or recreational fisheries, whether as target species or associated catch, were considered for inclusion as “species likely to benefit”. Species stocks that were considered “depressed” were given special emphasis. Designations of species likely to benefit from MPAs were based on further evaluation of various aspects of the species life history (e.g., scales of adult movement, etc.) to determine whether or not an MPA of modest scale would reduce mortality of the species in question.

In designating “levels of protection” (LOPs) for MPAs that allow various activities, including various modes of fishing, the SAT applies a decision tree analysis to each proposed activity. Given the uncertainty in predicting future fishing methods (e.g., gear types, depths) the SAT applies this analysis only to current fishing practices, but the analysis is readily applied to any proposed activity. LOPs, however, are not based upon levels of take or regulations on take (e.g., numbers of fish, size ranges, sex, composition of species aggregates, or distribution of effort) because of the potential for these variables to change both in time and by region.

In response to requests to provide estimates of the economic impacts of alternative MPA proposals on existing fisheries within each study region, the SAT has considered an assessment of the potential economic impacts of implementing MPAs, framed as a “worst case scenario” of the potential adverse impacts on the yield and value of fisheries within each study region. These assessments are worst case and do not include economic effects of non-consumptive or other activities resultant from implementing MPAs nor do they include economic assessments reflecting the relocation of fishing from MPAs to areas outside MPA boundaries. As such, these worst case assessments necessarily consider an estimate of the current (recent) state of fisheries (catch rates and value of targeted species) within MPAs, but do not include information on the biological status or trends of the fished stocks.