Appendix 1: Case Studies of Existing MPA Monitoring & Evaluation Plans

There are a number of existing marine protected areas (MPAs) with monitoring and evaluation (M&E) plans in place. The plans developed for these existing MPAs can serve as a useful resource for the central coast MLPA ME&AMF being developed. In the sections to follow, three MPA M&E plans will be summarized with a general description of each plan, the factors being monitored, the timeframes of the evaluation process, along with how effectiveness is assessed. The three examples come from the Channel Islands MPAs, the Great Barrier Reef Marine Park (GBRMPA), and the Florida Keys National Marine Sanctuary (FKNMS).

None of the surveyed MPAs appears to have exactly the type of monitoring and evaluation plan that will be implemented for the central coast MLPA. That is, none of the three example plans contains all the elements of the MLPA ME&AMF: goals, objectives, indicators, progress metrics, and an adaptive management component. This section will describe first and in the most detail information from the Channel Islands MPAs because this network of MPAs is in California, and it is a valuable point of reference for the central coast MLPA Initiative ME&AMF.

The three MPA M&E plans discussed below all pertain to the management of large-scale MPAs, but at different scales. A substantial challenge for the design of the ME&AMF is that its ultimate purpose is to support effective adaptive management initially of a regional MPA network, eventually growing into a statewide MPA network. While it could be the case that similar information is collected as part of an M&E plan for a discreet MPA as well as an MPA network, the evaluation and adaptive components of the plan will be qualitatively different. For the Central Coast MLPA Initiative ME&AMF, the decision-making framework for adaptive management will need to be more comprehensive and provide a means to use information from one or more individual MPAs to make decisions about the entire network.

Channel Islands MPAs Monitoring Plan

The Channel Island MPA (CIMPA) monitoring plan (CDFG 2004) includes both biological and socioeconomic components, and these are usefully summarized in the tables below. There was data collection in both a Year 0 (April 2003-March 2004) and Year 1 (April 2004-March 2005) to establish baselines. The indicators are listed and defined in columns 2 and 3 in Tables 4-1 and 4-2 below. Data are collected both inside the MPA and in adjacent areas outside the MPA to detect differences in the indicator parameters. The plan cites values from the literature concerning expected changes in density and size for a variety of species. The plan recommends a thorough data evaluation and review every 5 years. The plan suggests that some information (e.g. mapping commercial sea urchin beds and monitoring size profile of urchins) could be accomplished in 2-3 years. Other long-term trends such as catch rates could be estimated in 5-10 years (CDFG 2004).

The CIMPA monitoring plan objectives are to determine:

- Changes in abundance, size, biomass, and spawning biomass of species;
- Species composition as it relates to ecosystem function;
- Habitat changes as they relate to physical alteration (e.g., trawling) and secondary impacts of biological community changes (e.g., habitat forming algae);
- Amount of spillover; and
- Changes in CPUE and total catch

Biological monitoring activities have been separated into four general habitat/ecosystem categories: shallow subtidal; deep subtidal; intertidal; and seabirds and marine mammals. The monitoring categories have been prioritized based on the expected level of impact MPAs will have on the species or habitats, the need for new monitoring activities, the feasibility of determining changes, and the relative level of previous consumptive use.

Shallow subtidal monitoring (from 0 to ~100 feet/31 m) is the highest priority activity. The shallow subtidal region includes the primary areas for consumptive uses at the islands, has the highest number of existing monitoring programs available, and provides information not only on MPAs but the entire nearshore ecosystem. **Deep subtidal monitoring** is the second highest priority, and occurs at depths greater than 33 m. **Intertidal** consumptive use at the Channel Islands is relatively low, and fishing restrictions from the new MPAs are not expected to directly affect these areas. Changes to the intertidal zone are primarily expected through secondary ecosystem effects, which may take many years to be recognizable. Therefore, intertidal monitoring is a lower priority than shallow and deep subtidal monitoring. **Seabirds and marine mammals** are not expected to be directly affected by the establishment of MPAs, since they were already protected prior to implementation. Existing monitoring of breeding and nesting colonies will continue. There is also **socioeconomic monitoring** to monitor progress toward the goal of maintaining long-term economic viability while minimizing short-term losses. In order to evaluate socioeconomic impacts, statistically significant changes should be examined with regards to a community acceptable threshold. The monitoring plan does not recommend such thresholds.

Several recommendations for socioeconomic monitoring in the CIMPA were developed through a workshop conducted in March, 2003 and published in a subsequent report (NOAA 2003). Some of the priority recommendations were to: 1) hire, with input from the User's Group Oversight Committee, a social science coordinator under contract; 2) create an oversight committee and a peer review committee; 3) establish socioeconomic measurement thresholds that are tied to specific management actions; and 4) evaluate socioeconomic impacts by including information on factors other than marine protected areas that could be the sole or a contributing cause of a socioeconomic impact.

Effectiveness, Timelines, and Performance Measurement

Noting the extreme difficulty in setting target levels for expected changes because of variability, unforeseen ecosystem impacts, and species interactions, the plan instead assesses performance based on an analysis of trends in biological parameters. Performance of the Channel Islands MPA network will be measured based on comparisons of changes within MPAs to changes outside the MPAs. If the MPAs function as expected, there will be a differential change within MPAs, such as significantly higher abundance, mean size, and reproductive potentials of a variety of species. Performance of the Channel Islands MPAs will be based on analysis of trends in these biological parameters. The Channel Islands MPA network will be considered as performing satisfactorily if the biological trends within MPAs approach given estimates of potential change more rapidly than areas outside. Sufficient time must be provided for these changes to occur and for the monitoring program to collect enough data to detect changes and have statistical significance. Though some changes may be very rapid, most will take many years to accrue, especially given the biology of fish and invertebrate species in the region. In order to allow the process of adaptive management to continue, a major review of the monitoring program's results will occur approximately five years after reserve implementation, in the spring of 2008.

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Table 1. Summary of Biological Monitoring Programs in the Channel Islands MPA

Monitoring Activities	Measurements	Question(s) Addressed
SCUBA Surveys Visual surveys of focal species inside and outside target areas	Focal species abundance, sizes, and composition; habitat characteristics	Do focal species change in composition, size, abundance, or reproductive potential?
Trap/Fixed Gear Surveys Tag and recovery studies and CPUE estimates inside and outside focal areas	Catch per unit effort, size, date, and location of tag and recapture	Do focal species change in composition, size, or abundance? What is the level of adult spillover/movement?
Newly Settled Fish Surveys Collection of newly settled fishes using standardized modules inside and outside target areas	Indices of fish recruitment	Are recruitment levels changing over time? Does recruitment affect abundance inside and outside MPAs?
Aerial Monitoring of Kelp Canopy Aerial surveys using multi-spectral camera	Percentage cover of kelp canopy	Is giant kelp forest coverage more or less stable in MPAs than outside?
ROV Surveys Visual surveys of focal species	Focal species abundance, sizes, and composition; habitat characteristics	Do focal species change in composition, size, abundance, or reproductive potential?
Submersible Surveys Visual surveys of focal species	Focal species abundance, sizes, and composition; habitat characteristics	Do focal species change in composition, size, abundance, or reproductive potential?
Intertidal Monitoring MARINe program surveys of focal species	Focal species abundance, sizes, and composition; habitat characteristics	Do focal species change in composition, size, abundance, or reproductive potential?

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Table 2. Summary of Social and Economic Monitoring Programs in the Channel Islands MPA

Monitoring Activities	Measurements	Question(s) Addressed
Social Science Coordinator Seek funding for a full time position, possibly contracted by Channel Islands National Marine Sanctuary	Overall coordinator to collect and manage data and summarize results	Coordination of following programs
Commercial Fish Landing Receipts Annual review of commercial fish landing receipts	Quantity and value of catch and relative changes in fisheries	Is commercial catch or income changing at the Channel Islands?
Commercial Fish Log Books Monthly review of commercial squid, sea urchin, lobster, and sea cucumber logbooks	Location, catch per unit effort, and presence and/or amount of displaced effort	Are commercial catch, CPUE, or fishing locations changing at the Channel Islands?
California Recreational Fishery Survey (CRFS) Onboard and dockside sampling of recreational catch, location, and effort	Location, level of effort, species, size, and amount of catch from recreational fisheries	Are recreational catch, CPUE, or fishing locations changing at the Channel Islands?
Sanctuary Aerial Monitoring and Spatial Analysis Program (SAMSAP) Bi-monthly aerial surveys of all five Islands	Level and location of fishing and boating, presence and/or amount of displaced effort	Are locations of fishing and boating activities changing at the Channel islands?
Survey of Non-Consumptive Charter Industry Travel cost study of charter boat users, with additional information on knowledge of MPAs and regulations	2003 pilot study collected baseline information from a small subset of charter boat users	What is the value of MPAs to non-consumptive users and are these users accessing the islands because the MPAs are there?
Knowledge, Perceptions, and Attitudes Surveys Survey of local user groups and public	Public and user group knowledge, attitudes, and perceptions of MPAs	How are knowledge, attitudes, and perceptions regarding the MPAs changing over time?
Educator Use Tracking Tracking of educational use	Estimates of numbers of educators accessing the islands in general and MPAs in	Are educators accessing the islands and MPAs?

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	particular	
Scientific Use Tracking Tracking of scientific use	Annual numbers of researchers using the islands and MPAs	Are researchers accessing the islands and MPAs?
Public Outreach Providing MPA background information, updates, and data summaries to the public	N/A	Providing information to the public to help increase awareness and knowledge

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Great Barrier Reef Monitoring

There is a great deal of information about the comprehensive monitoring program for the Great Barrier Reef. However, the documents surveyed did not explicitly describe a suite of indicators, progress metrics, and the feedback mechanism to GBR management. It does appear that the results of monitoring are used for park management, but the process for how this occurs was not described in the materials surveyed**.**

The GBR Marine Park Authority website (http://www.gbrmpa.gov.au/corp_site/info_services/science/index.html), offers the following statement about the general goals and purposes of scientific research in the park:

"Having the best available information for decision making is essential to high quality, scientifically based management of the marine park. The authority has a strategic and coordinated approach to information acquisition, management, analysis, interpretation, dissemination and application.

Scientific Research is needed to:

- Ensure that decision making is supported by the best available information,
- Increase our understanding of the natural variability of the Great Barrier Reef's ecosystems and their response to natural or anthropogenic disturbances,
- Provide accurate and timely scientific information and advice for Park management, including reporting on the state of the Great Barrier Reef,
- Provide information systems and services that meet the needs and priorities of the organization,
- Achieve efficiency gains through the strategic and effective application of information technology,
- Integrate and cooperate on information with other organisations with an interest or role in the management of the Marine Park and the World Heritage Area."

There are a large number of research publications available concerning the many management plans (at http://www.gbrmpa.gov.au/corp_site/management/plans_of_management.html) pertaining to all aspects of the park and several documents detailing various aspects of monitoring.

The Marine Park Authority recently presented an explicit and detailed list of priority research questions for park management (GBRMPA 2005). They underwent a process to identify the most important research questions for park management. These research questions fall under a number of topic areas that are linked and cross-referenced with the Australian National Research Priorities, the GBRMPA's Key Performance Indicators, and key legislative or policy requirements (GBRMPA 2005). The full list of over 270 research needs was condensed to 21 priority questions. The final 21 were deemed to be critical in importance with results needed within 1-3 years for these questions, and they are:

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Effects of Zoning
What are the effects of the new Zoning Plan (2003): how effective has it been in protecting coral reefs and inter-reef habitats and species, especially fish; and what effect has it had on marine park users and regional, state, and national communities?

Water Quality and Pollution
How effective is the Reef Water Quality Protection Plan in halting and reversing declining water quality?
What are the relationships between catchment processes, pollutant loads delivered to the marine park, and the impacts on the near-shore marine environment?
What are the critical levels of major water pollutants (nutrients, sediments, agricultural and other chemicals) on marine park ecosystems (coral reefs, seagrass beds, mangroves, and pelagic/water column ecosystems): i.e. pollutant load-impact relationships?

Protection of Threatened Species
What are the status and trends in distribution and abundance of dugongs?
What are the direct, indirect, and potential impacts of incidental catch in fisheries on dugongs, and methods (e.g. “pingers”) to mitigate those effects?
What are the direct, indirect, and potential impacts of Indigenous hunting on dugongs, and what level of hunting is sustainable?
What is the status and trends in distribution and abundance of marine turtles?
What are the causes of the rising water table on Raine Island1, and what are the impacts on breeding turtles and seabirds?

Ecologically Sustainable Fisheries
What is the risk to elasmobranch (sharks and rays) populations taken in commercial mesh net, line, and recreational fisheries (including species and quantities taken)?
How effective are current and planned fisheries management strategies in achieving ecological sustainability?

Impacts and Mitigation of Climate Change
What are the current and predicted impacts of climate change, in combination with other pressures, on marine park species, habitats, and marine park users and regional communities, and how can these be mitigated?

Managing Diseases and Introduced Pests
What are the potential ecosystem impacts and implications of diseases and introductions of marine pest species, and which habitat types and regions are most susceptible?

Protecting Ecosystem Resilience
What management strategies can be used to support or improve ecosystem resilience?

Understanding and Responding to Community in a Multiple-Use Environment
What are community attitudes, perceptions, concerns, and needs with respect to the use and management of the GBR?

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What are the trends in population growth for Queensland Great Barrier Reef communities, and what impact will population growth and associated urban and rural development have on the direct and indirect human demands and pressures on the GBR, community partnerships, and community awareness of marine management issues?
What is the annual economic contribution of Great Barrier Reef based and supporting industries to regional, state, and national economies?
What are the social, cultural, economic, and natural resource management issues relating to Indigenous hunting and fishing in the GBR?
What are the most appropriate ways to enhance fishing, tourism, and recreational opportunities whilst minimizing impacts on the cultural, ecological, and world heritage values of the Marine Park?

Understanding Biodiversity
What are the spatial patterns of biodiversity of major organism groups and habitats in the GBRMP, including inter-reefal and shoal areas?

Monitoring the Health of Major Habitat Types
What are the trends in the condition of major habitat types in the GBRMP, and what human and natural factors influence those trends?

Florida Keys Monitoring Plan

The management plan (NOAA 2005) for this MPA specifies a number of "action plans" that articulate various management goals. Here, too, none of the documents surveyed defined explicit indicators, benchmarks or timelines for achievement. The action plan that concerns monitoring and effectiveness is the "Research and Monitoring" action plan (NOAA 2005), and it is further subdivided into a number of strategies. The FKNMS conducts periodic evaluations to determine the effectiveness of research and monitoring activities and prepares a comprehensive science plan. The evaluations identify strategies and activities that are ineffective or inadequate; evaluations also suggest new activities. In addition, the five-year reviews of the sanctuary management plan include evaluations of the science program by a sanctuary advisory council working group.

Research and Monitoring Action Plan

The monitoring component of the FKNMS Research and Monitoring Action Plan has established a baseline of information on spatial patterns and temporal trends in natural resources and other components of the ecosystem. To improve understanding of patterns and trends, research elucidates:

- Cause-and-effect relationships of specific ecological interactions;
- Processes that shape ecosystem structure and function; and,
- How management actions or other factors modify ecosystem processes.
- Research and monitoring projects investigate fundamental processes and specific topics in support of science-based management. The resulting scientific findings are used to:

- Evaluate the effectiveness of the Sanctuary and its management actions;
- Distinguish between the effects of human activities and natural variability;
- Develop hypotheses about causal relationships that can then be investigated; and,
- Validate models that guide management actions.

There are 13 strategies in the FKNMS Research and Monitoring Action Plan (NOAA 2005):

W.33 Ecological Research and Monitoring
Z.6 Marine Zone Monitoring
W.36 Conducting Socioeconomic Research
F.3 Researching Queen Conch Population Enhancement Methods
F.7 Researching Impacts From Artificial Reefs
F.6 Fisheries Sampling
F.11 Evaluating Fishing Gear/Method Impacts
F.15 Assessing Sponge Fishery Impacts
W.18 Conducting Pesticide Research
W.22 Assessing Wastewater Pollutants Impacts
W.23 Researching Other Pollutants and Water Quality Issues
W.24 Researching Florida Bay Influences
W.21 Developing Predictive Models

Strategy Z.6 Marin Zone Monitoring
Strategy Z.6 (Marine Zone Monitoring) is the element most relevant to the design of the MLPA MAMP plan. There are five types of marine zones in the Sanctuary: Wildlife Management Areas, Ecological Reserves, Sanctuary Preservation Areas, Special-use (Research-only) Areas, and Existing Management Areas. Marine zone monitoring occurs in the three types of marine zones that are fully protected from consumptive activities ("no-take zones"): Ecological Reserves, Sanctuary Preservation Areas, and Special-use (Research-only) Areas. The purpose of this strategy is to determine the effectiveness of fully protected marine zones as a management action for the conservation and sustainable use of marine resources. The basic design of these monitoring studies is to **compare surveys within and outside of fully protected marine zones**. There are three activities for this strategy.

1) Develop Baseline Data.
2) Monitor Marine Zones and Utilize as Controls. This monitoring concerns both protected areas and reference sites in order to detect functional changes (predation, herbivory, and coral recruitment) and structural changes (population abundance and size structure) that result from the restriction of consumptive activities. These monitoring studies examine benthic community structure, reef fishes, and spiny lobster and queen conch. Monitoring of human-use patterns, attitudes, and compliance with marine zone regulations is being conducted
3) Utilize Marine Zones as Research Areas. For all three types of fully protected marine zones, permitted researchers may conduct non-invasive experiments to address management strategies.

The primary goal of monitoring is to **determine within five years** whether the zones are effective in protecting biodiversity and enhancing human values related to the sanctuary. Effectiveness will be determined through the following performance measures:

- *Changes in **coral** cover and diversity will differ significantly between the zones and reference sites.*
- ***Macroalgal cover** and biomass will decline in zones, and these declines will be significantly greater than in the reference sites.*
- *Average **size of fish** and overall **abundance of fish** will be significantly greater inside the zones than in reference sites.*
- *Average **size of lobster and** overall **abundance of lobster** will be significantly greater inside the zones than in reference sites.*
- ***People's perceptions** of resource quality will be significantly higher inside the zones than in reference sites.*
- *Overall compliance with zone restrictions will improve over time.*

Dissemination of Information

The FKNMS provides a good model for the way in which monitoring components of a management plan are implemented and reported upon to scientists and resource managers. The Sanctuary has produced a complementary document to the Research and Monitoring Action Plan called The Comprehensive Science Plan (FKNMS 2002) that is envisioned as a living document that the Sanctuary's management team plans to revisit and revise on a regular basis. It is a complement to the FKNMS Research and Monitoring Action Plan in that it identifies management objectives and associated monitoring and research needs in a systematic fashion. The FKNMS also not only actively assesses the status and trends of the Sanctuary resources, but also actively communicate the results and interpretations through symposia and a number of reports.

There is a strategy under the Science Management and Administration Action Plan called Dissemination of Findings. This strategy has five activities:

1) Develop periodic reports on sanctuary health
2) Continue to communicate findings of the science program (symposia, newsletter, public presentations, annual reports)
3) Establish information exchange network (develop a compendium of ongoing and planned research)
4) Sponsor conferences (for scientists and managers)
5) Support journal publication

A good example of such reporting is the Sanctuary Science Report Card from 2001 (NOAA 2003). This 2001 report contains summary reports from yearly symposia along with brief updates on the Zone Monitoring Program with updates on the long-term monitoring projects of the Water Quality Protection Program (WQPP) to produce this Sanctuary Science Report 2001. There is also detailed monitoring exclusively on the Zone Monitoring Program (NOAA

1998). Such monitoring reports will form the basis of evaluating the effectiveness of the zones as a management tool.

Lessons Learned from Existing M&E Programs

These three example monitoring program have well-conceived elements that can be emulated in the design of the central coast MLPA Initiative ME&AMF. The Channel Islands MPAs have already field-tested a variety of monitoring methods suitable for use in the central coast. Importantly, these monitoring methods are directly linked to a number of testable questions (e.g. Is giant kelp forest coverage more or less stable in MPAs than outside?). This linkage of objectives to research questions is an important hallmark to emulate in the creation of the central coast MLPA Initiative ME&AMF. Last, the Channel Islands MPAs monitoring program has already grappled with some of the challenges associated with implementing a monitoring program to determine achievement with specific objectives and has done so in ecosystems similar to those of the central coast study region. This experience will aid greatly in the determination of cost and effort of specific monitoring program elements. In addition insightful lessons have been learned regarding the process of designing an M&E plan, as well as the collection of socio-economic data. This plan will take the recommendations from workshop reports, such as *Socioeconomic Research and Monitoring Recommendations for the MPAs in the Channel Islands National Marine Sanctuary* and apply them to the central coast ME&AMF.

The GBRMPA provides an example of a mature, large-scale MPA whose management and research priorities are linked to Australian National Research Priorities and key legislative or policy requirements. Another notable feature of GBRMPA management is that it followed a process in which a set of broad and comprehensive research priorities in a number of topic areas were developed (e.g. Protection of Threatened Species) that were further articulated into a finite number of testable research questions (e.g. What are the status and trends in distribution and abundance of dugongs?). The consideration of the topic areas and research question formulation for the Australian MPA will be beneficial example in the translation of objectives into questions for the Central Coast MLPA Initiative ME&AMF.

The FKNMS Marine Zone Monitoring strategy provides an example of how testable questions can be formulated to guide data collection to make determinations of progress toward goals in finite time periods. The monitoring program also includes data collection both in protected areas and reference sites in order to detect functional changes (predation, herbivory, and coral recruitment) and structural changes (population abundance and size structure) that result from the restriction of consumptive activities.

Finally, The National Fisheries Conservation Center surveyed six distinct efforts to designate MPAs in the U.S. and reported on lessons learned from these efforts (NFCC 2004). Regarding monitoring, the NFCC report stressed the importance of clearly stating the MPA goals in advance so as to facilitate measurement of progress toward reaching the goals. As an example, one of the goals of an MPA was stated as “restoration of normal sex ratios in the population.” This goal has very little subjective content and is readily translated into a straightforward program of monitoring with obvious metrics. A goal such as “progress toward sustainable fisheries” is more problematic due to the subjective nature of “sustainable.” It is

not as readily translated into measurable quantities. For the MLPA Central Coast Project, the objectives derived from broader goals will be translated into testable questions that will result into monitoring evaluation, and adaptive management program.

The NFCC report also addressed the challenge of long time horizons for detecting changes in marine MPAs. In such circumstances, the report suggests that monitoring "should focus on interim benchmarks of progress that reflect an underlying mechanistic understanding about how the MPA is expected to produce its desired effect(s) (NFCC 2004)." This mechanistic understanding is based on a set of assumptions about the processes that will lead to the changes, and if these assumptions are made explicit, then they form the basis for establishing interim progress metrics that can be evaluated through monitoring. As an example, if an MPA is intended to produce spillover of larvae because of the presence of greater numbers of females, the monitoring program should gather information on the following progress metrics: increased numbers of females in the MPA, increased size of females in the MPA, and increased reproductive output of females in the MPA. If these interim changes do not occur, then the MPA will have no chance of producing spillover of larvae as expected (NFCC 2004).

The NFCC acknowledges that there are cases where broad goals are appropriately established to aid in MPA design, but these are not suitable to serve as the basis of a monitoring program. In such cases, the authors recommend that managers develop specific indicators designed to detect some amount of change at some specific place and time (NFCC 2004). These specific indicators then, in essence, are an articulation of the broadly stated MPA goal into a testable statement or question.

The Federal Advisory Committee on Establishing and Managing a National System of MPAs states that, "effectiveness of MPAs in accomplishing their goals and objectives is heavily dependent upon the development of the shared concept of individual and collective stewardship" (FAC, 2005). Effective stewardship will need effective and communication among all stakeholders interested and affected as well as the general public. Furthermore, whenever possible, local knowledge and co-management strategies should be incorporated into the planning process (FAC, 2005).

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NOAA 2005. Florida Keys National Marine Sanctuary Draft Revised Management Plan.

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Appendix 2: State Goals

The statewide goals for the MLPA are as stated in Section 2859, a Marine Life Protection Program, which shall have all of the following goals:

1) To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.
2) To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.
3) To improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and to manage these uses in a manner consistent with protecting biodiversity.
4) To protect marine natural heritage, including protection of representative and unique marine life habitats in California waters for their intrinsic value.
5) To ensure that California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines.
6) To ensure that the state's MPAs are designed and managed, to the extent possible, as a network.

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Appendix 3: Central Coast Regional Goals and Objectives

California Marine Life Protection Act Initiative
Central Coast Project
Adopted Regional Goals and Objectives Package as amended by the MLPA Blue Ribbon Task Force

November 30, 2005

Design and Implementation Considerations

Introduction

The members of the Central Coast Regional Stakeholder Group (CCRSG) agree that Regional Goals, Objectives, and Design and Implementation Considerations are all very important in the development of an effective system of marine protected areas (MPAs) that have stakeholder support. Regional goals are statements of what the regional MPAs are ultimately trying to achieve (Pomeroy et al. 2004)[1]. The Regional goals are largely taken directly from the Marine Life Protection Act (MLPA) itself. Regional objectives are more specific measurable statements of what must be accomplished to attain a related goal (Pomeroy et al. 2004).

Design considerations are additional factors that may help fulfill provisions of the MLPA related to facilitating enforcement, encouraging public involvement, and incorporating socio-economic considerations, while meeting the act's goals and guidelines. Design considerations will be applied as the location, category (reserve, park or conservation area), size and other characteristics of potential MPAs are being developed (Kirlin Memo, 8/22/05). Design considerations are cross cutting (they apply to all MPAs) and are not necessarily measurable (Kirlin Memo, 8/22/05). MPA alternatives developed by the CCRSG should include analysis of how the proposal addresses both regional goals and objectives and design guidelines. (Kirlin Memo, 8/22/05).

Design Considerations

In developing regional goals and objectives for the central coast, the CCRSG identified several issues that should be considered in the design and evaluation of marine protected areas. Like the “Considerations in the Design of MPAs” that appears in the Master Plan Framework, these considerations may apply to all MPAs and MPA proposals regardless of the specific goals and

[1] Pomeroy R.S., J.E. Parks, and L.M. Watson. 2004. How is your MPA doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness. IUCN, Gland, Switzerland and Cambridge, UK. xvi + 216 p. (Accessed 17 January 2004). http://effectivempa.noaa.gov/guidebook/guidebook.html.

objectives for that MPA. The design considerations below will be incorporated with the provisional goals and objectives and provided to the Master Plan Science Advisory Team, the Blue Ribbon Task Force, and the California Fish and Game Commission. Design considerations with long-term monitoring components will be used in developing monitoring plans and to inform the adaptive management process.

1. In evaluating the siting of MPAs, considerations shall include the needs and interests of all users.

2. Recognize relevant portions of existing state and federal fishery management areas and regulations, to the extent possible, when designing new MPAs or modifying existing ones.

3. To the extent possible, site MPAs to prevent fishing effort shifts that would result in serial depletion.

4. When crafting MPA proposals, include considerations for design found in the Nearshore Fishery Management Plan[2] and the draft Abalone Recovery and Management Plan.[3]

5. In developing MPA proposals, consider how existing state and federal programs address the goals and objectives of the MLPA and the central coast region as well as how these proposals may coordinate with other programs.

6. To the extent possible, site MPAs adjacent to terrestrial federal, state, county, or city parks, marine laboratories, or other "eyes on the water" to facilitate management, enforcement, and monitoring.

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[2] Design considerations from Nearshore Fishery Management Plan:

1. Restrict take in any MPA [intended to meet the NFMP goals] so that the directed fishing or significant bycatch of the 19 NFMP species is prohibited.
2. Include some areas that have been productive fishing grounds for the 19 NFMP species in the past but are no longer heavily used by the fishery.
3. Include some areas known to enhance distribution or retain larvae of NFMP species
4. Consist of an area large enough to address biological characteristics such as movement patterns and home range. There is an expectation that some portion of NFMP stocks will spend the majority of their life cycle within the boundaries of the MPA.
5. Consist of areas that replicate various habitat types within each region including areas that exhibit representative productivity.

[3] Design considerations from draft Abalone and Recovery and Management Plan:

Proposed MPA sites should satisfy at least four of the following criteria.

1. Include within MPAs suitable rocky habitat containing abundant kelp and/or foliose algae
2. Insure presence of sufficient populations to facilitate reproduction.
3. Include within MPAs suitable nursery areas, in particular crustose coralline rock habitats in shallow waters that include microhabitats of moveable rock, rock crevices, urchin spine canopy, and kelp holdfasts.
4. Include within MPAs the protected lee of major headlands that may act as collection points for water and larvae.
5. Include MPAs large enough to include large numbers of abalone and for research regarding population dynamics.
6. Include MPAs that are accessible to researchers, enforcement personnel, and others with a legitimate interest in resource protection.

7. To the extent possible, site MPAs to facilitate use of volunteers to assist in monitoring and management.

8. To the extent possible, site MPAs to take advantage of existing long-term monitoring studies.

9. To the extent possible, design MPA boundaries that facilitate ease of public recognition and ease of enforcement.

Implementation Considerations

Implementation considerations arise after the design of MPAs as the California Department of Fish and Game and any other responsible agencies implement decisions of the California Fish and Game Commission and, if appropriate, the California Park and Recreation Commission, with funding from the Legislature or other sources.

1. Improve public outreach related to MPAs through the use of docents, improved signage, and production of an educational brochure for central coast MPAs.

2. When appropriate, phase the implementation of central coast MPAs to ensure their effective management, monitoring, and enforcement.

3. Ensure adequate funding for monitoring, management, and enforcement is available for implementing new MPAs. [In addition to approving this language, the BRTF also adopted three statements related to funding[4]]

4. Develop regional management and enforcement measures, including cooperative enforcement agreements, adaptive management, and jurisdictional maps, which can be effectively used, adopted statewide, and periodically reviewed.

Regional Objectives

Goal 1. To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.

1. Protect areas of high species diversity and maintain species diversity and abundance, consistent with natural fluctuations, of populations in representative habitats.

2. Protect areas with diverse habitat types in close proximity to each other.

[4] 1. The MLPA requires development of a plan of protected areas, while implementing the program of protected areas occurs as resources are available (Section 2855[a]).
2. The adopted MLPA Master Plan Framework includes a feasibility analysis of proposed MPAs contingent upon funds reasonably expected to be available during implementation (Activity 3.4)
3. A lack of funding for implementation does not preclude designing and adopting MPAs.

3. Protect natural size and age structure and genetic diversity of populations in representative habitats.

4. Protect natural trophic structure and food webs in representative habitats.

5. Protect ecosystem structure, function, integrity and ecological processes to facilitate recovery of natural communities from disturbances both natural and human induced.

Goal 2. To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.

1. Help protect or rebuild populations of rare, threatened, endangered, depleted, or overfished species, where identified, and the habitats and ecosystem functions upon which they rely.

2. Protect larval sources and restore reproductive capacity of species most likely to benefit from MPAs through retention of large, mature individuals.

3. Protect selected species and the habitats on which they depend while allowing the harvest of migratory, highly mobile, or other species where appropriate through the use of state marine conservation areas and state marine parks.

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.

1. Ensure some MPAs are close to population centers and research and education institutions and include areas of traditional non-consumptive recreational use and are accessible for recreational, educational, and study opportunities.

2. To enhance the likelihood of scientifically valid studies, replicate appropriate MPA designations, habitats or control areas (including areas open to fishing) to the extent possible.

3. Develop collaborative scientific monitoring and research projects evaluating MPAs that link with fisheries management information needs, classroom science curricula, volunteer dive programs, and fishermen of all ages, and identify participants.

4. Protect or enhance recreational experience by ensuring natural size and age structure of marine populations.

Goal 4. To protect marine natural heritage, including protection of representative and unique marine life habitats in central California waters, for their intrinsic value.

1. Include within MPAs the following habitat types: estuaries, heads of submarine canyons, and pinnacles.

2. Protect, and replicate to the extent possible, representatives of all marine habitats identified in the MLPA or the Master Plan Framework across a range of depths.

Goal 5. To ensure that central California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines.

1. Minimize negative socio-economic impacts and optimize positive socio-economic impacts for all users, to the extent possible, and if consistent with the Marine Life Protection Act and its goals and guidelines.

2. For all MPAs in the region, develop objectives, a long-term monitoring plan that includes standardized biological and socioeconomic monitoring protocols, and a strategy for MPA evaluation, and ensure that each MPA objective is linked to one or more regional objectives.

3. To the extent possible, effectively use scientific guidelines in the Master Plan Framework.

Goal 6. To ensure that the central coast's MPAs are designed and managed, to the extent possible, as a component of a statewide network.

1. Develop a process for regional review and evaluation of implementation effectiveness that includes stakeholder involvement to determine if regional MPAs are an effective component of a statewide network.

2. Develop a mechanism to coordinate with future MLPA regional stakeholder groups in other regions to ensure that the statewide MPA network meets the goals of the MLPA.

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Appendix 4: Summary of Federal and California Fisheries Management

Compiled by Amy Boone
October 31, 2005

1. Federal Fisheries Management

Overview: The Pacific Fishery Management Council (PFMC) is one of eight regional advisory councils to the National Marine Fisheries Service (NMFS) within the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce and is responsible for some fisheries management in California, Oregon, Washington, and Idaho[5,6]. The PFMC was established in 1976 with the passage of the Magnuson-Stevens Fishery Conservation and Management Act. The PFMC advises NMFS on fisheries for which a federal management plan has been adopted in federal waters (generally 3-200 miles from shore). Current federal management plans include groundfish, highly migratory species, salmon, and coastal pelagic species. Although the PFMC is legally only an advisory body, NMFS adopts most recommendations submitted to it from PFMC[7].

a. Composition: There are 14 voting members and five non-voting members of the PFMC. Members serve 3-year terms and may not serve more than three consecutive terms. The 14 voting PFMC members include the directors of state fish and wildlife departments from California, Oregon, Washington, and Idaho, or their designees; the Regional Director of the National Marine Fisheries Service or his or her designee; a representative of a federally-recognized West Coast Native American tribe, and eight private citizens who are familiar with the fishing industry, marine conservation, or both. The PFMC includes one "obligatory member" from each state and 4 are "at-large" members who may come from any state. There are also five non-voting members who assist the PFMC in decision-making. They represent the Pacific States Marine Fisheries Commission, which coordinates data and research for the Pacific states; the U.S. Fish and Wildlife Service, which serves in an advisory role; the State of Alaska, because both fishermen and fish stocks migrate to Alaskan waters seasonally; the U.S. Department of State, which is concerned about management decisions that have international implications, and the U.S. Coast Guard, which is concerned about enforcement and safety issues.

b. Meetings: The PFMC meets five times a year, usually in March, April, June, September, and October or November. Most PFMC meetings take five days, with individual advisory body meetings occurring during the course of the week. All meetings are open to the public, except for a short closed PFMC session in which the PFMC deals with personnel and litigation issues. Minutes are created for each PFMC meeting, and are available to the public.

[5] Pacific Fisheries Management Council website: http://www.pcouncil.org/guide/Guide-intropage.html.
[6] Eagle, Joshua; Newkirk, S., and Thompson, B.H. (2003) *Taking Stock of the Regional Fishery Management Councils*, Island Press, Washington, D.C.
[7] Anecdotal evidence gained from interviews during spring 2005.

c. Advisory groups to the PFMC: There are three types of advisory groups that provide critical input to the PFMC. Management Teams are composed of fishery biologists from NMFS and state fish and game departments. They are given the task of monitoring fisheries and preparing Fishery Management Plans, stock assessments, and impact analyses. Management teams meet approximately eight times per year, at the five PFMC meetings plus three times when the PFMC is not in session. Advisory Subpanels consist of various stakeholder groups including commercial and recreational fishermen, processors, conservationists, and charter boat operators. Their role is to advise the management team on the fisheries management plans, and they meet five times per year at the PFMC meetings. Currently there are four advisory panels for groundfish, coastal pelagic species, highly migratory species, and salmon fishery management processes. The Scientific and Statistical Committee (SSC) is composed of scientists from tribal, state and federal agencies, academic institutions, and other sources. The SSC provides multidisciplinary peer review of proposed fishery management actions, including reviewing stock assessments, assessment methods, and biological, economic and social impact analyses. The SSC has subcommittees that focus on salmon, groundfish, highly migratory species, coastal pelagic species, marine protected areas, and economics. The SSC meets five times a year at PFMC meetings but will meet on an ad hoc basis to discuss various issues such as marine protected areas, stock assessments reviews, etc.

d. Stock Assessment Process (see figure below)
A stock assessment is first conducted by NMFS, state agencies, or academics to evaluate the health of the specific species' stock. If found to be below a certain abundance level, NMFS and PFMC are required under the Magnuson-Stevens Act to develop a Rebuilding Analysis which sets a limit on the catch of the species. The Rebuilding Analysis is reviewed by the Science and Statistical Committee for the soundness of the quantitative analysis. Once approved, the management teams are then tasked with suggesting regulatory action in the form of a Rebuilding Plan so that the catch of the species stays within the limit recommended in the Rebuilding Analysis. The management team then meets with the advisory subpanel to consider their recommendations on the proposed regulations. Finally, the suggested regulations go to the PFMC for approval and then to NMFS and the Secretary of Commerce for legal approval and inclusion in the Federal Register. Rebuilding Plans are evaluated every other year to consider changes such as adjustments to the harvest rate. Such changes require full rulemaking action such as a NEPA document and must be discussed at three PFMC meetings.

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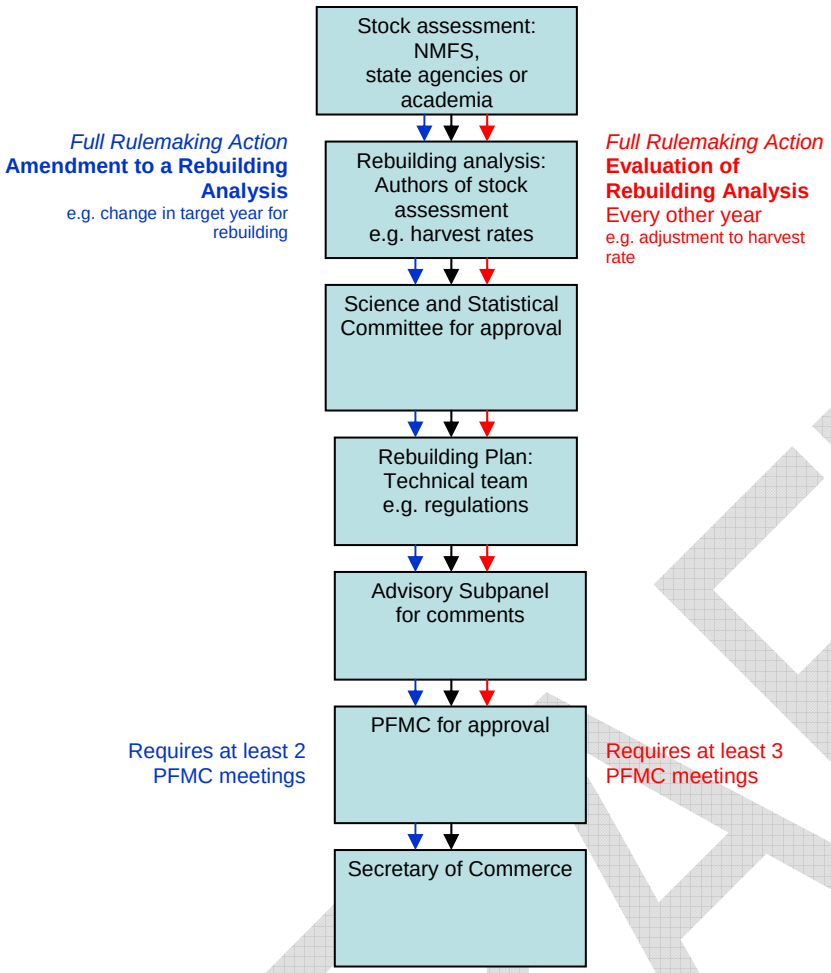

Figure 1: PFMC process design for adaptive management

2. California State Waters Fisheries Management

In the U.S., individual states are responsible for managing fisheries within state waters, generally defined as within three miles from shore with some exceptions (e.g. Monterey Bay in California), and state laws must be consistent with federal laws. The Marine Life Management Act (MLMA) of 1999 delegated most management authority to the California Fish and Game Commission [8]. The goal of the MLMA is to base decisions on comprehensive reviews of fisheries and on clear objectives and measures for fostering sustainable fisheries. MLMA also places a priority on long-term sustainability over short-term economic gain and requires an ecosystem approach to management. The vehicle for these objectives is a fishery management plan (FMP) which is a set of planning documents that assemble information, analyses, and management alternatives that allow the Department of Fish and Game to provide a coherent package of information and management measures to the commission.

[8] Weber, Michael; Heneman, Burr (2000) *Guide to California's Marine Life Management Act*, Common Knowledge Press, Bolinas, California.

a. The Fish and Game Commission sets regulations regarding management of California's fish and wildlife resources. The commission is composed of up to five members, appointed by the Governor to six-year terms and confirmed by the Senate. The commissioners are not full-time state employees, but individuals involved in private enterprise with expertise in various fish and wildlife-related fields. They have a staff of eight employees, which handle day-to-day administrative activities. The commission meets at least eleven times each year to publicly discuss and take action upon various proposed regulations, permits, licenses, management policies and other subjects within its areas of responsibility[9].

b. Advisory Groups to the Commission
The commission forms subcommittees to gather additional advice and information. There are currently two subcommittees - the Al Taucher's Preserving Hunting and Sport Fishing Opportunities Advisory Committee (Al Taucher Committee) and the Marine Subcommittee. The Al Taucher Committee, created in 2000, focuses on discussions of recreational hunting and fishing opportunities and ways to increase these opportunities while maintaining healthy fish and wildlife populations. There are approximately 39 members representing various recreational hunting and fishing interests. The Al Taucher Committee is chaired by a commissioner. The Marine Subcommittee focuses on gathering more detailed information on marine issues than can be provided at regular Commission meetings. The Marine Subcommittee consists of two commissioners and generally meets one or two weeks prior to each commission meeting where marine issues will be heard[10].

c. California Department of Fish and Game
The Department of Fish and Game within the Resources Agency implements regulations approved by the commission. The Marine Region within the department is responsible for implementing regulations, collecting information, and making recommendations to the commission on marine fisheries and resources.

d. California State Fisheries Management Process (see figure below)
The FMP or proposed fishery regulations are developed by the department or by another organization contracted by the department. FMPs are then peer reviewed by a panel of external experts and edited accordingly. Similarly, the scientific basis for proposed regulations may be peer reviewed. The department then submits the FMP or proposed regulations to the commission. For FMP that include implementing regulations, a full rulemaking action, under the administrative procedures act, is required. (Ugoretz, 2005). Once adopted, the department is the lead agency for implementation of regulations.

The MLMA requires that FMPs establish a procedure for regular review and amendment. The MLMA allows flexibility in responding to changes in a fishery by allowing an FMP to specify the kinds of regulations that may be changed without amending the FMP itself. This process mirrors the federal government's process, where annual quotas or in-seasons adjustments in

[9] California Fish and Game Commission website: http://www.fgc.ca.gov/index.html
[10] California Fish and Game subcommittee website: http://www.fgc.ca.gov/2005/2005submtgs.html

management measures may generally be made without resorting to the lengthy process of amending the FMP itself.

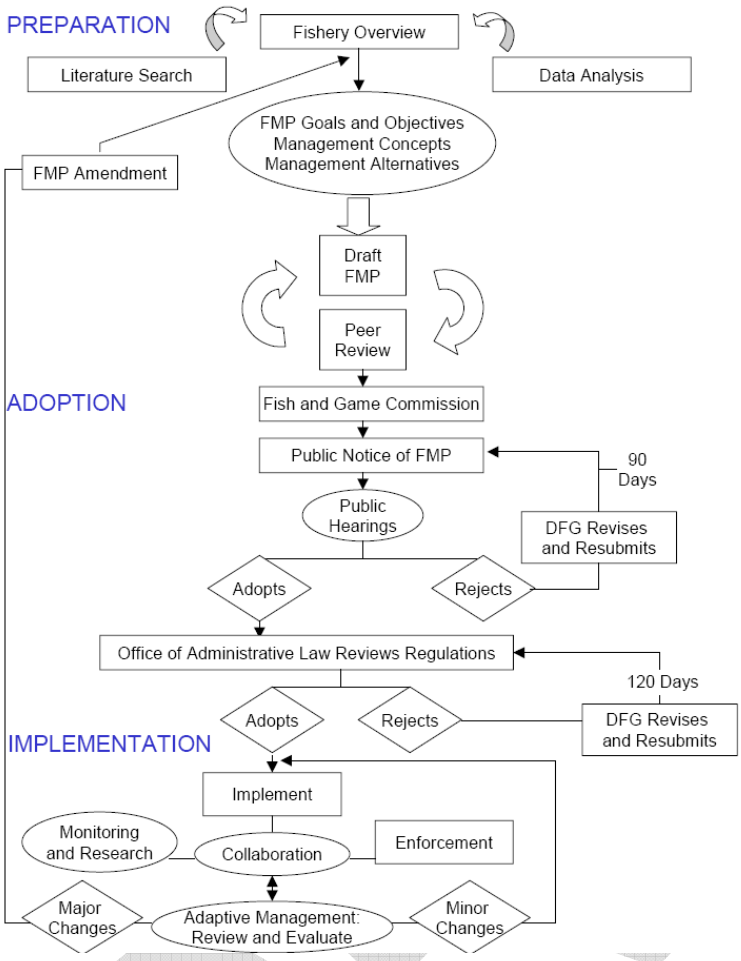

Figure 2: Diagram of fishery management plan (FMP) preparation, adoption, and implementation stages. Source: FMP Master Framework, http://www.dfg.ca.gov/mrd/masterplan/chapter2.pdf.

Appendix 5: Summary of the Nearshore Fishery Management Plan Committee Structure and Process, and External review

1. Regional Advisory Committees

Because of regional differences in the intensity and character of consumptive and non-consumptive activities that relate to nearshore fisheries, the NFMP Project establishes four regional management areas and calls for establishing a Regional Advisory Committee (RAC) for each region: North Coast Region - from the Oregon border to Cape Mendocino (Humboldt County); North-Central Coast Region - from Cape Mendocino to Point Año Nuevo (San Mateo County); South-Central Coast Region - from Point Año Nuevo to Point (Santa Barbara County); and, South Coast Region - from Point Conception to the border of Mexico (CADFG 2002, ch.3 p.125).

Composition: The RACs include representatives from interested constituent groups within that region. These groups include various sectors of the commercial fishing industry, recreational anglers and divers, environmental organizations, Commercial Passenger Fishing Vessel (CPFV) operators, scientists, and any other group or persons identified by the Commission or Department (CADFG 2002, ch. 3 p. 127). The Department will solicit nominations for the different stakeholder representatives for the RACs. These individuals will be appointed by the Director of the Department to the RACs and will serve for a term to be determined by the Fish and Game Commission.

Function: The function of the RACs is to facilitate participation by local interested parties, provide rapid response to specific management issues and to generate regionally targeted recommendations for regional fishery management. The RACs meet once a year, normally in the spring. The Department provides the RACs with an annual status report of the fishery along with Department management recommendations. If these reports indicate the need for quick action, then Department staff confer with RAC members. Based on the reports, public discussions, and the RAC meeting, the RACs may decide to provide recommendations to the Department regarding management of the regional fishery. The Department will forward the RAC's recommendations and views along with its regulatory package to the Fish and Game Commission (CADFG 2002, ch. 3 p. 127). The Department also may establish a statewide standing committee, which may be similar to the RACs in composition, to address specific management issues if a need for this committee is identified by the Department or the Commission (CADFG ch. 1 p. 17).

2. External Review of Management Effectiveness

The Department will conduct a periodic review to determine the effectiveness of nearshore regulations in accomplishing the goals and objectives of the NFMP. The periodic review will determine whether any resource conservation, social, or economic issues exist that require a management response. The reviews could be triggered by biological or social/economic issues (CADFG 2002, ch. 1 p. 16).

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Issues triggering review: Biological issues that could trigger review are: catch that is projected to exceed the allowable catch limits, any adverse or significant change in the biological characteristics of a nearshore, finfish stock (for example: age composition, size composition, age at maturity, or recruitment), existing or imminent overfishing, any adverse or significant change in the availability of forage for nearshore finfish or in the status of a dependent species, an error in data, or a stock assessment that significantly changes the estimates of impacts from current management. Social/economic issues that may be addressed in the annual review are: gear conflicts, or conflicts between competing user groups, extension of fishing and marketing opportunities as long as practicable improvements to product volume and flow to the consumer or user to increase economic yield, to maintain or improve the safety of fishing operations, to increase or decrease fishing efficiency, to maintain or improve product quality, to maintain or improve the recreational fishery, to maintain or improve data collection, including means for verification, to maintain or improve monitoring and enforcement, and to address any other measurable benefit to the fishery (CADFG 2002, ch. 1 p. 16).

Review Process: The Department will present the results of this review to regional and statewide advisory bodies and seek their views and recommendations. The Department will then present the results of discussions with advisory bodies along with its recommendations and views of the advisory bodies to the Commission regarding the need for changes in management (including regulatory actions) of the nearshore fishery. The Commission then determines whether to consider changes to the NFMP or to the regulations implementing it (CADFG 2002, ch. 1 p. 16).

Reference

California Department of Fish and Game, Marine Region (CADFG 2002). Nearshore Fishery Management Plan

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Appendix 6: Summary of Marine Region Advisory Committees

Compiled by Paul Reilly November 16, 2005
(Note: This excludes Pacific Fishery Management Council and Pacific States Marine Fisheries Commission advisory committees)

1. Aquaculture Disease Committee
2. Commercial Salmon Review Board
3. Commercial Abalone Advisory Committee
4. Recreational Abalone Advisory Committee
5. Ocean Resources Enhancement Advisory Panel
6. Director's Herring Advisory Committee
7. Sea Urchin Fishery Advisory Committee
8. Squid Fishery Advisory Committee
9. Squid Research Scientific Committee
10. Pacific Scientific Review Group
11. Restricted Access Policy Team
12. Prawn Advisory Committee
13. Take Reduction Team for the California/Oregon Swordfish and Shark Drift Gillnet Fishery
14. Collaborative Marine Research Program
15. Nearshore Fishery Regional Advisory Committees

1. Aquaculture Disease Committee

Composition: The director appoints an 11-member committee consisting of at least six industry producers selected to represent geographic, species, and other diverse aspects of the industry, plus two individuals to represent the Department of Fish and Game, one to represent the Department of Food and Agriculture, one academic scientist who is an expert in aquatic diseases, and one representative of the University of California Cooperative Extension.

Function: The purpose of the committee is to advise the FGC and the director on lists of diseases, regulations, responses to discovery of disease, quarantine procedures, and related actions to prevent the entry and spread of diseases and disease agents. (F&G Code section 15502)

2. Commercial Salmon Review Board

Composition: Five voting members appointed by the Director:
Three members shall be owners of permitted vessels appointed by the Director from lists submitted by associations or groups representing commercial salmon fishing vessel owners.
Two members shall be owners of permitted vessels appointed by the Director from lists submitted by individual commercial salmon fishing vessel owners.

Function: The board shall function as an advisory body to the Department regarding implementation of the provisions of Article 4.5 of the Fish and Game Code, which relates to commercial salmon fishing. (RSection 8247 F&G Code)

3. Commercial Abalone Advisory Committee (CAAC)

Composition: six members:
One commercial abalone diver living north of Pt. Sur
One commercial abalone diver living south of Pt. Dume
One commercial abalone diver living south of Pt. Sur and north of Pt. Dume
Two members from the California Abalone Association
One member who was required to pay landing taxes for abalone in 1996-97 (the last year of the fishery).

Function: The CAAC shall make recommendations to the Director concerning activities related to the expenditure of funds under the Abalone Resources Restoration and Enhancement Program
(Section F&G Code 8051.4)

4. Recreational Abalone Advisory Committee (RAAC)

Composition: nine members:
Six members who are not officers or employees of DFG:

Two members shall reside north of the southern boundary line of Marin County, and shall be selected from a list of nominations by the Northern California Shellfish Assessment Program or by individuals or organizations participating in the recreational abalone fishery (not more than one member shall be a former commercial abalone diver or seafood processor or marketer);

Two members shall reside south of the southern boundary of Marine County and north of the Santa Barbara/San Luis Obispo county line and shall be selected from a list of nominations by the Central California Council of Divers, the Southern California Shellfish Assessment Program or by individuals or organizations participating in the recreational abalone fishery (not more than one member shall be a former commercial abalone diver or seafood processor or marketer);

Two members shall reside south of the Santa Barbara/San Luis Obispo county line and shall be selected from a list of nominations by the Greater Los Angeles Council of Divers, the San Diego Council of Divers, the Southern California Shellfish Assessment Program or by individuals or organizations participating in the recreational abalone fishery (not more than one member shall be a former commercial abalone diver or seafood processor or marketer);
One member shall represent DFG in enforcement activities and shall be selected from personnel in Wildlife Protection division;

Two members shall be marine scientists who are or have been involved in abalone research at universities, state universities, or in state or federal programs.
No member shall be involved in or profit from the culture for sale of abalone.

Function: The RAAC reviews proposals and recommends to the Director projects and budgets for the expenditure of fees collected under the Recreational Abalone Management Program. The committee may review progress reports and the results of projects and make recommendations to the Director regarding abalone resource management.
(Section F&G code 7400)

5. Ocean Resources Enhancement Advisory Panel
Composition: Sport, commercial and scientific interests are represented on the Panel.

Function: The panel assists the Director in establishing policy and direction for the Ocean Resources Enhancement and Hatchery Program (OREHP). OREHP is currently focused on raising white seabass to see if artificial propagation can enhance depressed marine finfish populations.

6. Director's Herring Advisory Committee (DHAC)

Composition: There are representatives, primary and alternates, for the following segments of industry: Odd Platoon, Even Platoon, DH Platoon (all for San Francisco Bay fishery), CH Platoon (boats converted from roundhaul to gill net), Herring-eggs-on-kelp fishery, Out-of-State, Tomales Bay fishery, and Humboldt fishery, as well as buyers. The herring CEQA document lists a total of 26 DHAC members). In addition, there is now an industry chairperson, who is charged with submitting recommendations for DHAC proposed regulatory changes for the Director to consider.

Function: The DHAC advises the department on all issues related to the herring fisheries in central and northern California. The DHAC meets with the Department a minimum of twice per season: pre-season meeting in November and the end of the season meeting in March. They also meet or conference call internally prior to each of these two meetings. They have also, in concert with Department staff, formed ad hoc committees to work on issues (permitting) and projects (gill net mesh experiment).

7. Sea Urchin Fishery Advisory Committee (SUFAC)
(previously known as DSUAC (Director's Sea Urchin Advisory Committee).
Composition: SUFAC consists of five sea urchin processors/handlers and five licensed urchin divers. The statute has residency requirements for the urchin divers: One must reside in San Diego or L.A. Co., one in Ventura Co., one in Santa Barbara Co., and two in northern CA from different counties. There are currently only four divers and four processors on the committee, and only three divers and one processor have named alternates.

Function: SUFAC decides what projects their remaining funds should be spent on to promote and manage a sustainable sea urchin resource and fishery.

The SUFAC was created by statute and will cease to exist on January 1, 2007, when FGC Section 8051.2 is repealed. A referendum was held last year that created a marketing board called the California Sea Urchin Commission. Consequently, the urchin industry is not interested in reauthorizing SUFAC. SUFAC was funded by a self-imposed landing tax of 1 cent on every pound of sea urchin landed. That money is used to fund a variety of projects and activities. SUFAC has been funding long-term sea urchin recruitment studies being done by scientists associated with UCSB and UCSD. They also fund industry newsletters and workshops, and have recently embarked on a grassroots campaign to increase the scientific data base used to help manage the fishery. The program, called "Barefoot Ecologist Data Collectors," resulted from recommendations made by a pair of international fishery scientists who visited California in 2003 to conduct a review of what data was lacking (SUFAC funded their study). A commercial sea urchin diver in each port, “the Barefoot ecologist,” is trained by a retired California Department of Fish and Game marine biologist (John Duffy) to collect density and test diameter measurements during normal fishing operations. These barefoot ecologists will then train other sea urchin divers in their respective ports.

There is a DFG staff member who is a liaison for SUFAC and a non-voting member of the Sea Urchin Commission.

8. Squid Fishery Advisory Committee (SFAC)

The SFAC was established by the Director, included fishery participants, environmentalists, and scientists, and was charged with assisting the Department with the development and review of fishery assessments, management options and proposals, and FMP amendments.

9. Squid Research Scientific Committee (SRSC)

The SRSC comprised national and international university, agency, and private industry scientists and made recommendations on squid research protocols and methods as well as management strategies.

The above two committees met from 1998 through 2000 and played a major role in the interim management of the fishery. (Squid fishery Management plan, Chapter 1 and Chapter 3)

10. Pacific Scientific Review Group

Composition: The committee is made up of state representatives (OR, WA, CA), federal representatives (NOAA/NMFS- both regional and SWFSC, USFWS), researchers (mainly university, some private), and fishing industry representatives.

Function: The Pacific Scientific Review Group is a Committee created under the Marine Mammal Protection Act. The Marine Mammal Protection Act (MMPA) requires that the National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service (FWS) develop Stock Assessment Reports for all marine mammal stocks that occur regularly in U.S. waters. The PSRG is responsible for reviewing these stock assessments for all marine mammals

(cetaceans, pinnipeds, sea otters) for the northern Pacific including the waters of Hawaii. These reports are based upon the best available scientific information and include information the distribution, abundance, population trends, human-caused mortality, and the Potential Biological Removal (PBR) of each stock. The main goal here is to reduce marine mammal-fisheries interactions.

11. Restricted Access Policy Team

Composition: Members of the RAPT were appointed by the Director, in consultation with the Commission. Mike Weber chaired RAPT until 2003. The core group of RAPT included the Marine Region Manager, L.B. Boydstun, Burr Heneman, Chris Dewees, and different Department staff depending which program was being discussed. A few staff members continued to serve beyond the review of the programs for which they were responsible

Function: The Restricted Access Policy Team was formed in 1999 by the Director. The function of RAPT was to advise the Director regarding the consistency of proposed restricted access programs with the newly adopted Commission policy on restricted access. RAPT met informally and irregularly.
RAPT no longer exists.

Excerpt from Commission's Restricted Access Policy:
"POLICY — 3.1: Restricted access programs shall be developed with the substantial involvement of participants in the affected fishery and others, consistent with the stakeholder participation requirements of Section 7059 of the Fish and Game Code, and shall balance the specific needs of the fishery with the desirability of increasing uniformity among restricted access programs in order to reduce administrative complexity."

12. Spot Prawn Advisory Committee

Composition: The committee was comprised of two Department biologists and one to two representatives of each of the following sectors of the commercial spot prawn fishery: central/northern California trawl fishery, southern California trawl fishery, central California trap fishery, southern California trap fishery.

Function: The committee was functional from 2000 to 2002, when the Department was developing regulations to establish a restricted access spot prawn fishery. The committee suggested possible regulations and advised the Department of potential impacts from proposed regulations. A restricted access trap fishery was established, but a restricted access trawl fishery was never established. Spot prawn fishing with trawl gear was prohibited in 2003.

13. Take Reduction Team for the California/Oregon Swordfish and Shark Drift Gillnet Fishery

Composition: The committee is made up of state representatives (OR, WA, CA), federal representatives (NOAA/NMFS- both regional and SWFSC, USFWS),

researchers (mainly university, some private), and fishing industry representatives.

Function: The Take Reduction Team for the California/Oregon Swordfish and Shark Drift Gillnet Fishery (TRT) is just what is sounds like. This team was also created under the MMPA and was specifically created to reduce marine mammal take in a specific fishery, the drift gill net fishery. The TRT instituted the use the suspenders to lower the nets below surface waters as well as the use of pingers to scare off marine mammals. Recently, it has been focusing more on sea turtle interactions.

14. Collaborative Marine Research Program (CMRP).

Composition: The planning committee consists of representatives from fisheries (commercial, and soon to be sport too), science, environmental groups, and agencies (NMFS and DFG).

Function: This committee is operated through the Channel Islands Marine Sanctuary Foundation and is a partnership involving stakeholders in collaborative research, resource assessment and protection. The focus of the committee has been on the Channel Islands and their MPAs. One of the main tasks is to identify research/management questions of interest, send out RFPs, and then evaluate and award money (through the Sanctuary Foundation) to the winning proposals. The committee has recently done this for three proposals involving outreach, larval export, and spillover studies – although the final awarding of the money has not been made. There is more information about the CMRP at http://www.cisanctuary.org/cmrp/index.htm 15. Nearshore Fishery Regional Advisory Committees

Composition: The Nearshore Fishery Management Plan (NFMP) provides for the establishment of regional advisory committees (RACs). These committees shall be composed of representatives from interested constituent groups from within each region. Membership of RACs should reflect the diverse interests of the nearshore, including various sectors of the commercial fishing industry, recreational anglers and divers, CPFV operators, non-consumptive users, conservationists, the scientific community, and any other group or persons identified by the Commission or Department.

The NFMP says the department will have Regional Advisory Committees, although it does not lay out a timeline for their development. The plan states that, "The Department will solicit nominations for the different stakeholder representatives. These individuals will be appointed by the Director of the Department to the RACs and will serve for a term to be determined by the Fish and Game Commission. The RACs will receive reports from the Department on the status of the fishery."

Function: The Department will provide the RACs with an annual status report of the fishery and Department management recommendations. Based on these materials, public discussions, and the RAC meeting, the RACs may decide to provide recommendations to the Department regarding management of the fishery.

If these reports indicate the need for quick action, then Department staff will convene a conference call with RAC members. Each committee will meet once each year, most likely in the spring. The Department will forward the RAC's recommendations and views along with its regulatory package to the Commission.

The nearshore fishery RACs have not yet been established.
The Department also has a seat on the Pacific Fishery Management Council and on several of their committees. The Council has been previously reviewed by Amy Boone.

In addition to the Council's Groundfish Advisory Committee which advises the Council on groundfish related issues, the Department also works with a groundfish taskforce group about proposed groundfish management specifications, particularly those related to the biennial regulation process. Most if not all of California's GAP representatives are on this taskforce. The department is developing a few smaller, more focused groups of constituents (primarily composed of groundfish taskforce members) that can provide input on more narrow, time sensitive issues.

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Appendix 7: Parameters of Measuring MPA Network Effectiveness (NOAA, Syms and Carr)

Table 1: Effectiveness parameters for individual and networked conservation MPA's

I. Species population parameters
Abundance
Density
Size structure
Age structure
Size specific fecundity
Larval production (product of density and size specific fecundity)
Spawning biomass
Population stability
Population resilience
Population resistance
Genetic diversity (within and between populations throughout network)
Demographic rates (reproduction, mortality, immigration, and emigration)
Mean individual growth rates
Local population viability estimates
Larval dispersal (to assess extent to which MPA populations are self-replenishing)
Connectivity of larval dispersal with other MPAs
Species-specific habitat quality and abundance

II. Community parameters
Focal species (e.g., rare, endangered, keystone, indicator, umbrella, and flagship species)
All or subset of species population parameters identified above with emphasis on interaction strengths and effects of keystone and exploited predator species
Community-wide
Species composition
Species richness
Relative densities of species
Species diversity
Trophic richness
Trophic diversity
Trophic structure
Guild structure and dynamics
Species redundancy
Species interactions and strengths (e.g., competition, predation, parasitism, mutualism)
Community stability and dynamics (e.g., resistance, resilience, constancy, and persistence)
Spatial relationships of populations
Community function (e.g., primary and secondary productivity)
Breadth of resource use (e.g., dietary breadth of predators)
Complementarity
Genetic diversity and structure
Threshold effects—potential alternative stable states

III. Ecosystem
Habitat structure (size, shape, spatial arrangement of habitats)

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Habitat richness Habitat diversity Habitat representativeness Physical (structural) complexity (of abiotic and biotic substrata) Interactions between biogenic physical structures and species that alter them. Productivity (C gm fixed / area / time; total and by trophic level) Nutrient and matter cycling and fluxes (e.g., rates of change, rates of cycling, fluxes, nutrient ratios, nitrogen fixation) Detrital production and export.

Table 2. Effectiveness parameters for individual and networked fishery MPAs

I. Population parameters Local (within MPA) Abundance Density Size structure Age structure Size specific fecundity Larval production (product of density and size specific fecundity) Spawning biomass Mean individual growth rates Demographic rates (reproduction, mortality, immigration, and emigration) Population stability and dynamics (e.g., resistance, resilience, constancy, and persistence) Genetic diversity (within and between populations throughout network) Local population viability estimates Larval dispersal (to assess extent to which MPA populations are self-replenishing) Density, dynamics, and stability of by-catch species Regional (outside MPA) Larval production and export rate (from inside to outside MPA) Larval dispersal and recruitment patterns (outside MPAs) Emigration (i.e. “spillover”) and immigration of benthic stages inside and outside of MPAs Stock stability and dynamics (e.g., resistance, resilience, constancy, and persistence) Fishery yield II. Community Local (within MPA) By-catch assemblage composition, structure, dynamics, and stability Density, dynamics, and stability of resource requirements for exploited species Regional (outside MPA) Community stability, to extent that MPAs contribute to regional stock abundance and stability, and exploited species influence community structure III. Ecosystem Local (within MPA) Abundance and quality of spawning, recruitment and other habitat requirements Abundance and quality of other ecosystem-based resource requirements Regional (outside MPA)

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Ecosystem stability, to extent that MPAs contribute to regional stock abundance and stability, and exploited species influence ecosystem structure Ecosystem stability, to extent that MPAs contribute to production and export of ecosystem components (e.g., larval export and replenishment of biogenic habitat)

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