Lessons Learned from California's Marine Life Management Act

Prepared under the MLMA Lessons Learned Project

May 18, 2010

About the MLMA Lessons Learned project:

The Harty Conflict Consulting & Mediation [HCCM] project team was selected to conduct a lessons learned study of the Marine Life Management Act [MLMA] as described in the RFP issued by the Ocean Protection Council on October 27, 2008. In the words of the Request for Proposals "Both DFG and the Commission have agreed that summarizing lessons learned from the previous FMP-approval processes could help to streamline efforts in the future. Additionally, because each past FMP creation process involved vastly different protocols, standards, costs, and time investments, a study evaluating comparative lessons learned could function as a useful reference for future efforts. The study will evaluate the successes and challenges of the implementation of the MLMA and provide recommendations to direct future MLMA efforts by DFG and the Commission."

About this document:

This is the final report prepared to assess lessons learned about the implementation of the MLMA. The first draft report addressed Task One under the contract scope of work: a description of California's experience implementing the MLMA. The second draft report combined Tasks Two and Three: evaluating the MLMA, identifying lessons learned, and providing recommendations for improving future implementation. The public was invited to comment on both draft reports, which were posted on the OPC's project web page. While a comment-by-comment response to public input is outside the scope of work for this project, all comments received have been carefully read and considered by the project team and in some cases are cited in the text of the final report. The actual comments are not included in the report; interested readers should contact the OPC about their status.

This final report is intended to serve as both an evaluation and a catalyst for constructive public discussion and identification of solutions, looking backward as well as toward possible futures for California's management of its living marine resources. The project team appreciates the opportunity to explore MLMA accomplishments and challenges, to learn from public review and input, and to support an important discussion about California's future.

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LESSONS LEARNED from California's Marine Life Management Act

Final Report:
Evaluation, Lessons Learned, and Recommendations
May 18, 2010

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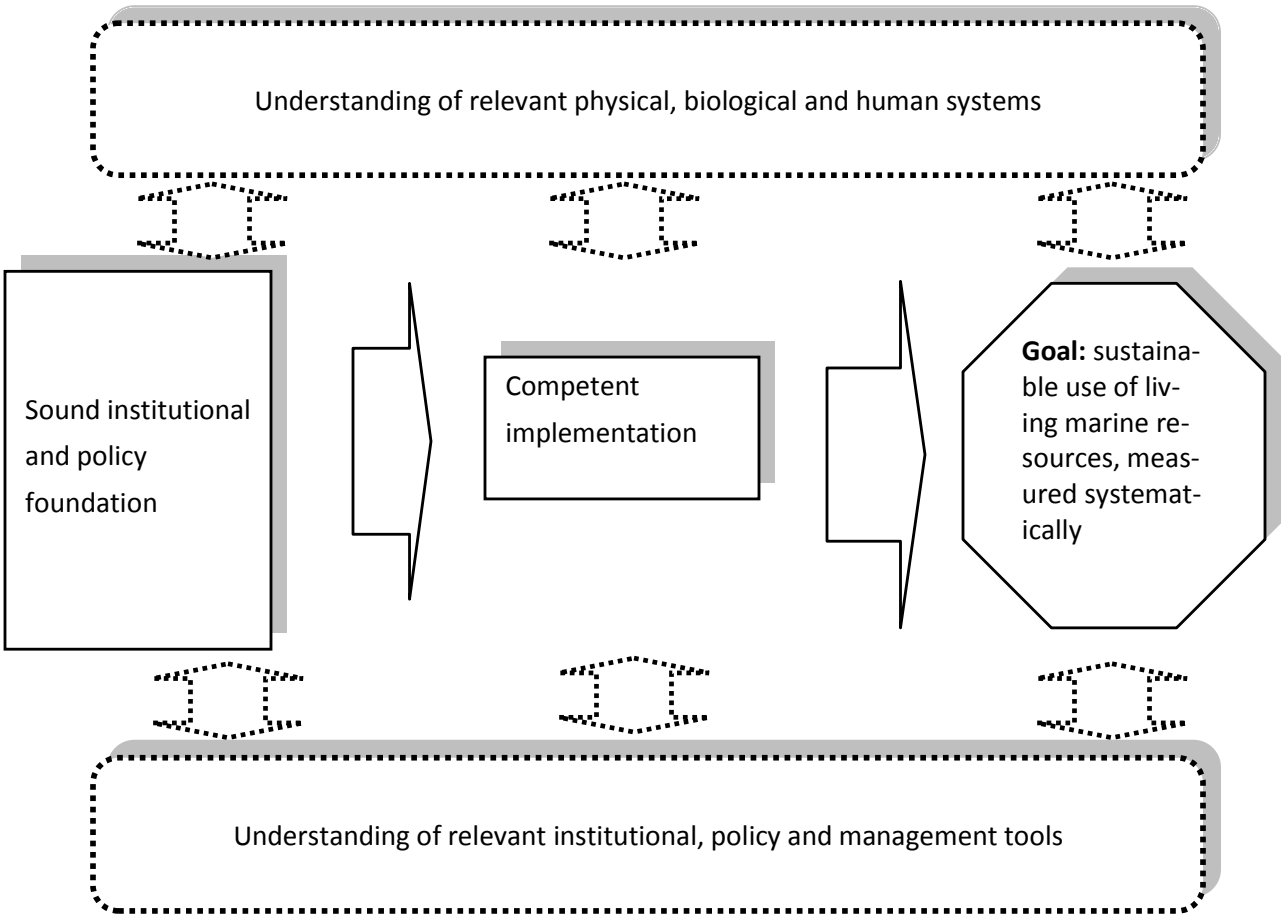
Executive Summary

The Marine Life Management Act of 1998 (MLMA or Act) was adopted amidst profound change in marine fishery management at the federal level and in other states as well as in California. The significance of this change for California's MLMA is detailed in the first report for this project, *Passage and Implementation of California's Marine Life Management Act*. July 15, 2009 [Appendix 1 to this report]. The MLMA emphasized sustainable, adaptive management that extended beyond individual species to address their marine habitats. The stature required improved science to inform decision making, wider constituent involvement, and a priority on long-term sustainability over short-term harvest. Fishery Management Plans, or FMPs, based on a wide range of Essential Fishery Information, were to be the primary tool for sustainable fisheries management.

Important elements of the MLMA have been successfully implemented. The Act required the preparation of Status Reports about marine resources, a Master Plan, and two Fisheries Management Plans (FMPs) for specific species (white sea bass and the near shore fishery). Separate legislation resulted in development of a market squid FMP. But momentum for implementation slowed after explicit requirements of the Act were satisfied. No other FMPs have been adopted by the Fish and Game Commission; many state-managed fisheries lack the data required for FMPs; there is no clear, publicly available management plan to support decision making, measure progress, and provide accountability; and funding for the Commission and Department is unreliable.

This report identifies lessons learned from the first decade of MLMA implementation, and offers specific recommendations to improve prospects for achieving the MLMA's broad goal of sustainable fisheries in future years. The report's lessons and recommendations are based on a simple framework for understanding marine resource management (Figure 1).

Figure 1. Framework for effective management of living marine resources



Goal.

The goal of the MLMA is sustainable management of marine fisheries and the habitats on which they depend. Fisheries are to be managed in accordance with the general policy of ensuring the conservation, sustainable use, and restoration (where feasible) of California's living marine resources.[1] It is about more than simply managing individual fish species to maximize short-term harvest: sustainable management looks to the long term, and fishery management decisions are adaptive, based on science, and encompass marine habitat. This report summarizes the goal as "sustainable use of living marine resources, measured systematically."

It is beyond dispute that fishery management is changing within and outside California, and this should be acknowledged and even celebrated. While difficult to measure, interviews for this project suggest these changes are clearly linked to passage and implementation of the MLMA. Both the Department and Commission deserve credit for this change. The extent to which this change in management has promoted actual progress toward sustainable use of living marine resources is open to debate. The Department focuses narrowly on fisheries and—understandably—

[1] MLMA §§ 7055, 7050. *See* discussion in Appendix 1, pp. 18-19.

asserts that these resources are being managed sustainably in its official comments on this report. Interviews of well informed people both outside and inside the Department, as well as review of available data, lead to a more limited conclusion: while there has been clear progress for some individual species, a broad claim of achieving sustainability for the state's fisheries is not supported by available information.[2] Perhaps more importantly, there is only limited and unsystematic evidence of progress toward adaptive decision making and ecosystem-based management of living marine resources as envisioned by the MLMA.

Sound institutional and policy foundation.

Management of California's living marine resources under the MLMA is fragmented and complex. The causes of this fragmentation can be traced back, in large measure, to the MLMA itself. Authority is spread among the Legislature, Commission, and Department, and requirements to integrate with federal fisheries law and the Pacific Fisheries Management Council increase fragmentation and complexity. The Legislature retains authority to manage some high-value fisheries, and the Commission must obtain approval from the Legislature in order to adopt FMPs for some species, limiting the statute's practical scope. One consequence is that marine resources policy development often appears to be driven by legislative influence focused on single "problems" and not by the science-based approach mandated in the MLMA. The MLMA was designed to provide the foundation for all state management of living marine resources, but the fragmented structure of marine management and political pressures from narrowly focused stakeholder interests have prevented progress toward the broader ecosystem-based management that the MLMA envisions.[3] Senior DFG staff spend a significant portion of their management time working through the PFMC or with the Legislature and the Commission rather than through the Master Plan and MLMA-based FMPs. The legislatively mandated Dungeness Crab Task Force is a recent example.

Effective policy implementation depends on specific requirements, powers conferred, resources available, and remedies provided. The changes in legislative language as the MLMA was enacted resulted in a statute with limited explicit requirements, limited powers, no continuing provision of resources, and no remedies for failure to act. A central lesson learned is that the Act lacks features necessary to accomplish the changes that it sought. The MLMA has no explicit requirements for the preparation of additional FMPs, gives no assurance of adequate resources to accomplish its goals, provides no sanctions or remedies for failures, and provides only limited new authority to the Department or to the Commission. As enacted, the tools the Department may use to meet the goals of MLMA are, at least arguably, discretionary. For example, the MLMA provides discretion to the Department in how and to what extent it conducts collaborative science, designs dispute resolution, promotes co-management, secures peer review, develops FMPs, identifies non-fishing sources of depressed fisheries, evaluates the management system, specifies measures to achieve sustainability, and chooses the approach to manage emerging fisheries.

[2] Comments received on the draft report support this fundamental conclusion, with the exception of the Department's views.
[3] See DFG's narrower reading of the MLMA and therefore its responsibilities in Note 6.

Effective and competent implementation.

The principal fishery management tool in the MLMA is FMPs. A lack of requirements for consistent progress in developing FMPs, along with unrealistic assumptions about ability to gather, analyze, and use Essential Fishery Information (EFI) linked to FMPs has undermined the practical value of this tool. The costs of the initial Nearshore FMP were significant and became a source of resistance to future FMPs. While the NFMP justifiably receives support as a useful tool, some key provisions—such as regional management—have not been implemented. Instead of FMPs, DFG and the Commission have largely relied on traditional tools and policies such as gear limitations, along with *ad hoc* use of the Commission's policy on restricted access. No broad principle of precaution has been articulated for fisheries lacking data and catch limits have not been widely implemented in state fisheries. The MLMA sought to place fishery management, and the management of other living marine resources, on a solid foundation of scientific information about EFI, socioeconomic information, and understanding of the health of living marine resources other than fisheries. But progress towards this goal has been slow. Most fisheries are still *data poor*, and the Department has yet to make significant progress towards defining – much less towards gathering and using systematically – information about socioeconomics and living marine resources other than fish.

There is no practical, understandable management plan for the MLMA that sets priorities, specific objectives, and management actions; identifies resources; supports evaluation of progress; and provides for public accountability. Implementation appears to depend on discretionary choices by the Commission and the Department. The Master Plan for Fisheries, intended to provide a comprehensive policy framework, has not been updated on the schedule required by the MLMA.

Another clear lesson from this evaluation is that the ambitious goals of the MLMA were advanced with little attention to ensuring that the state entities most responsible for success – the Department and the Commission—had sufficient capacity and resources. It is clear that the public subsidizes the costs associated with fisheries management. No stakeholder has demonstrated a compelling self-interest in successful long-term implementation of the MLMA. Also troubling is that the economic value of living marine resources is relatively modest: a small fraction of the value of California agriculture, for example, and a tiny fraction of the state's overall economy. Absent compelling self-interest by stakeholders or a sizable role in the California economy, it is difficult to sustain policy makers' commitment to effective policies—and necessary funding—regarding living marine resources. The current fiscal situation facing California makes it unlikely that budgets for the Department and Commission will increase in the foreseeable future.

Understanding of relevant physical, biological and human systems

There is substantial evidence that many California fisheries are reduced. Since 1995, there have been significant decreases in commercial landings, revenues, and vessels, with a general understanding that these declines are attributable primarily to a failure of fish populations to recover from a combination of coastal development and pollution, overfishing, and other problems. On the other hand, there is some evidence that these recent declines may be reversible. Whatever the broad patterns may be, it is clear that California lacks the robust data needed to guide management as the MLMA envisioned in 1998 and requires today. In 2008, Botsford and Kilduff analyzed 149 fisheries

in California organized into eight groups, with the results shown in Table 7. Landing data are available for over 90 percent of these fisheries, and size composition of catch is available for 60 percent. The life histories of 86 percent of the fished species are understood. In contrast, the age composition of only 22 percent of fisheries is known and stock assessments are available for only 31 percent of the fisheries.

Improving knowledge of marine systems, and associated human systems, is essential to effective management. The MLMA anticipated managing species with varying levels of information. Equally importantly, fishery management policies can increase essential information over time, allowing use of different management tools which require better information. The tools employed need to match the available information. As an example of how new policies can improve knowledge, all of the nearshore stock assessments now available [for seven species, but only five have been used in management] were carried out after passage of the MLMA.

As noted above, the MLMA and the Master Plan both require socioeconomic data as well as EFI. But socioeconomic data are limited and the FMPs completed so far provide insufficient insight into the social and economic aspects of fishing. The NFMP [covering 19 species] identifies a list of socioeconomic EFI and suggests some ways these data could be used, but does not provide a model or framework for prioritizing socioeconomic data or for incorporating the results of socioeconomic analyses into fishery management. If regional management anticipated in the NFMP is to become a reality, better understanding of socioeconomics will be necessary in order to achieve the "fairness" principles in the MLMA.

In addition to requiring EFI and socioeconomic data, the MLMA also set a new direction for fishery management by seeking to ensure both sustainable fisheries and healthy marine ecosystems. The MLMA envisions adaptive, ecosystem-based management, or EBM, to achieve this broader goal. The intent to move toward EBM is affirmed in the three FMPs discussed above, but none of the documents state what EBM means and how it will affect management. The NFMP lists a number of possible indicators of fishery effects on the ecosystem but does not provide any conceptual model or framework that would connect these variables with fish production or management. Without these kinds of organizing frameworks it is difficult to assess how management will proceed, whether it will be sustainable, and how the management system will respond to future changes.

Finally, while information on recreational take is improving there are critical gaps relative to commercial fishery data. The recreational take is low in some fisheries, such as market squid or northern anchovy. But recreational fishers are responsible for all abalone taken, and are active in the nearshore fishery, where one analyst concluded recreational fishers were responsible for landing more tons of vermillion rockfish in Southern California than commercial fishers from 1970 through 2003.[4] The White Seabass FMP directly addresses large recreational catches. The state, through both DFG and OPC, has initiated efforts to improve data on recreational fisheries, including improvements to

[4] Alex MacCall. *Recreational Fishery Monitoring and Stock Assessment*. PowerPoint presentation to the Pacific States Marine Fisheries Council Recfin Workshop, August 2006, Portland, OR.

the California Recreational Fisheries Survey, Commercial Passenger Fishing Vessel (CPFV) data, and the "report card" programs for abalone and spiny lobster.[5]

Understanding of available institutions, policies and tools

Successful management of marine living resources depends on a systematic effort to gather, analyze, and apply knowledge about institutions, policies, and management tools.

California's institutional approach to marine resource management principally involves the Legislature, Commission, and DFG, with an indirect coordination and resource capability available through the OPC. This approach contributes to fragmented authority and single-species management. Other states have different institutional structures, and other countries with significant fisheries—such as Canada to the north—also offer potentially useful examples.

California's policies for managing marine resources under the MLMA, other state laws such as the MLPA, and federal law currently reflect an *ad hoc* approach. State fisheries management policies are strongly influenced by the historic single-species, command-and-control model that focuses on harvest. There is a lack of broad precautionary rules for data-poor fisheries. The Department claims that its policy approach to individual fisheries is consistent with precaution and cites examples for individual fisheries. The Commission's policy on restricted access creates opportunities for precaution, but the policy is not applied consistently. California has resisted experimentation with catch shares, and adaptive management has not been systematically employed. Finally, the role of MPAs in overall marine resource management has not been effectively articulated.[6]

Perhaps even more than knowledge about institutions, knowledge about fishery and marine management policies is an essential element of improving California's ability to achieve its broad goal of sustainability. There is a range of experimentation occurring with catch shares, for example, that merits attention and even a test in California. There is significant learning about the role of MPAs, and increased understanding of models for adaptive management. Research for this report indicates efforts to bring this knowledge to bear in California are uneven at best, and a coherent structure for gathering, evaluating, debating, and applying knowledge is missing.

The MLMA rests on core assumptions about the ability to gather information sufficient to develop FMPs. This assumption does not match the record of California's first 10 years of MLMA implementation. Only three FMPs have been developed, which means that most of the state's fisheries are managed using other tools. The Department's interpretation of data requirements for FMPs—reflected in the Master Plan—and the costs of gathering, analyzing, and synthesizing that data, have severely limited the use of FMPs as a management tool. The MLMA identifies FMPs as the principal tool for managing fisheries resources but provides sufficient flexibility to manage fisheries without the full extent of information needed to satisfy the "data rich" standard for FMPs in the Master Plan. In addition, there is significant activity among fishery researchers and managers at the state and federal levels about how to effectively

[5] The importance of improved information about recreational catch and impacts was emphasized by several reviewers of this draft report.

[6] The Department's legal counsel offered a different view in comments on the draft. See Note 97.

manage "data poor" fisheries. The Department sponsored a workshop on this topic in 2008 and research for this project indicates this topic is rich with possibilities for improved management tools.

Comments on this report highlight an important set of choices for the state about improved management tools. One view is that the state should devote its limited resources to improving knowledge about managing under data-poor circumstances, and should not devote resources to gathering new information in the short-term. Another view is that information gathering should be a priority, along with a more flexible interpretation of the FMP tool. A full exploration of new and emerging knowledge about all management tools, and a clear policy choice, should be a priority for improving the MLMA.

This report is organized in six sections:

1. A framework for managing living marine resources
2. Institutional and policy foundation
3. Effective and competent implementation
4. Understanding of relevant physical, biological and human systems
5. Understanding of available institutions, policies and tools
6. Recommendations

Appendix 1 contains the final version of the Task One report prepared for this project: *Passage and Implementation of California's Marine Life Management Act, May 18, 2010*.

The information in the report is taken from the statute and legislative history, California Fish and Game Code, regulations, published reports and documents, and interviews with persons who had direct experience with MLMA enactment and implementation. The project team received multiple sets of comments on the public draft, including a peer review organized through the California Ocean Science Trust. These comments also inform the revised structure and content of the final report and are greatly appreciated.

Recommendations

Given the weaknesses of the MLMA as a statute and the patterns of weak and irregular funding for the Department and Commission, some of the responsibility for remedying the shortcomings of the MLMA—and the system by which the state discharges its responsibilities to protect and preserve ocean resources as a public trust—lies with the Legislature. There is, however, a great deal that the Commission and the Department can do on their own, or with the assistance of the Ocean Protection Council, other state agencies, and even federal agencies.

These observations lead to a core recommendation from this lessons learned assessment: rather than re-writing the MLMA, the Commission and Department should focus on achieving the goals of sustainability and adaptive, ecosystem-based management that are central to the MLMA and other state and federal policies, using the broad suite of tools already available to them, including those in the MLMA.

A focus on the goals of sustainability and ecosystem-based management and openness to use of all tools available to the state has advantages over focusing narrowly on implementation of the MLMA or any other single management tool. First, it recognizes current practice, where the state uses a wide variety of management tools. Second, it avoids a current paralysis arising from expectations that FMPs developed under the MLMA are large, expensive undertakings. Third, a focus on broad goals invites "mixing and matching" tools to best advantage in achieving the goals, an appropriate strategy given the variety of living marine resources and limitations on current and likely future resources.

While consistently acknowledged to be modest and only erratically available, funds and personnel are available to the Department and the Commission. According to information provided by the Department, the total Marine Region budget was $18.3 million in 2009-10, supporting 154 staff, and $2.7 million and 26 staff members were allocated to MLMA activities. In that same year the total Commission budget was $1.4 million, supporting 7.8 personnel years. These resources should be used to maximum effect. On example is the state's experience since 2004 implementing the Marine Life Protection Act (MLPA): a clear focus on achievable results within specified time periods, reasonable processes, and effective leadership have provided the basis for decision making by the Commission and movement to implement that statute.

This report makes six basic recommendations:

1. Develop an effective management plan for living marine resources, considering the MLMA as one tool among those available.
2. Adapt current institutions and policies for greater success within available resources.
3. Ensure adequate institutional and policy authority and capacity to achieve the goal of sustainable use of living marine resources.
4. Improve management of living marine resources by incremental steps that are feasible given limited resources.
5. Systematically increase the scientific knowledge base available to inform management of living marine resources.
6. Systematically increase the understanding of available institutions, policies and tools to inform management of living marine resources.

A priority order and time frames for these recommendations are provided in Figure A below. Figure A also includes information about which public entity should initiate action and identifies possible needs for new legislative authority. In most cases, it appears that sufficient authority exists to act on the recommendations but that some "clean up" or further elaboration of authority may be needed in the future. The Figure A summary is provided as an overview and should be understood, considered, and acted upon in the context of the analysis and discussion in the full report.

A high priority should be placed on effectively using the existing authority of the Commission in light of resource limitations. Where possible, the capacity of the Commission to meet its responsibilities in a timely and effective manner should be increased. Given the small size of the Commission staff, modest increases in available resources can

have large impacts. Earliest attention should be directed to (1) ensuring that proposed decisions are brought to the Commission with needed available scientific and other information, and (2) managing relationships with stakeholders. This recommendation encompasses the capacity of the Commission's Marine Resources Committee.

Importantly, Californians express strong support for effective management of marine resources. In 2003, a very large majority (88 percent) of Californians said the condition of oceans and beaches was personally important to them and 60 percent said it was *very* important.[7] This reservoir of public support for effective management of living marine resources has not been tapped to provide needed fiscal, staffing and political support for policies in this arena. Clear, transparent discourse about the progress, and the challenges, of managing living marine resources is the best strategy with which to mobilize public support. Public perception that all is well, or that crises follow crises without effective public action, would be neither accurate nor likely to yield long-term support needed for effective management.

Figure A: Summary list of recommendations, priority, time frames, and identification of responsible public entities

Number	Recommendation	Priority	Time frame (start-end)	Public entity which initiates	Possible need for new legislation
1	**Develop a basic, practical management plan for living marine resources, considering the MLMA as one tool among those available.**	1	2010-2011	FGC	Over long-term, "clean-up" of existing law possibly useful but
2	**Adapt current institutions and policies for greater success within available resources**		2010-2013	DFG and FGC	May be required for full effectiveness
2A	The Commission should develop a policy that ensures the privilege of harvesting public trust resources carries an obligation to pay for the costs of collecting and analyzing data and the management actions needed for sustainable management.	1	2010-2012	DFG and FGC	Appears consistent with MLMA
2B	DFG should take the initiative to develop pilot projects in collaborative data gathering and other aspects of fishery management with willing fishers as a step toward developing the necessary trust and respect.	2	2011-2013	DFG	Possible future need
2C	Redirect resources devoted to individual fishing permit	3	2010-2013	DFG and FGC	Possible need if clear

[7] Public Policy Institute of California. *It's a Beach State … of Mind: Despite Tumultuous Times, California's Golden Coast Still Captures Hearts*. San Francisco. PPIC. November 2003.

Number	Recommendation	Priority	Time frame (start-end)	Public entity which initiates	Possible need for new legislation
	issues.				barriers are identified
2D	Continue and complete conversion to electronic record keeping for all fisheries data.	3	2010-2013	DFG	Possible need if clear barriers are identified
3	**Ensure adequate institutional and policy authority and capacity to successfully achieve the goal of sustainable use of living marine resources.**		2010-2013		
3A	Improve the capacity of the Commission and focus its work on broader policy and management roles and away from individual resource user actions.	1	2010-2012	FGC	Selected items recommended for consideration in this report
3B	The Legislature should transfer full authority for interpretation of marine fishery management legislation and management of state fisheries to the FGC [and DFG] or other policy making body. The Legislature should not hear appeals from individual fishery groups, either recreational or commercial, for legislation to "fix" their specific problems.	2	2011-2012	Legislature	Yes
4	**Improve management of living marine resources by incremental steps feasible with limited resources.**				
4A	Balance management actions and data collection, giving priority to management action, but structure management processes to increase information about living marine resources, effectively moving to "Fishery Management *and Information Plans*."	1	2010-2012	FGC and DFG	Not at this time
4B	Set a clear timetable and specify the resources necessary to gather Essential Fishery Information (EFI.	2	2011-2013	DFG	Not at this time
4C	DFG (in collaboration with the OPC and the FGC) should organize a series of workshops offered by academics and practitioners knowledgeable about effectively incorporating science and information and new policy tools into fisheries management.	3	2012-2013	DFG, FGC, and OPC	Not at this time
4D	DFG and the FGC should clearly articulate policy regarding MPAs and fisheries.	2	2011-2013	FGC and DFG	Possible need but current laws appear to offer reasonable foundation

Number	Recommendation	Priority	Time frame (start-end)	Public entity which initiates	Possible need for new legislation
4E	Clarify the Ecosystem Based Management model and how it relates to EFI, habitat protection/restoration, and fishery management.	1	2010-2013	DFG	Not at this time
5	**Systematically increase scientific knowledge available to inform management of living marine resources.**				
5A	Continue the policy of peer review of FMPs and other important management actions	2	2011-2013	DFG	Not at this time
5B	Improve the stature of DFG as an organization that runs on a foundation of good science to enhance its credibility as a management organization.	3	2012-2013	DFG, possibly with support of OPC	Possible need for re-sources
5C	Identify science topics which could inform policy making and management and organize workshops, symposia or other vehicles to assess and make available understanding usable to policy makers and managers.	1	2010-2013	FGC/DFG/OPC	Not at this time
6	**Systematically increase the understanding of available institutions, policies and tools to inform management of living marine resources.**				
6A	Develop processes to systematically collect, assess, and apply knowledge about institutions, policies and management tools relevant to California living marine resources.	2	2011-2013	OPC, DFG and FGC	Not at this time
6B	DFG should convene an advisory committee of social scientists, including economists and social anthropologists, to develop a strategy and a plan for defining essential socioeconomic information and how it can be used in management of fisheries.	3	2012-2013	DFG, with possible support of OPC	Possibly needed to ensure resources

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Credits for cover photographs:

Lobster pull: Matt Kay and Sam Shrout, taken at Santa Rosa Island

Blue rockfish in kelp: Curt Degler, taken at Bluefish Cove, Point Lobos

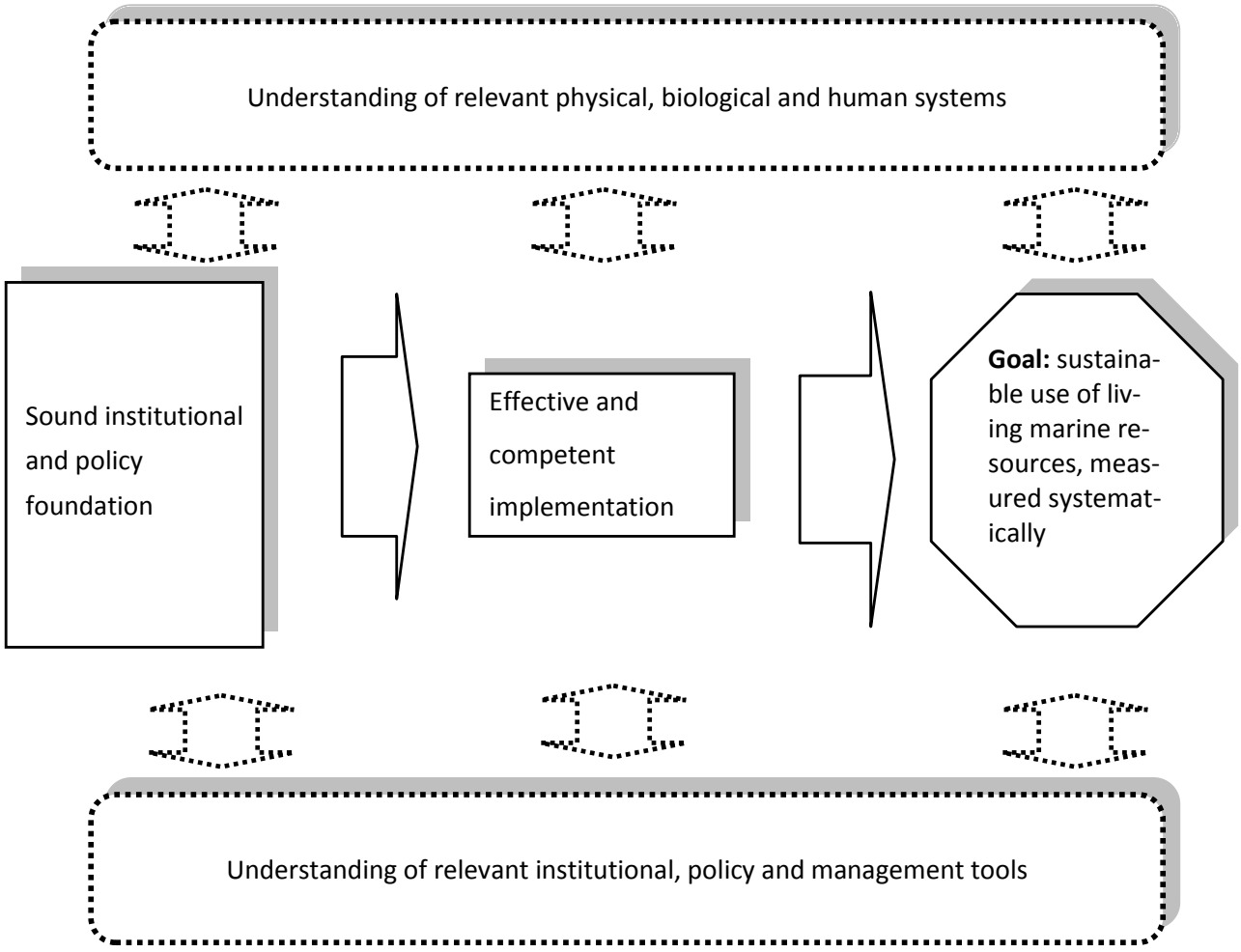
Sheephead: Ben Troxell, taken at Channel Island

A Framework For Managing Living Marine Resources

California's Marine Life Management Act (MLMA or the Act) of 1998 is intended to profoundly change management of California's diverse fisheries and other marine resources. This is a difficult task. The underlying natural systems are complex and changing. The responsibility for managing marine resources is fragmented among many agencies, which operate in multiple policy arenas. Stakeholders—recreational fishermen, commercial fishermen, boaters, SCUBA divers, environmental groups, ordinary citizens and many others—often have an active interest in a narrow range of marine resources: a specific species, location, or use of the ocean. Sometimes these interests are in conflict, with some users wanting to harvest a resource while others preferring to minimize extractive uses.

Policy makers and managers will benefit from an effective, simple framework within which to understand their work. Such a framework can also inform interactions with legislators, the governor, stakeholders and interested parties. A basic framework also provides an organizing approach to evaluation, lessons learned, and recommendations. Figure 1 shows the elements of such a framework.

Figure 1. Framework for effective management of living marine resources



The MLMA, together with other state and federal legislation, establishes a management goal: sustainable use of living marine resources, shown on the center-right of Figure 1.[8] A clear goal is critical to effective policy implementation. If there is no agreement about the goal, any policy usually succeeds in doing something of value to some interest group and fails by not meeting the expectations of others. It is critical to measure systematically the progress towards the goal. Success can motivate additional effort. Failure can be analyzed and provide insights into needed changes in institutions, policies or implementation activities.

At the core of this framework – to the left of the goal – are two factors that policy makers and managers can control to some degree: (1) institutions and policies, and (2) effectiveness and capacity for implementing policies. Institutions and policies should be "sound," meaning that they are designed to achieve desired goals in most foreseeable conditions. Implementation should be "effective," meaning that agencies utilize policy tools in a way that has impact, and use management tools to measure that impact. It should also be "competent," meaning that agencies have the capacity to execute policies effectively.[9]

As explained in more detail below, the MLMA defines the responsibilities of key agencies and sets policy goals and procedures, but it pays little attention to ensuring that these institutions have the capacity required for effective implementation of these policies. As a result of this weakness in institutional design, specific initial milestones required by the MLMA have been completed, but the extensive development of Fishery Management Plans (FMPs) anticipated by some to result from passage of the MLMA has not occurred.

Improving knowledge and employing it to support the management goal is also important. Figure 1 identifies two "knowledge factors": (1) understanding of relevant physical, biological and human systems and (2) understanding of relevant institutional, policy and management tools. These factors are "outside" in the sense that information is developed and shared not only by state agencies and legislators but also by fishermen, scientists, advocacy groups, academic institutions, private foundations, and others. The management system can integrate knowledge effectively only if agencies work smoothly with the institutions and individuals who do not have formal responsibilities for putting policies in place and making them work.[10]

[8] In comments submitted in response to the draft of this report, legal counsel for the Department offered a narrower reading of the MLMA's scope: "[M]anagement of marine living resources is outside the scope of the MLMA, whose goal is management of sustainable fishery resources (FGC §§7056, 7070)." While this reading may be preferred by the Department in order to simplify its management under the MLMA, a broader reading of the Legislature's vision is consistent with the FGC provisions cited by counsel as well as other MLMA sections and the legislative history. Apart from the two FGC sections just noted the Department did not identify any legal precedent for its narrow reading of the MLMA. Readers are encouraged to review the statute and draw their own conclusions. This report is not a legal opinion.

[9] "Competence" in this framework refers broadly to institutional capacity and not to job performance of Marine Region personnel.

[10] This is not a unique problem in state resource management. A recent report by the Public Policy Institute of California entitled "California Water Myths" identifies a similar challenge facing water policy makers (p.3).

For example, the understanding of life cycles of rock fish or of the effects of human settlement near coasts is relevant to sustainable use of living marine resources. That understanding develops in universities, among stakeholders, and in agencies with other missions, as well as among DFG scientists and other staff directly engaged in this policy arena. Knowledge about relevant institutional, policy, and management tools similarly develops outside DFG. Examples include learning about effective support for those charged with policy making (such as the Fish and Game Commission) or development of policies and management approaches that engage user communities in achieving desired policy objectives. “Catch shares” proposals are an example of an idea originating outside government agencies – in universities and think tanks – intended to encourage users of natural resources to behave as “owners” with personal stakes in sustainable use. California policy makers need to know about such proposals and assess their usefulness for California’s goal of sustainability.

Figure 2 summarizes the current status of the marine management framework elements illustrated in Figure 1 above as a preview of the analysis and “lessons learned” that follow.

Figure 2. Summary of California’s current capacity for management of living marine resources

Model Element	Current situation
Sound institutions	Policy making fragmented among legislature, FGC, and federal agencies. DFG has multiple, conflicting missions. OPC touches large number of marine resource issues, but has weak linkage to policy making regarding living marine resources. Overall, weak, given challenges in managing public trust resources.
Sound policies	Broad suite of policy tools available, a positive feature. However, few policy tools give affected parties incentives to achieve policy goals. MLMA includes detailed prescriptions as well as broad themes, leading to tension regarding effective implementation. MLMA lacks accountability mechanisms or guidelines for measurement of progress, e.g., "bringing 80% of fished species to moderate data status by 2012".
Competent and effective implementation	Challenges inherent in weak institutions, multiple missions, and limited resources. FGC has very limited resources available and DFG funding is erratic; one consequence is that both FGC and DFG lack critical capacity. Overall, largely responsive to direct legislative direction with a tendency toward narrowly focused actions. Weak management frameworks for measurement of progress, adaptation, and accountability.
Understanding of relevant physi-	Capabilities to generate information dispersed among DFG, uni-

cal, biological and human systems	versities, agencies, resource users and others with DFG science capacity relatively limited. Little institutional capacity to organize available information to effectively support policy making and resource management.
Understanding of relevant institutional, policy and management tools	Capabilities to generate information dispersed among universities, agencies, resource users and others, which is appropriate. No systematic attention within California public agencies to bring this information into policy making and management.
Sustainable use of living marine resources, measured systematically	Understanding progress toward sustainability limited by lack of systematic assessment or evaluation of the status of many species and associated ecosystems.

The balance of this report analyzes lessons learned and offers recommendations linked to these elements. *The broad lesson is that California's system for managing living marine resources is hampered by weaknesses that must be addressed to improve prospects for achieving the MLMA goal of long-term sustainability.*[11]

Institutional and Policy Foundation

This section focuses on "soundness." The first topic is the soundness of California's institutional foundation for implementing the MLMA, with a particular focus on fragmentation of authority. The second topic is the soundness of policy: tools, incentives, accountability mechanisms, and guidance for measuring progress.

Fragmented institutions and multiple policies

Management of California's living marine resources is fragmented and complex. Ocean resources are considered public trust resources and are managed for the benefit of all citizens.[12] States grant the public the right to fish, but have a duty to protect and preserve ocean resources.[13] Management of marine fisheries in the United States involves three basic jurisdictions: federal, state, and international. Because fish populations often overlap jurisdictions,

[11] It is useful to repeat here the message in Note 2: none of the comments on the draft report disagreed with this basic lesson, with the exception of the Department's.

[12] *See, e.g., Martin v. Waddell's Lessee* 41 U.S 367 (1842) which affirmed the public's right in fisheries resources. *People v. Weeren,* (1980) 26 Cal.3d 654, 661 applies California law to marine waters. Arnold v. Mundy, 6 N.J. L. 1 (N.J. 1821), a New Jersey case is illustrative of other states similar approaches, where the court found a landowner may not stop others from gathering oysters. For treatment of public trust, see *Audubon* 33 Cal3d 419, 658 P.2d 709 (1983*)* a case which required preservation of inland fisheries resources on public trust grounds. A general review of public trust, coastal states and fishery management, is available in *Ocean and Coastal Law and Policy*, American Bar Association 2007, at 52-53. One commenter suggested that ocean resources technically are not "open to access by all citizens" because the state actually limits access, e.g., through the Commission's Restricted Access policy.

[13] Coastal States Organization, "Putting the Public Trust Doctrine to Work: the Application of the Public Trust Doctrine to the Management of the Lands, Waters, and Living Resources of the Coastal States," [2d ed. 1997] at 17-18.

management is shared among states, between the federal government and the states, or between the federal government and other countries through bilateral or multilateral agreements. For example, vessels fishing for tuna in the deep ocean off California's coast may be governed by an international agreement administered by the Inter-American Tropical Tuna Commission. Vessels targeting herring or sardines beyond state waters are governed by federal regulations. Nearshore fisheries like squid and crab may come under state or federal regulation, while inshore shellfish harvest is entirely under state regulation.

The institutional structure of fisheries management was complex before passage of the MLMA in 1998, was not made simpler by that Act, and remains very complex.[14] The challenges of sorting out authorities of the Commission, the Department, and the Legislature are significant; these challenges are further complicated by the authority of the State in relation to that of the federal government. Figure 3 shows the most important state and federal policy actions affecting fisheries in state waters since the 1990s, alongside key points in the passage and implementation of the MLMA. At almost every key decision point for the MLMA, a federal agency or another state agency was taking action that was integrally connected with the Department's implementation of the MLMA.

[14] See the Master Plan flow chart in Figure 4 below for a visual depiction of a multiyear process to adopt a FMP. The DFG and FGC advise that this flow chart is inaccurate; an update is needed to more accurately depict the FMP process. Commenters on the draft report noted the absence of a California Environmental Quality Act and regulatory track.

Figure 3: Timeline of fisheries related events, 1990s-present

California			Federal
MLMA Events	Other		
	• Limited access in various fisheries prior to 1994-95	1994-95	• SALMON DISASTER DECLARATIONS: U.S. Dept. of Commerce declares federal fishery disaster, enabling release of emergency disaster relief assistance. 5/26/1994 FR doc 94-22078 (Sept. 2, 2994); Aug. 2, 1995; 61 Fed Reg. 17879-17881 (April 23, 1996)
		1996	• MAJOR REFORMS: Passage of Sustainable Fisheries Act. Reauthorization of Magnuson Fishery Conservation and Management Act. 96 Pub. L. 561, 94 Stat. 3275
• Abalone closure		1997	• California salmon listed as endangered/threatened (62 Fed. Reg. 3308 (Jun. 18,1997)
• Legislature passes MLMA AB1241		1998	
	• Legislature passes MLPA • FGC Policy on Restricted Access	1999	
		2000	• PACIFIC GROUNDFISH DISASTER: Declaration of federal fishery disaster in west coast groundfish. The Secretary of Commerce announced the determination of a commercial fishery failure on January 19, 2000.
• First Status of fisheries published as California's Living Marine Resources: A status report • Master Plan		2001	
• White Seabass FMP • Nearshore FMP	• Channel Islands Marine Protected Areas adopted	2002	
• Status report updated with additional species		2003	• Pacific Council incorporates California Rockfish Closure Area, with modifications, into federal area closures to protect groundfish.
• Market squid FMP adopted 2004	• Ocean Protection Council created. Public Resources Code 35600-35625	2004	
	• ARMP adopted	2005	
• Status Updates & State of Fisheries		2006	• Magnuson Stevens Reauthorization Act: California, Oregon and Washington delegated authority to manage Dungeness crab. 104 Pub. L. 208
	• Central Coast MLPA package adopted	2007	
• MLMA Lite (AB 2532) Vetoed	• Dungeness Crab Task Force (SB 1690) created by Legislature, August 2008.	2008	• Secretary of Commerce announces Salmon disaster declaration November 2008, continued in 2009
		2009	• Amendments to WC groundfish plan by PFMC; stocks rebuilding; quota program adopted. 74 Fed Reg 9874 (March 6, 2009)

The MLMA captured the prevailing philosophical direction in analyses of fisheries management at the time of its passage. It is beyond dispute that fishery management is changing within and outside California, and this should be acknowledged and even celebrated. Key changes in California since the MLMA include a greater emphasis on data-driven decision making and science, some evidence of precaution in management, a greater appreciation for the contributions of fishery participants and others to management, development of fishery management plans (FMPs) required by the legislation, development of a Master Plan, and improved reporting on the status of the state's fisheries. While difficult to measure according to a single yardstick, interviews suggest these changes are clearly linked to passage and implementation of the MLMA. That said, these changes represent a beginning phase also characterized by increased appreciation of what is not in the MLMA, including clear direction about how to address the basic lack of Essential Fishery Information (EFI) for most of the state's fisheries.

Passage and Implementation of California's Marine Life Management Act, released earlier in this project[15], describes the complex relationship between federal law, primarily the 1996 Sustainable Fisheries Act (SFA), and the MLMA. On balance it appears the MLMA is consistent with the core goals and objectives of the SFA, including 2006 amendments aimed at reducing by-catch. A number of California's high-value fisheries are managed either wholly or partially under the SFA. California appears to benefit from stock assessments and other data-gathering and analysis conducted with federal resources, and the Pacific Fishery Management Council, or PFMC, provides one forum for public engagement that is consistent with MLMA objectives. According to interviews, the PFMC, like California, has made very little progress toward effectively integrating ecosystem-based management, or EBM, into its management approach, which remains tilted toward harvest and single-species analysis.[16] Nonetheless, California derives benefits from the federal fisheries management framework, particularly from federal resources devoted to data-gathering that can assist in improving EFI. Federal-state interactions overall appear to support effective marine policy integration and resource stewardship.

In this context of fragmentation and complexity, putting the MLMA philosophy into operation has proved challenging for DFG, the FGC, fishery participants, and others interested in marine resource use and conservation. Figure 4 illustrates the multi-step process required to develop a FMP within California's regulatory system. Formal action by the Commission and then the Office of Administrative Law are controlled by statute as to form and schedule. The MLMA influences steps leading up to formal Commission action on FMPs, e.g., in the design of the policy, use of

[15] *See* Appendix A to this report: *Passage and Implementation of California's Marine Life Management Act*. July 15, 2009. Previously posted for public comment at: http://www.opc.ca.gov/webmaster/ftp/project_pages/mlmall/T1_draft

[16] The PFMC currently is working on a draft report on an Ecosystem Fishery Management Plan, according to a recent announcement. http://www.pcouncil.org/2010/04/8761/ecosystem-advisory-subpanel-meeting-may-4-2010/. More than one commenter on the draft report recommended that California not take the lead on this issue but rather follow the PFMC. Here is one example: "Rather than pursuing ecosystem management on its own, DFG may consider leveraging the Council's efforts by considering how ecosystem management concepts developed in that arena can be applied to California fisheries."

science, and stakeholder involvement, and in implementation phases. This regulatory complexity is not unique to California.

Figure 4: The FMP Development Process

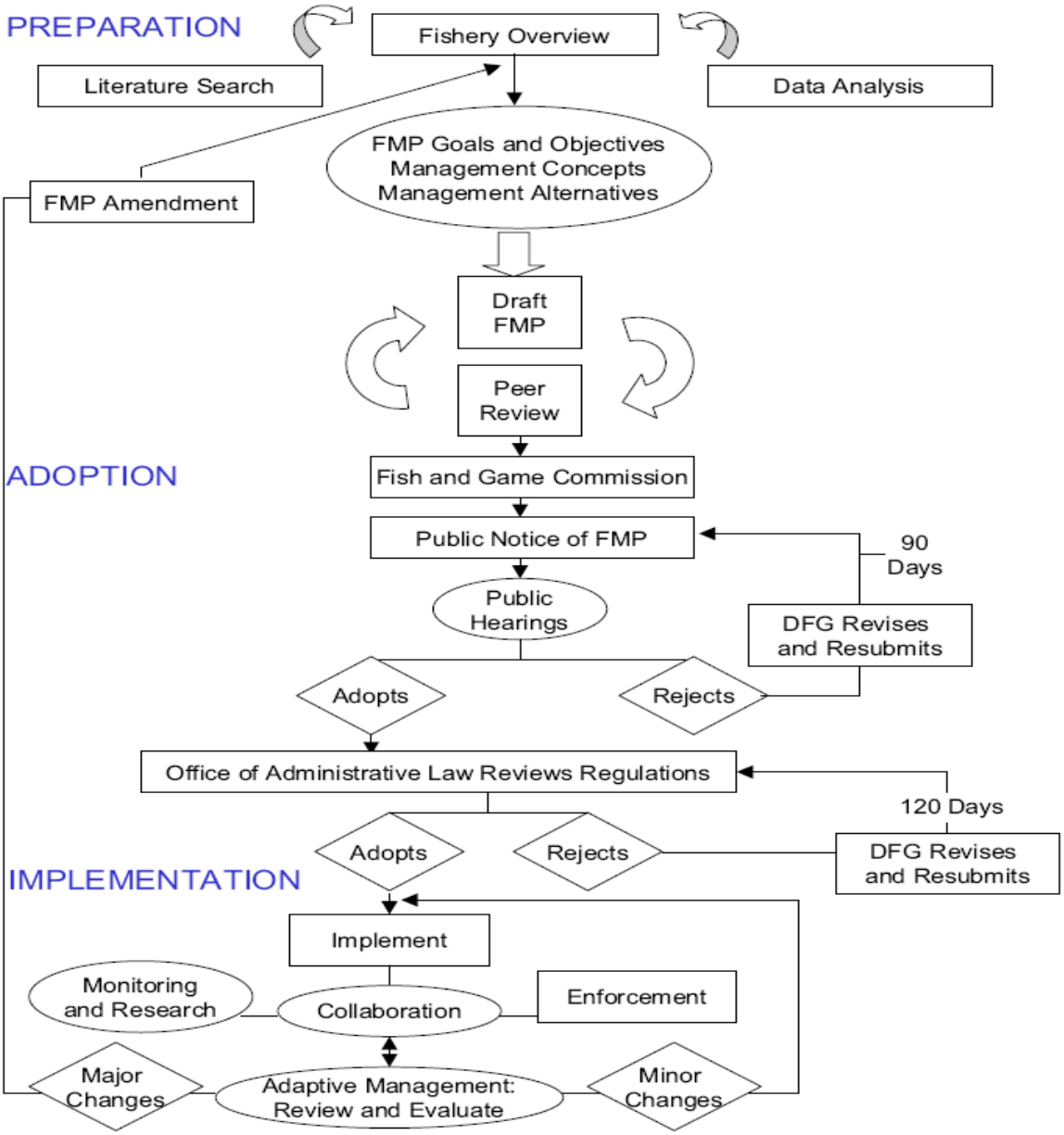


Figure 2-1. Diagram of fishery management plan (FMP) preparation, adoption, and implementation stages.
DFG = Department of Fish and Game

Source for diagram: Master Plan. Both DFG and FGC acknowledge that this diagram should be updated to reflect current practices, including the regulatory process. The project team received multiple suggestions that require discussion and resolution as part of any update.

Both the Commission and Legislature are attractive forums for interests seeking to influence fisheries management in California. The Commission can influence FMP development preceding formal adoption and during implementation through interaction with the Department, stakeholders and the public at its meetings. The Legislature can affect these processes in a variety of ways, including budget allocations, control language included in budget bills, oversight hearings, and new or amended statutes. Consistent with experience of such bodies in any area of public policy, interests affected by fisheries policies frequently seek relief from one or another dimension of the policies or some change that advances their perspective on how the policy should be structured or implemented. As a consequence, marine resources policy development in California often appears to be driven by legislative influence focused on single "problems" and not by the science-based approach mandated in the MLMA when the legislature looked at issues more broadly. The legislatively created Dungeness Crab Task Force is the latest example of a single, high-value fishery forcing a shift in Marine Region priorities, with inevitable impacts on overall staffing and resources. DFG management reportedly sought in late 2009 to control demands to support the Dungeness Crab Task Force by focusing its participation between formal Task Force meetings on responses to formal OPC data requests.[17]

Table 1 illustrates the resulting fragmentation in policy making patterns. It shows that MLMA-based FMPs are used to manage only three fisheries – white seabass, market squid, and 19 near-shore species. All other species in the top 20, ranked by commercial landed value, are managed directly by the Legislature or the Commission or by the federal PFMC. The implementation of these policies – the day to day management – falls largely to the Department.

The MLMA was designed to provide the foundation for all state management of living marine resources, but the fragmented structure of marine management and political pressures from narrowly focused stakeholder interests have prevented progress toward the broader ecosystem-based management that the MLMA directs.[18] Top DFG staff spend a significant portion of their management time working through the PFMC or with the Legislature and the Commission rather than through the Master Plan and MLMA-based FMPs.

The causes of this fragmentation can be traced back, in large measure, to the MLMA itself. The statute directs the Department and the Commission to adopt a multi-species, ecosystem-based approach for management of living marine resources, but the law does not include any deadlines, penalties, or other requirements that would force action that complies with MLMA goals. The statute also has limited practical scope, because it leaves in place most existing management policies and effectively exempts important fisheries from its provisions, including those managed by the Legislature. While the FGC can develop an FMP for legislatively managed species, doing so requires legislative approval.

[17] In 2009 the Legislature enacted AB 571 (Saldana), a program focused on a single commercial fishery: lobster. The bill was vetoed by the Governor. The veto message cited three concerns:

1. Increasing the cost of a commercial permit by almost 90%
2. The risk of driving some permittees out of the fishery due to increased costs, and
3. Imposing new mandates and obligations on DFG without adequate funding.

These concerns merit re-consideration in light of recommendations discussed later in this report.

[18] See DFG's narrower view of its responsibilities in Note 7.

Table 1: Management of California Commercial Fisheries

Fishery	Major management policies in place (date)	Rank by commercial landed value, in dollars, 2007	Rank by commercial landed value, 2007	Rank by commercial landing weight, 2007
White sea bass	MLMA FMP (2002)	$1,154,017	16	24
Near shore	MLMA FMP (2002)	$2,424,836		
Squid	MLMA FMP (2004); restricted access (2005)	$29,093,312	1	2
Abalone	Recovery and management plan (2005)	$0		nab
Crab, Dungeness	CA legislature. Vessel-based restricted access (1992)	$26,892,110	2	6
Sardine, Pacific	PFMC. Limited entry (1999); capacity goal (2003)	$8,218,158	3	1
Salmon, Chinook	CA legislature, PFMC; Restricted access (1983)	$7,835,240	4	12
Lobster, CA spiny	CA legislature, PFMC; Restricted access (1997)	$6,915,601	5	21
Sea urchins	FGC. Restricted access (1989). Effort reduction (1990)	$5,400,279	6	4
Sablefish	PFMC; FGC	$4,872,745	7	9
Swordfish	PFMC; FGC	$3,126,635	8	18
Prawn, spot	FGC	$2,879,716	9	34
Sole, Dover	PFMC; FGC	$2,376,031	10	7
Sole, Petrale	PFMC; FGC	$2,122,196	11	10
Anchovy, northern	PFMC. Limited entry (1999); capacity goal (2003)	$1,103,299	17	3
Mackerel, Chub	PFMC. Limited entry (1999); capacity goal (2003)	$788,915	20	5
Hake, Pacific (Whiting)	PFMC; FGC	$386,216	24	8
Herring	FGC. Sac-roe fishery limited access (1983)	$149,073	41	16

Sources: Commercial landed value and weight from the National Ocean Economics Program

Notes: No commercial take of abalone. Value for herring includes Pacific Herring and roe on kelp. Value of near shore species under NFMP is sum of 16 (of 19) species identified in National Ocean Economics Program data for 2007. Total weight was 533,321 pounds. Not included in ranks for value or weight as other entries are for single species.

Effective policy implementation depends on specific requirements, powers conferred, resources available, and remedies provided. The changes in legislative language as the MLMA was enacted resulted in a statute with limited explicit requirements, limited powers, no continuing provision of resources, and no remedies for failure to act. While the intent of the original AB 1241 could understandably be characterized as dramatically changing policies on use of California ocean resources, the MLMA as enacted was narrower in its aspirations. At least as importantly, some of the provisions of AB 1241 intended to achieve more effective policy making, such as establishing a "Marine Life Management Commission" with significant regulatory authority, or explicitly requiring use of a precautionary approach to manage fisheries, were removed before passage of the bill.[19]

As enacted, the tools the Department may use to meet the goals of MLMA are, at least arguably, discretionary. For example, the MLMA provides discretion to the Department in how and to what extent it conducts collaborative science, designs dispute resolution, promotes co-management, secures peer review, develops FMPs, identifies non-fishing sources of depressed fisheries, evaluates the management system, specifies measures to achieve sustainability, chooses the approach to manage emerging fisheries, and imposes fees. Additional flexibility was provided by amendments to the statute that extended deadlines for completion of mandatory elements.

While the Master Plan required by the MLMA specifies steps and processes for implementation, it ultimately can be no more forceful than the underlying statute.[20] And it is unrealistic to believe that the existence of any statute or planning document will easily alter the expression of stakeholder self-interest in policy processes.

[19] See *Passage and Implementation of California's Marine Life Management Act* pages 18-26 for discussion of provisions included at passage of the Marine Life Management Act.

[20] The Master Plan is not an effective *management plan*, although it is an important tool. Recommendation 1 in this report (see below) addresses the need for a clear management plan.

Lessons Learned

1. The MLMA has helped to foster broader understanding and observance of science-based, ecosystem-oriented, multi-species approaches to management of living marine resources. But the MLMA is not the sole force pushing for this way of doing business: other state legislation and federal law and policy are also significant factors.
2. Authority for making decisions about management of living marine resources in California remains fragmented. This fragmentation perpetuates single-species legislation, policy making, and management at odds with MLMA goals. It is disruptive of the science-based decision making intended to lead to FMPs based on prioritization. As long as this is the case, consistent policy making that promotes MLMA goals will be difficult to achieve.
3. The MLMA's lack of mechanisms for measurement of progress and accountability has contributed to a slowing of momentum and lack of progress in achieving core goals. The absence of such mechanisms leaves MLMA implementation as a discretionary set of choices for DFG and the FGC.

Effective and Competent Implementation

Competent and effective implementation of policies depends upon a number of factors. This section discusses progress in implementing major components of the MLMA and then moves to a discussion of factors that have hindered progress in recent years. These include institutional capacity, vision and strategy of implementation, and ability to access and make use of appropriate scientific and technical knowledge.

Implementation of the MLMA

Discussion of the implementation of the MLMA focuses first on use of the tools provided by the MLMA and then on stakeholder relationships.[21]

Using MLMA Tools

The MLMA mandated the preparation of three kinds of documents to guide management of living marine resources:

- Status Reports to describe the health of different fisheries and other resources
- A Master Plan to set priorities for and guide the preparation of Fishery Management Plans
- Fishery Management Plans

As described in the *Passage and Implementation of California's Marine Life Management Act*, there is no doubt

[21] The public draft of this report included an issue paper entitled "Science and the MLMA" as an appendix. That paper has been revised by its authors, Michael Healey and Ralph Larson, and submitted to the OPC as a separate product. Parts of that science paper are included in this report. Readers interested in the complete science issue paper should contact the OPC.

that the Department and Commission responded to MLMA directives to develop specific tools and products and use specific processes.[22] In particular:

1. DFG prepared an initial Status of Fisheries report in 2001 and updated it for some species in 2003 and 2006.
2. DFG developed a detailed Master Plan in 2001 that was responsive to the MLMA, and did it in a way that engaged external scientists, fishers, and other interested parties.
3. DFG developed, and the FGC adopted, three legislatively directed FMPs, one for white sea bass (WSB FMP, 2002), one for 19 nearshore species (NFMP, 2002) and one for market squid (MSFMP, 2004).

Both DFG and the Commission deserve credit for these accomplishments, which not only responded to the statute in significant ways but promoted the shift in California's approach to fisheries management mandated by the Legislature. There was a significant role for science, peer review was part of the process, DFG engaged outside experts, and there was extensive involvement of fishery participants and other interested stakeholders.

Since that initial burst of activity—and even enthusiasm—there have been no new FMPs. Interviews for this project identified diverse factors, with some external observers perceiving a critical loss of momentum. These different views are addressed below after a discussion of the Master Plan and of the three FMPs that have been completed so far.

Master Plan

The Master Plan is intended to serve as the overarching point of reference for all fisheries managed under the MLMA. It is intended to identify priority species for preparation of FMPs, describe data-gathering activities for marine fisheries and other activities needed to gather EFI, and identify an inclusive process for developing FMPs and research plans. DFG and the Marine Region devoted substantial resources to development of the Master Plan in 2001 and took steps to include constituent and outside scientific perspectives. The Master Plan has not been revised on the schedule specified in §7.2 of the plan itself: four years after adoption, and thereafter every four years unless more frequent review is appropriate.[23] The Marine Region has committed resources to a revision but it is still under development.

There is conflicting evidence about the impact of the Master Plan since its adoption. The *Passage and Implementation of California's Marine Life Management Act* raises questions about whether it was developed in time to influence the NFMP in any significant way. And there is some evidence that the Master Plan has unintentionally served as a barrier to the development of FMPs due to a perceived lack of flexibility in its interpretation of the MLMA.

Other concerns about the Master Plan are that:

1. The Master Plan does not include a management framework to address lack of EFI. As described in the Master Plan, FMPs are linked directly to the availability of EFI that is lacking for most of the state's fisheries. While there are tools available to manage fisheries, e.g., gear types, bag limits, and restricted access, there is no clear process

[22] DFG management generally interprets the MLMA as a philosophy. See Appendix 1, pp. 23-25.
[23] Appendix 1, p. 32. The MLMA does not specify a schedule for updating the Master Plan in §7073.

for precautionary management in the absence of EFI or for data-gathering to improve understanding and better conform to MLMA goals.

2. The Master Plan states that California is committed to and is moving toward EBM but does not specify what this means. FMPs are to include ecosystem guidelines but these are left to be decided in the context of each plan. The WSB FMP and NFMP both mention the importance of ecosystems but lack any framework for management actions or description of the role of EFI.

3. The Master Plan contains a description of adaptive management that is potentially useful, but offers no guidance about how adaptive management could or should be integrated into fishery management.[24]

4. The Master Plan does not integrate socioeconomic considerations into fishery management.

5. The Master Plan has been interpreted by DFG as presenting a single model for FMP preparation that highlights process detail over flexibility and adaptability. DFG consistently highlights information that "must" be in an FMP based on the Master Plan interpretation of the MLMA.[25]

Fishery Management Plans

FMPs are at the heart of the MLMA's approach to fisheries management. There have been some disappointments associated with the FMPs that have been adopted so far, as well as some steps toward precautionary management given the lack of EFI.[26]

The adopted Market Squid FMP was a response to legislative direction and not the Master Plan system of fisheries prioritization. The Commission's process for adopting the Market Squid FMP, and its final content that eliminated capacity limits, raise questions about whether California truly has shifted from a short-term, harvest-based perspective to a long-term, sustainability perspective.

Developing and implementing the NFMP is estimated by DFG to have cost over $10 million. Clearly $10 million for any future FMP is very difficult to accommodate in California's current and likely future fiscal environment. It is not clear just how to allocate these cost estimates across different FMP process components, e.g., DFG staff time, data gathering, science, and public engagement.[27] .

Significant components of the NFMP have not been implemented, undermining its effectiveness. This FMP was destined to be difficult to develop and implement because of the biological, economic, and sociological complexity of the fishery. Regional management and comparison of species dynamics inside and outside marine reserves were key components of the FMP. However, DFG has not implemented regional management, reportedly due to cost concerns, and intended reserve/non-reserve comparisons await establishment and management of MPAs under the Marine Life

[24] See Appendix 1, pp. 2-5

[25] Some interviews for this project suggested that concern over possible litigation for taking a different approach contributes to resistance. A foundation for this concern is difficult to ascertain in the MLMA, however, as it does not contain any citizen suit provision.

[26] The WSB FMP and NFMP are discussed extensively in Appendix 1.

[27] The Master Plan suggests public engagement is 5% of total costs.

Protection Act. Relevant data monitoring plans are being developed by the MPA Monitoring Enterprise, in cooperation with the DFG. Nearshore fishery management appears to be drifting away from the NFMP vision, while increasing pressure from recreational fisheries is challenging fundamental plan assumptions. In the view of some, the NFMP promised something it could not deliver in the near term and is unlikely to deliver in the next decade. This inability to deliver, and the cost of the plan, has contributed to resistance to doing more FMPs according to interviews with DFG staff.

What fishery management tools are used?

The fact that only three FMPs have been completed, all required specifically by legislation, has been a principal source of frustration about the MLMA's first decade.[28] The first decade of management since passage of the MLMA has been characterized primarily by continued use of already existing conventional measures regarding gear, seasons and sizes. Though the conventional measures used to manage many of California's fisheries arguably contribute to sustainability, they do not reflect a consistent and clear commitment to precautionary management in the spirit of the MLMA. In particular, they do not establish reliable catch limits that include a margin for error or uncertainty. Some fisheries remain under *ad hoc* frameworks devised in the Legislature, and are effectively shielded from DFG and FGC management actions under the MLMA. It is notable that the best examples of precautionary management approaches appear to be in those fisheries for which DFG developed FMPs.

Table 2 shows the management tools used in fisheries managed by the state, plus Dungeness crab and halibut, currently managed by the Legislature. Conventional tools remain dominant, and the limited use of annual catch limits merits attention.

[28] Another view is that the MLMA has generated only two full FMPs, as the WSB FMP was largely based on a pre-existing plan.

Table 2. Management tools used in state-managed fisheries.

Fishery	FMP (or similar)	Abundance estimate	Annual catch limit	Plan to acquire EFI	Management measures	Effort limitations	Restricted Access or Limited Entry
Abalone	Y (ARMP)	Y	Y	Y	Closures, area management	Y	Y
Dungeness crab (legislature manages)	**N**	Y	N	(Task Force)	Size, sex, season	Not yet	Y
Hagfish	**N**	**N**	N	N	Gear restrictions	N	N
Halibut (legislature manages)	**N**	Stock assess-ment 2009	N	Y	Size, area, gear restrictions; season	N	Y
Market squid	Y	**N**	N	?	Season, area, lights, vessels	Y	Y
Nearshore fisheries	Y	**Y**	Y	Y	Control rule, area management, gear re-strictions	Y	Y
Nearshore sharks and rays	N	N	N	N	Rec fishery measures generally; some spe-cies included in NFMP	N	N
Pacific herring	N	Y	Y	Y	Area closures, gear and area restrictions, recent TAC	N	Y
Sea basses[29]	N	N	N	N	Various: see note.	N	N
Sea Cucumbers	N	N	N	Y	Landings reporting	N	N
Sea urchin	N	N	N	Y	Size limits; no catch allowed Friday, Sat, Sunday (June – Oct) 120.7(l)	N	Y
Spiny lobster	N	Collaborative research	N	Y	Catch reporting, seasons, size	N	Y
Surf perches	N	N	N	N	N	N	N
White seabass	Y	Y	Y	Y	Trigger, season, size, gear	N	?

[29] Numerous basses are found in California waters including kelp bass, sand bass, spotted bass, white seabass, striped bass, barred bass, spotted sand bass and giant (black) seabass. Taking of giant (black) seabass is prohibited in both sport and recreational fisheries. White seabass are managed under an FMP that provides recreational measures and a bycatch-only take by commercial vessels. Striped bass have a recreational catch limit and size limit in some areas. Some bass species may come under measures of the NFMP. Recreational fishing regulations include some species-specific time/area closures and size limits.

The MLMA does not call for DFG to develop FMPs for all state species—over 140—on a schedule. It leaves to DFG and the Master Plan decision making on a list of priority species in need of FMPs to achieve conservation goals in the statute. The Master Plan includes a prioritized list of anticipated FMPs, including sea urchins, California halibut, and nearshore sharks and rays. But none of these three species has an FMP, and it appears that other, non-prioritized species are more likely to see FMPs (with the possible exception of California halibut).

DFG has engaged in many activities that would be part of an effort to write one or more additional FMPs. It has:

- supported efforts to gather data that could lead to renewal of a commercial abalone fishery at San Miguel Island. The Department did prepare a noteworthy Abalone Recovery and Management Plan, but it is not an FMP, despite what appears to be a robust research program and progress toward achieving population targets.
- prepared annual regulatory decision-making materials and a framework for Pacific herring; these materials have been characterized by DFG as an "interim FMP."
- participated in the San Diego Sea Urchin Project, an initiative of the San Diego Watermen's Association.[30]
- worked with advocates for a pilot project to develop a Spiny Lobster FMP using external resources.
- supported the Dungeness Crab Task Force (in response to legislative direction), which reportedly is considering recommendations for an FMP.

DFG personnel also are involved in other data-gathering, monitoring, and research activities that may have connection with MLMA goals and objectives.

DFG has understandably addressed the MLMA's explicit requirements but has not made these other goals and objectives a management priority or developed a clear framework and schedule for achieving progress (see earlier discussion). It appears that the basic strategy was, in part, to address these objectives through individual FMPs; the lack of FMPs points out a problem with this strategy. One explanation for any reduction in attention to preparing more FMPs is that without clear directives and with limited funding and staffing, other program needs gain priority. Unlike requirements to develop the Master Plan or NFMP, there is no explicit legislative deadline associated with objectives such as protection of marine resource habitat, or adoption of adaptive EBM, and there is no significant consequence for failing to demonstrate progress.[31] There is no evidence of either an effective internal champion or external advocate for these broader legislative objectives at this time.

The current effort to develop a FMP for the spiny lobster fishery, where the issue is more allocation of catch among competing users than sustainability, illustrates some of these challenges in finding funds. A recent press release issued by DFG stated:

> *The state's current budget crisis presents both a challenge and an opportunity in moving forward with the preparation of an FMP. DFG does not have the resources to prepare an FMP and carry out the*

[30] There is also a sea urchin initiative supported by the Commercial Fishermen of Santa Barbara to address the shortage of data for that fishery.
[31] Appendix 1.

necessary meetings for constituents to contribute to the plan. Because it is uncertain if and when the budget situation will improve, DFG will be trying a new partnership-based approach. DFG is seeking outside funding as well as qualified partners to provide physical help and logistical support. This concept of an exploratory phase has not been used by the department for previous FMPs. If sufficient outside help is not obtained, DFG will not proceed with developing the FMP.[32]

New and Emerging Fisheries

According to FGC §§ 7850 and 8140, all fish may be taken at any time for commercial fishing purposes by holders of a commercial fishing license unless otherwise restricted by state or federal laws or regulations adopted pursuant to those laws (e.g., gear types, bag limits, seasons, access).[33] This language allows commercial harvest of unregulated species either directly or as incidental catch. The MLMA, however, contains specific language calling for "proactive management" of new and emerging fisheries in §7090(b) and the Commission adopted criteria for identifying an emerging fishery in 2000.[34]

One example is Kellet's whelk, which can be harvested directly by divers and is one of several species that can be taken incidentally in traps for rock crab and lobster. The Marine Resources Committee of the Commission addressed issues related to rock crab and Kellet's whelk during 2009. These discussions were largely species-specific, but highlighted some of the deeply held values among fishers about access to fisheries as well as challenges facing DFG and the FGC in fulfilling their statutory obligations.

Three points merit attention:

1. The MLMA contains language directing the Department to monitor landings and other relevant factors and notify the Commission about each emerging fishery. However, the statute leaves it to the Commission to decide whether to adopt regulations or direct preparation of an FMP, i.e., "may do either, or both, of the following . . ." in §7090(d) (see below). This approach appears inconsistent with the limited capacity of the Commission.

2. New and emerging fisheries are, in general, data poor and will not meet DFG's current "single model" requirements for FMPs. If such fisheries are allowed to develop (see next bullet), *ad hoc* management is one possible path based on precedent. An alternative, consistent with recommendations in this report, would be to develop

[32] DFG News Release, August 17, 2009.

[33] FGC §8140: *All fish, the taking of which is not otherwise restricted for commercial purposes, by state or federal law or any regulations adopted pursuant to those laws, may be taken at any time for commercial purposes*. This section of the Code was amended by the MLMA.

[34] *It is the policy of the California Fish and Game Commission that: The following criteria shall be utilized by the Department to determine if a fishery qualifies as an "Emerging Fishery" in accordance with Section 7090, Fish and Game Code: (1) The fishery is not a previously established fishery as determined by criteria set forth in Section 7090(b)(2), Fish and Game Code; and (2) The Director shall have determined that the fishery has recently exhibited trends which will result in an increase in landings, an increase in the number of participants, or which may jeopardize a stable fishery. In making this determination, the Director shall consider, but not be limited to, an actual increase in landings of the species in question; an increase in the number of applications for experimental gear permits received by the Commission for this fishery; an increase in the amount or efficiency of the gear used in the fishery; or any evidence that the existing regulations are not sufficient to insure a stable, sustainable fishery.* (Adopted 10/20/00)

management approaches that focus on improving information about each such fishery over time, beginning with a baseline. Depending on basic policy choices that could be reflected in a revised Master Plan, a step may be to develop explicit precautionary interim management regulations that allow limited harvest and focus on collaborative data gathering to support future FMP development. As noted, the MLMA directs the Department to notify the Commission of an emerging fishery; the Commission is authorized to adopt short-term regulations [up to 12 months], direct preparation of an FMP that includes a three-year evaluation period, or both. The 12-month limitation appears unrealistic under current circumstances, including resource constraints.

3. There is no question that the public currently subsidizes a portion of the total management costs, including enforcement, for commercial fisheries in the state. The state's budget crisis and cost of managing existing fisheries provokes the question whether creating new management costs associated with emerging fisheries is good policy. The MLMA goal of sustainability based on sound information, coupled with the costs of fishery management, raises the question: Who should pay for the costs associated with managing any new or emerging fishery? MLMA §7090(f) authorizes the Commission to impose a fee on an emerging fishery to cover implementation costs, which appears to signal a clear legislative choice.

Measured against its overall goal of sustainable management of fisheries, the MLMA cannot be judged to be successful for three reasons:

1. While some species appear to be managed sustainably, decreasing catch levels suggest others may be in decline (e.g., market squid) and for too many species there is not enough information available to make a sound judgment that they are managed sustainably. For example, a 2008 assessment of 149 species found landing data for 91 percent, but size composition for 60 percent, age composition for 22 percent and stock assessments for 31 percent.
2. Only three of the more than 100 California fisheries are managed under FMPs with a goal of sustainable use and only a few more FMPs are now under consideration.[35]
3. Where information about the status of species is weak (data-poor), state management is *ad hoc* and does not consistently and effectively use precautionary approaches; this raises questions about the capacity of DFG and the Commission to develop and implement programs, plans and measures that avoid over- exploitation.

In short, current evidence of sustainable management of specific species is mixed, current practices do not provide information on which to make robust judgments on overall sustainable management, the process of improving management is slow and halting, and precautionary approaches are not being used consistently to avoid over-exploitation.[36]

[35]Development of an FMP for herring has been underway for two years. The Department has requested participation from external partners to prepare a Spiny Lobster FMP beginning in 2010 and projects a halibut FMP will be undertaken thereafter.

[36] Comments received on the draft of this report support this overall judgment regarding MLMA implementation and the status of managing living marine resources; the Department's views are an exception.

These issues can be illustrated generally by examining three species: market squid, Kellet's Whelk, and spiny lobster. Figure 5 reports information on commercial landings of the three species. Market squid is a high value commercial fishery in California, ranked first in value in 2007, for example, and managed under a FMP since 2004. However, the fishery is characterized by declining landings (left axis), which fell from 261,940,567 pounds in 2000 to 83,996,819 pounds in 2008 (less than one-third the 2000 level, though much higher than the approximately 150,000,000 pounds in 1997). The Department's Status of Fisheries (2006) observes that there is very high natural mortality in this species, as the entire stock replaces itself semi-annually. However, the report finds there is some reason for concern as there is no reliable estimate of squid biomass, fishing takes place over active spawning areas, and the average length and weight of catch declined from 1999 through 2007. *The report concludes that additional information is needed for effective management of the market squid fishery.*

Kellet's Whelk (with pounds of landing on the right axis in Figure 5) is not presently a managed fishery in California. A significant portion of landings are as legal incidental catch, historically in crab traps. Because the species has commercial value there is concern that fishing pressure is increasing, and this issue has been addressed at Commission meetings. Scientists consider Kellet's Whelk to be "[A]n important predator, particularly on herbivorous snails and other grazers. Therefore, removal of the species from a given location could indirectly affect a number of other species in the ecosystem, particularly algae including kelps."[37]

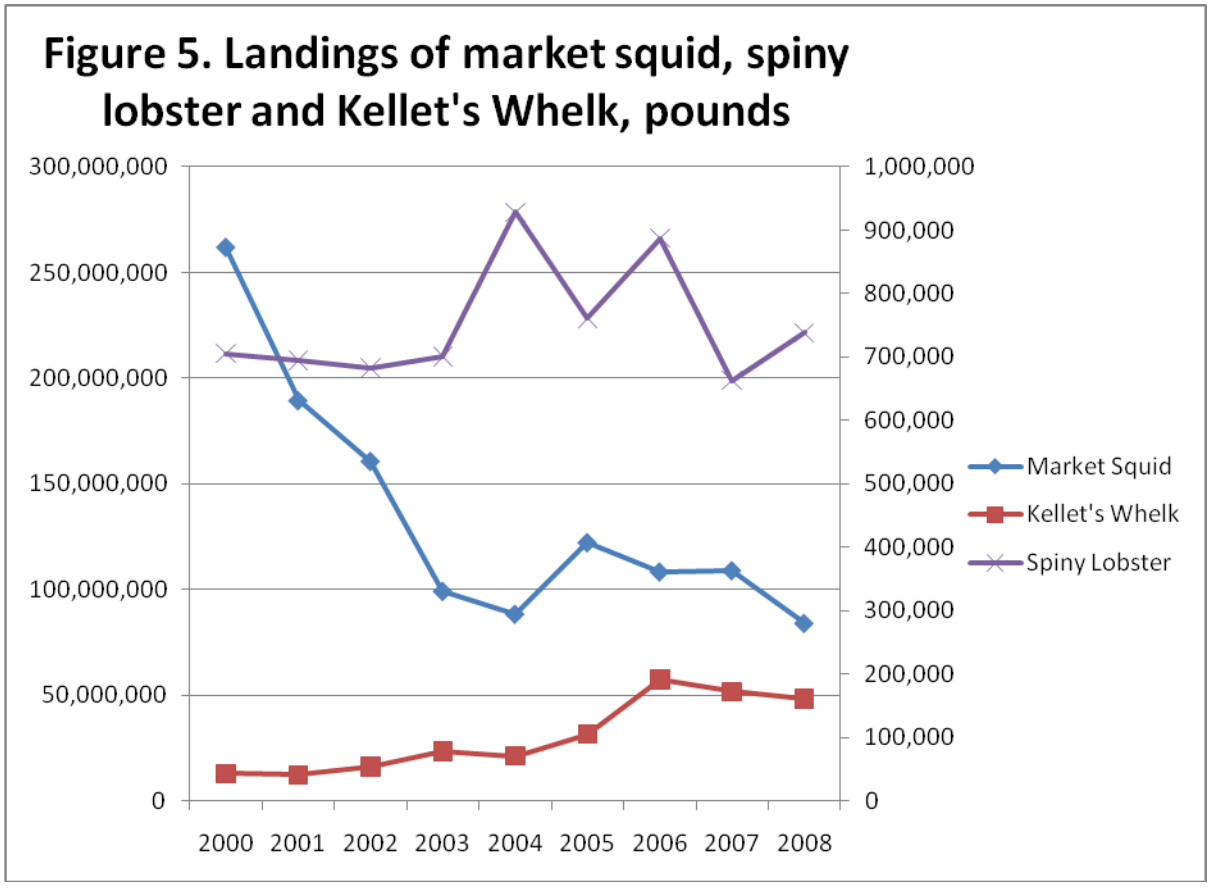
Market squid and Kellet's Whelk are largely harvested commercially and recreational take is small. In contrast, there was already a well-established commercial fishery for spiny lobster (fifth ranked by value in 2007) but recreational fishers have targeted spiny lobsters in recent years. Spiny lobster take is limited in season, gear, and minimum size. Commercial landings of this species are shown on the right axis in Figure 5. Recreational effort and catch were widely believed to be increasing for several years, partly driven by a new technology of rigid side traps requiring less skill to use and mostly deployed from small boats and kayaks. However, as is common with many recreational fisheries, especially when effort targeting a species increases rapidly, inadequate information was available on which to make management decisions. The Commission adopted regulations (2007) requiring those harvesting spiny lobsters purchase a "spiny lobster report card." Analysis of the first cards returned, for the first half of the 2008/09 season only, found 217,000 lobsters taken recreationally and 459,000 by the commercial fishery. In other words, newly available data suggest recreational harvest rates are as much as 50% of commercial rates. [38]

These three fisheries illustrate challenges facing the Commission and the Department in making and implementing effective resource management policy. Market squid are managed under a FMP but there is uncertainty regarding basic information about the fishery stock. Kellet's Whelk are being harvested at increased levels but are not yet being treated as an emerging fishery. Recreational harvest of spiny lobsters has increased and recent information suggests recreational take approximates half the level of commercial take. In each of these three cases, the Department and the Commission have acknowledged management issues but there is no clear, public determination of fu-

[37] http://www.dfg.ca.gov/mlpa/pdfs/agenda_061809e1.pdf

[38] Department of Fish and Game. "Overview: Exploring Data and Stock Assessment Needs for the California Spiny Lobster." December 15, 2009. http://www.dfg.ca.gov/marine/invertebrate/spinylobster.asp (slide # 26 and # 29)

ture policy. For example: are the current rates of harvest of these three species sustainable? What factors (e.g., changes in levels of harvest, natural events, new scientific understanding) would require consideration of new management actions? On what time lines will any decisions regarding these three species be made?



These three cases illustrate why uncertainty regarding stocks and the impacts of current fishing efforts make reliable judgments regarding sustainable use of California's living marine resources virtually impossible at this time. Uncertainty exists regarding underlying science, human uses, and public policy capacity, and it is difficult to predict when and how policy makers will act.

Adaptive management

From a policy perspective, adaptive management requires decision making which recognizes the probability of less than desired results and makes decisions based on the best available science and best available policy tools. Adaptive management equally commits to observing, analyzing and understanding the results of those actions. Finally, adaptive management requires the political, managerial and operational capacity to design and implement improved actions. The important point is that adaptive management requires much more explicit policy making and capacity than a series of after-the-fact reactions to the "latest data" possibly related to a policy goal.

Adaptive management is defined in the MLMA as a scientific policy that seeks to improve management by designing management actions as tools for learning, able to provide useful information whether the actions succeed or not.[39] This is a good general definition of adaptive management, but neither the statute nor the Master Plan provides any details or guidance about implementation. Adaptive management is mentioned only briefly in the existing FMPs and the way it is mentioned suggests that the authors of the plans did not fully understand the application of this policy.

A definition of adaptive management widely used by the federal government focuses on processes and outcomes to improve policy making without detailing steps:

> "A type of natural resource management in which decisions are made as part of an ongoing science-based process. Adaptive management involves testing, monitoring, and evaluating applied strategies, and incorporating new knowledge into management approaches that are based on scientific findings and the needs of society. Results are used to modify management policy, strategies, and practices."[40]

Scientists also observe that adaptive management can be a powerful tool for increasing our understanding of fish population and ecosystem dynamics (Walters 1986, Lee 1993). This perspective leads to an emphasis on the use of models and experimental design (Walters 1986), as seen in a recommended seven step process: 1) define the problem; 2) specify the conceptual model or models of how the system functions; 3) evaluate the response of the model systems to various policy options using computer simulation; 4) design the adaptive experiment and evaluate its costs and benefits; 5) implement the experiment if the benefit/cost ratio is favorable; 6) monitor the response of the system to the experiment; 7) revise and update problem definition and models based on the results. Interviews and research for this project indicate that, at present, DFG probably lacks sufficient capacity to implement adaptive management in this manner on a significant scale. One reason is that adaptive experiments tend to be intrusive and require close collaboration with fishers and other constituent groups.[41]

Restricted Access

DFG, the Legislature, and the FGC have used a variety of other policy tools for fishery management both prior to and following MLMA adoption. These tools focus on limiting effort and restricting access to fisheries, which is a key component of sustainable fishery management. When these measures have been adopted with the full engagement of stakeholders, they appear to have produced positive results.

Restricted Access is a resource management approach that limits the fishing power participants put into a fishery, in contrast to other management measures, which limit the amount of fish that participants take out.

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[39] MLMA §7056(g), FGC §90.1: "Adaptive management," in regard to a marine fishery, means a scientific policy that seeks to improve management of biological resources, particularly in areas of scientific uncertainty, by viewing program actions as tools for learning. Actions shall be designed so that even if they fail, they will provide useful information for future actions. Monitoring and evaluation shall be emphasized so that the interaction of different elements within the system can be better understood.

[40] See, e.g., Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management (Federal Register 65, no. 202, October 18, 2000, p. 62571)

[41] The San Miguel Island Red Abalone Fishery Consideration Process is an example of collaborative management effort currently supported by the Department. See http://www.dfg.ca.gov/marine/armp/sanmiguelisland.asp.

Achieving the goal of sustainable fisheries requires a combination of both types of measures. According to the Commission's restricted access policy, California historically did not restrict the number of participants or amount of fishing effort in its fisheries, so by the 1950s commercial fisheries generally were overcapitalized and had the capacity to exert more fishing pressure than resources could sustain. Through department regulation and legislative action California attempted to limit the number of commercial vessels or individuals permitted to take specific species or groups of target species. A combination of provisions developed over 10 or more years resulted in a confusing, inconsistent, difficult to administer and sometimes ineffective approach.[42]

The MLMA recognizes that restricted access is an important tool in the suite of fishery management tools, but does not prescribe such measures for every fishery.[43] The current FGC policy on restricted access was developed following MLMA passage. The policy provides detailed steps and guidance for how to address each of the questions that will arise when managers act to restrict access or reduce effort. Its stated purposes are 1) to promote sustainable fisheries; 2) provide for an orderly fishery; 3) promote conservation among fishery participants; and 4) maintain the long-term economic viability of fisheries.

The inclusion of restricted access in the NFMP is an example of how successful implementation of this tool can achieve objectives of the MLMA. In that case, a collaborative approach that included senior staff, stakeholders, and outside experts created a set of guidelines that helped reduce permits in the fishery from 1,200 to approximately 200 over several years. The market squid FMP presents a contrast. Existing participants and the Department had supported proposals to limit effort in the fishery, which was recognized as over-capitalized. These proposals were consistent with the FGC restricted access policy but were defeated by the arguments of potential new entrants who wanted access to the fishery. Based on research for this project, the failure to include restricted access in the FMP was more indicative of a lack of knowledge, capacity, and resolve on the part of the Commission than on the availability of reliable science or the soundness of the FGC restricted access policy.

Other issues not addressed in the Master Plan or FMPs

A statewide network of MPAs is now being created pursuant to the Marine Life Protection Act (MLPA) and protection of identified areas is beginning. MPAs are intended to serve broad ecosystem conservation objectives and their sizes and locations are being established based on those broad objectives. MPAs provide both opportunities and difficulties in the scientific management of fisheries, and a careful consideration of how to integrate MPAs into fishery management is needed (Field et al. 2006). [44] Neither the Master Plan nor any of the FMPs consider how to integrate MPAs into fishery management; the MPA Monitoring Enterprise offers hope for some progress here.[45] The NFMP identifies MPAs as a primary means of conserving essential fish habitat but provides no real guidance on how the

[42] *Passage and Implementation of California's Marine Life Management Act*; FGC Policy on Restricted Access.
[43] FGC §7056
[44] Field J., Punt A., Methot R., Thomson C., "Does MPA mean major problem for assessments? Considering the consequences of place-based management systems." *Fish and Fisheries* (2006) 7:284–302.
[45] Comments on the draft report indicated that a draft of the NFMP included a detailed discussion of MPAs but this section was dropped from the final version.

existence of MPAs affects fisheries management. Habitat condition and its importance to sustainable fisheries is not well addressed in the Master Plan or any of the three state FMPs. Habitat damage by activities such as shipping, coastal development, and land-based sources of pollution is commented on but not discussed in terms of its impact on fish stocks. The NFMP depends on habitat protected in MPAs to provide required non-target species benefits, ecological health benefits, non-commercial use benefits and habitat protection. However, MPAs are not being established with specific fishery needs in mind and resource managers cannot depend on MPAs to provide all these benefits. Very near shore habitats in particular do not receive attention commensurate with their potential value and importance.

Changes in physical habitat that may result from climate change, such as changes in sea surface temperature, changes in seasonal upwelling, reduced freshwater inflow to coastal waters, and ocean acidification are not discussed in detail in the FMPs or other fishery management actions. These changes have the potential to impact heavily on state fisheries and deserve consideration in marine resource management.

Lessons learned

1. The intended role of FMPs under the MLMA as a central management tool has not been realized in the MLMA's first decade, and that situation is unlikely to change significantly in the foreseeable future due to several factors, including lack of resources and inadequate EFI.
2. The Master Plan has clear strengths but its potential has not been realized. A perceived lack of flexibility in the Master Plan involving EFI and requirements for FMP development has become a significant obstacle and generated at least one effort at legislative clarification, i.e., MLMA "lite."
3. It is reasonable to expect little or no change to established fishery management regimes, e.g., the *status quo*, absent significant evidence of problems. The *status quo* applies to many state-managed fisheries, but the lack of EFI for many fisheries undermines the foundation for business as usual. Even with significant evidence it has been difficult to reduce harvests, e.g., the herring fishery.
4. There is some evidence that the FMP development process, including stakeholder engagement, leads to robust use of management tools, including annual catch limits, consistent with the need for precaution in light of data gaps. A more flexible approach to the requirements for FMPs has the potential to increase the overall level of precaution in management of state fisheries.
5. A strategy of addressing the potential role of MPAs in fisheries management through individual FMPs, rather than as a discrete policy, is unlikely to show measureable progress in the foreseeable future.

Working with Stakeholders

The MLMA states that "successful fishery management is a collaborative process that requires a high degree of ongoing communication and participation of all those involved in the management process, particularly the commission, the department, and those who represent the people and resources that will be most affected by fishery management decisions, especially fishery participants and other interested parties."[46] The anticipated benefits of this collaboration apply to "most fishery management activities including . . . the development and implementation of research plans, fishery management plans, and plan amendments, and the preparation of fishery status reports . . . ." DFG and the FGC are accordingly directed, i.e., "shall," to "[d]evelop a process for the involvement of interested parties and for fact finding and dispute resolution processes appropriate to each element in the fishery management plan process . . . ."[47]

This emphasis on collaboration and constituent involvement over traditional command-and-control decision making was, and remains, a key aspect of the MLMA.[48] Fundamentally, the MLMA directed DFG to expand its comfort zone by giving up some control over decision making processes while retaining its legal authority. The shift is not simply about more public meetings, which were a familiar tool for both DFG and the FGC. Public meetings can be useful ways of conveying information, improving understanding, and gathering input, but they are not typically a forum that promotes collaborative decision making and management. This shift also is about more than talking with fishery participants or researching fisheries; DFG has always worked directly with fishers both on land and on the water. Another familiar and traditional tool is the use of advisory committees for gathering views from fishery participants, outside scientists, and others.

As noted in the *Passage and Implementation of California's Marine Life Management Act*—and to its credit—DFG committed significant resources to developing meaningful public engagement frameworks, specific tools appropriate to different types of decisions or activities, and internal capacity to meet this obligation.[49] Outside experts were part of this effort along with DFG staff. One concrete result can be found in the Master Plan's detailed framework for public involvement in FMP development in Chapter 5. It specifies four possible levels of involvement, and a set of criteria to determine which level is appropriate. Table 3 illustrates these four levels and the type of activity associated with each (Table 5-1 in the Master Plan).

[46] FGC §7059(a)(1)
[47] *Id*. (b)(2)
[48] *See* Weber and Heneman, p.7: Constituent involvement is one of four general policies for achieving MLMA goals.
[49] Appendix 1 at 45.

Table 3. Master Plan categories of public involvement

Table 5-1. Levels of public involvement and associated methods and activities.	
Public Involvement	Methods and Activities
Standard	Notice of announcement, public notice, fact sheet, public review, questionnaire and comment forms, web site
Level I	Peer review, meetings, workshops
Level II	Advisory committees, consensus building panels
Level III	Formal dispute resolution

The NFMP was, in some respects, a field test for DFG's new approach to constituent engagement. That process is described in detail in the *Passage and Implementation of California's Marine Life Management Act*. Based on interviews and research, the NFMP process produced very mixed reviews and has had a significant influence on DFG's unwillingness to develop future FMPs. The $10 million estimated cost includes a large amount of staff time and external consultant resources devoted to involving the public. Some within DFG perceived very limited benefits from the many hours spent working with the NFMP advisory committee. The failure to reach negotiated agreements on key issues such as allocation between recreational and commercial fisheries raised fair questions about what was achieved and whether it could have been done with fewer resources or using a different mix of approaches.

It is apparent from interviews and DFG's own internal review that concerns about the cost of public engagement based on the NFMP experience (and others) have become an obstacle to advancing the MLMA goal. The recent call for outside partners to support the costs of facilitation for a Spiny Lobster FMP process (cited above) is an indicator of these concerns.

DFG has not simply abandoned public engagement, however. It is involved with fishery participants and others in a limited number of projects intended to explore alternative approaches to data-gathering and research and co-management. It appears that most, if not all, of these projects originated with stakeholders and not within the Department. DFG staff continue to hold public meetings, and to talk directly with individuals and organizations pursuing innovation. DFG personnel are participating in the legislatively mandated Dungeness crab task force. And DFG's ongoing involvement in the MLPA planning process, with its intensive model of stakeholder involvement, is contributing to internal capacity building in the Marine Region even as it places more demands on reduced resources. Figure 6 shows a partial list of committees and other forums where DFG staff participate; most of these focus on specific fisheries or locations and involve stakeholders as well as agency officials.

There are two core challenges for DFG around public engagement. The first is in comfortably giving over some decision making process control while retaining its authority. The traditional top-down, command-and-control view was present within DFG [and on the FGC] when the MLMA was enacted, and interviews suggest that it has remained influential over the past decade. Giving up some process control in favor of more meaningful engagement in decision

making has been difficult, particularly because it places DFG personnel in a position of being directly accountable and needing to justify policy choices, and be open to the MLMA's encouragement of "creativity." The traditional model places fewer demands and, given resource constraints, can be seen as an attractive refuge. DFG is inevitably seeing change in personnel over time, however, and this change also is slowly influencing willingness to collaborate, particularly as new staff gain experience in more open processes. The variation in DFG's approach to public engagement reflects both the lingering influence of command-and-control and the views of a new generation of DFG staff whose expectation is that collaboration is the most common approach.

The second challenge is in supporting substantive change in marine resource management. The purpose of public engagement is to respond to the MLMA's view, stated above, that successful fishery management is a collaborative process beginning with baseline data collection and continuing though policy making, implementation and adaptive management. The statute intends that DFG meaningfully explore collaborative data-gathering and research, and meaningfully address various forms of co-management.[50] California must continue to develop incentives for fishery participants to conserve resources, and this cannot be done without testing models for shared management. DFG's commitment to collaboration is being tested and, at least in the eyes of some, found wanting to this point. There is an external perception of fundamental resistance to change in the way DFG manages the state's marine resources: not simply caution, but active opposition, to an approach where DFG retains its responsibility to protect public trust resources but is willing to take some reasonable risks, and even accept some failures, in order to learn what can work in partnership with fishery participants and others. In some instances, it is likely that DFG resists investing its limited funds and staff where it judges the issue is largely economic conflict among users and the living marine resource is not threatened by current use patterns.

Finally, there is reason to believe based on interviews for this project that key fishery participants, advocates, and others appreciate the costs of public engagement and would be willing to accept tradeoffs between quantity and quality. In other words, if the engagement is meaningful and has a clear impact, the amount of time and the costs potentially can be reduced. However, it is also the case that the current implementation phase of the MLPA has been

[50] The Department provided extensive comments on draft Recommendation 17 and the concept of co-management. Here is the first sentence of these comments: "The MLMA only requires that the Commission and the Department consider the appropriateness of various forms of fisheries co-management. (FGC §7059(b)(3))." [emphasis in original] The Department's comments also identified five models of co-management: instructive, consultative, cooperative, advisory, and informative, and offered this summary: "[T]o date, fishery advisory committees have most closely fit the second (consultative) model, with mixed results. Committees can provide a forum for building consensus, but can also form factions and disenfranchise fishery participants who are not members, or become merely another lobbying forum for vested interests. A committee might also be perceived as a bureaucratized extension and not as an autonomous co-management partner the way an independent fisherman's cooperative might be." One other commenter recommended the DFG and the FGC set explicit criteria (e.g., credible science, limits on costs to state) and have others design a range of co-management options in the near term. Under this approach the state would also encourage and engage in collaborative fisheries science and management programs, with the fishing industry covering a significant portion of costs.

characterized by extensive support for high levels of stakeholder involvement and public processes and some stakeholders may form expectations based on those efforts.[51]

Lesson Learned

1. It would be unrealistic to expect a profound shift away from traditional command and control fisheries management in a single decade, even in California.
2. The MLMA and Master Plan promote a collegial and collaborative approach to FMP development and implementation through constituent involvement. However, DFG often appears to interpret constituent involvement rather narrowly as a consultative process with DFG firmly in control. The failure to generate significant collaboration in marine resource management overshadows DFG's participation in a handful of pilot projects and underscores a lack of initiative.
3. The NFMP describes a number of successful and beneficial projects in which managers, academics and fishers worked together and suggests that more such projects would be a good idea but does not identify any particular candidate projects. Benefits of fisher's knowledge and fleet infrastructure as well as the engagement of fishers as part of the management process cannot be realized by effectively keeping fishers at arm's length.[52] Ultimately, collaborative research and management offer opportunities for reducing costs and enhancing management effectiveness, depending on circumstances. (See, for example, the experiences of Starr, Wendt, Wilson, Culver, Schlosser and Halmay, among others).
4. DFG staff members face significant demands to engage with the public in many forums. Taken as a whole, the value of this participation is not evident on its face, particularly given staffing shortages and inability to implement MLMA direction on EBM and adaptive management, or to analyze existing fishery information. There is reason to believe that, in some cases, less but better direct engagement with the public may lead to more concrete MLMA results.

[51] The private sector has been a significant source of funding for the MLPA Initiative planning process, including its intensive public engagement.

[52] In other words, it is not enough simply to sit in the same room with fishery participants, no matter how many meetings that includes. The focus must be on collaborative decision making.

Figure 6. DFG roles with stakeholders

Group Name	DFG Role
Abalone Advisory group – San Miguel Island	Support – constituents
Abalone San Miguel Island Technical Panel	Member
Benthic Habitat Goal Project	Advisory
Bolinas lagoon Project Reformation Advisory Group	Advisory
Bolinas Lagoon TAC	Member
California Coastal National Monument Co-manager	Co-Manager of CCNM with BLM & State Parks
California Sea Urchin Commission	Non-voting member
Channel Islands Sanctuary Advisory Council	Member
Collaborative Marine Research Program--CINMS	Evaluate and select proposals for funding
Director's Herring Advisory Committee	Support – constituents
GFNMS Bolinas Lagoon Ecosystem	Advisory
Humboldt Bay Benthic Habitat Goals project	Advisory Team member
Humboldt Bay Ecosystem based management program	Advisory Team member
Humboldt Bay Ecosystem Based Management Program (EBM) Core Team	Advisory
Interagency Oil & Gas Decommissioning Working Group	Member
Long Term Management Strategy (for dredged materials in SF Bay) - Management Committee	Consultation/Recommendations
Monterey Bay Sanctuary Advisory Council	Voting Member
North coast Critical Coastal Areas committee	Advisory
Ocean Resources Hatchery Enhancement Program Advisory Panel	Support –constituents
Recreational Abalone Advisory Committee	Support –constituents
Santa Monica Bay Restoration Commission Technical Advisory Committee (TAC)	Voting Member
Southern California Caulerpa Action Team	Vice-Chair
Subtidal Habitat Goals Management Committee	Member
Tomales Bay Mooring Committee	Voting Member
Tomales Bay Shellfish TAC	Voting Member

Source: DFG. This is not a complete list but gives a flavor for the kinds of committees staff participates in or supports. These are all constituent groups in one form or another; some are multi-agency; some agency and public members; some are fishing constituents only.

Vision and Strategy

The Marine Region of the Department wrote its first strategic plan in 2000, shortly after passage of the MLMA and the MLPA. In July 2009, it published a new strategic plan in response to "new funding and unprecedented hiring in 2007 "under the joint OPC/DFG work plan (p. 4)." The new strategic plan sets three broad goals that correspond closely to topics addressed in this report:

"Organizational Vitality: administrative functions, employee foundations, and internal communications

Marine Resources Stewardship: adaptive management, scientific capacity and regulatory programs

Public Engagement: education, outreach, and collaborative efforts with others." (p. 7)

The plan is attractive and succinct. Eight pages give brief descriptions of the mission and staffing of 14 specific projects, e.g.: Administrative and License Sales Staff, Marine Fisheries Statistical Unit, Groundfish Project, Marine Protected Areas Project, Project Review Project, and Fishery-Independent – SCUBA Assessment Project. Nine pages outline the implementation process for the three goals. All of the specific commitments are on target. But most commitments either define operational responsibilities, e.g.: "maintain a database of equipment owned by the Marine Region," or are very general:

"a staff person will develop a description of how to optimize training opportunities"

"selected staff will work with constituents to develop a working definition and model for ecosystem-based management based on scientific and management literature"

"publish reports and the results of research, if appropriate"

"Staff will provide Marine Region partnership guidelines to potential partners".

There is no indication in the plan that the Department used this opportunity to consult with stakeholders, the Commission, or the Legislature, or to go through common steps of strategic planning, such as assessments of strengths, weaknesses, opportunities, and threats. The plan does not address the specific challenges that are outlined in this report – data poor fisheries, budget shortfalls, fragmented institutions, or lack of progress in preparing FMPs. The plan does not set performance targets or deadlines and does not provide for monitoring and evaluation of progress.[53] It says simply that every year the Regional Manager will select a high-priority action, assign someone to be Champion, and have an assistant keep track of progress.

Research for this project also revealed the absence of a practical, publicly available management plan for MLMA implementation. In some cases such plans are tools to translate strategic visions into specific actions and measurements. While there are agendas for the Commission, and while the Department has its own internal practices, a single, accessible point of reference about goals and progress on MLMA implementation for those institutions, stakeholders, and the Legislature does not exist. This contributes to a perception that fisheries management is primarily

[53] The plan uses five to eight year timeframes, which are too long to guide management actions and are subject to external influences such as the four-year election cycle for governor. These timeframes are more appropriate to measure success against policy goals, such as sustainable use of marine resources.

driven by short term priorities, *ad hoc* decision making, and Departmental discretion. It also makes measurement of progress toward sustainability difficult, and limits accountability for achieving MLMA goals.

Lessons Learned:

1. The Marine Region updated its Strategic Plan in 2007-09 in response to budget increases in 2007. The plan is a useful initial effort to identify important questions about the Marine Region's capacity to fulfill its statutory responsibilities. But it falls well short of a working agenda for action. Strategic planning can be an opportunity to reach out to the Commission, the Legislature, fishermen and other stakeholders to develop a shared plan for action, but this has not happened.
2. The absence of a clear management plan for MLMA implementation results in a lack of priorities, a perception of *ad hoc* management, and weak accountability.

Capacity for Managing California's Living Marine Resources

This section focuses on "competence" of implementation. As noted in earlier in this report, competence refers to capacity—principally budgets and human resources—and not job performance. Capacity is a central issue for California's management of living marine resources.

Budget and personnel

The extent and character of financial and human resources available to the Department generally, and the Marine Region specifically, are important to understanding implementation of the MLMA. Implementation of resources policies and programs requires money and people as surely as does building roads, regulating banks, or running school systems. In fisheries management, as with any other policy area, it is sensible to secure money and people sufficient to achieve desired policy goals, but not sensible to waste such resources.

The current budget of the Department's Marine Region is $18.239 million (FY 2009-10). Perhaps the best way to put this figure in context is to compare it to size of the California's commercial fisheries and to total expenditures for recreational marine fishing. The total Marine Region budget was approximately 15 percent of the value of commercial fishery landings in 2007 and slightly less than 5 percent of the combined commercial landing values and midpoint estimate of expenditures on recreational marine fishing of $205 to $545 million annually. As shown below in discussion of budgets and resources, MLMA implementation receives less than 20 percent of the total Marine Region budget, so funds for this program are a modest fraction of the value of commercial and recreational fishing.

The size of recreational and commercial fishing industries in the California economy is relevant to both the attention likely to be received by policy makers and the comparative resources available for policy making and policy implementation. While of great importance to direct users, and valued broadly by Californians, commercial and recreation fishing are a small part of California's economy, as illustrated in Table 4 below. In summary:

- Commercial and recreational fishing are roughly equivalent in economic value to hunting or timber harvest
- Total cash income from California farming is much greater, perhaps 80 times larger, than income from harvest of marine resources[54]
- Totaled together, direct uses of natural resources (fishing, hunting and timber harvest) and farming are small fractions of the total California economy

Table 4.

Economic value of California commercial and recreational fishing in context

Annual values

Total landed value of all California commercial fisheries, 2007	$120.2 million[55]
Expenditures for marine recreational fishing, early 2000s	$205 million to $545 million[56]
Retail sales associated with hunting in California, 2001	$526 million[57]
Total value of timber harvest, 2007	$474 million[58]
Total cash income from California farming	$39,000 million[59]
California state gross domestic product, 2007	$1,800,000 million[60]

Obviously, this information does not address whether the DFG budget is sufficient to meet the responsibilities of the Marine Region. It does, however, provide a context in which to understand the prospects for increases in funding.[61] Moreover, the public character of living marine resources means that there are limited incentives for private users to invest in managing these resources more sustainably. Some management tools could possibly address this second challenge. As an example, catch shares do not change the public character of a resource but create "owners" of the rights to access the resource.[62] Whatever the success of policies designed to influence use patterns of public

[54] Any sector has greater economic impact than cash income or expenditures (usually analyzed as "multiplier effects"), but these data are useful to identify relative levels of economic activity.
[55] National Ocean Economics Program. *Commercial Living Marine Species in California*, 2007.
[56] Woods Hole Oceanographic Institute. *An Inventory of California Coastal Economic Sectors*. http://www.whoi.edu/mpcweb/research/NOPP/California%20region%20progress%20report%20Jan03.pdf See also: Linwood H. Pendleton and Jamie Rooke. *Understanding the Potential Economic Impact of Marine Recreational Fishing: California*. http://www.dfg.ca.gov/MLPA/pdfs/binder3di.pdf. Accessed October 19, 2009.
[57] International Association of Fish and Wildlife Agencies. *Economic Importance of Hunting in America*. 2002. Page 8.
[58] California State Board of Equalization. *California Timber Harvest Statistics*.
[59] California Department of Food and Agriculture. *California Agricultural Resource Directory, 2008-2009*. Page 23
[60] California State Department of Finance. *California Statistical Abstract*. January 2009. Table D-1.
[61] One commenter raised questions about the comparability of data in this table in the draft report and suggested that it identifies more of a political argument about size and importance than a pure economic argument.
[62] State management of rights to use fresh water resources is an example of a similar, but not identical, public resource framework.

resources, the total economic value of living marine resources as a portion of the broader economy is harder to change. Even if users of living marine resources have larger "ownership- like" stakes in that use, the sector's economic value will remain very modest in the state's total economy and the fundamental challenge of attracting policy maker attention and support for modest economic activity remains. This suggests that the long term political support for effective management of living marine resources will be strengthened by tapping the broad public support for oceans and marine life generally, rather than by relying solely on appeals based on direct economic values.

California's current fiscal problems constrain the prospects for more spending on managing living marine resources. State government budgets are being cut and personnel are being put on furloughs. Deficits are significant and are projected to grow for several years.[63] General fund allocations have been an irregular source of revenues in the past and are likely to remain so for the foreseeable future. While fees have been important sources of funding for DFG, there is often resistance to fees among users unless direct benefits are seen through dedication to specific purposes valued by fee payers. In any case, the limited total economic value of commercial and recreational fishing also imposes limits on feasible fee revenues.

The Marine Region is just one of seven DFG regions whose broad mission encompasses much more than managing marine resources. Though important historically, fishery management is just one part of the responsibilities in the Marine Region, which also has pollution prevention, aquaculture, and bay management among other responsibilities. The MLMA imposed significant new responsibilities on DFG and the Commission without establishing a reliable, dedicated source of funding to support those responsibilities. When the law was passed, the Marine Region received its first general fund appropriation in 1999-2000. And for the first time, commercial fishing programs, according to the Fish and Game Code, were to be financed in part by revenues they generated.[64]

But funding in recent years has been volatile. As shown in Figure 7,[65] the largest category of funds for the Department is "other" – mostly bond funds. The second largest category is appropriations from the state General Fund. The third largest, "Fish and Game Preservation Fund," includes sport fishing and hunting and commercial fishing license revenues and a number of dedicated funds. Examples of marine-related dedicated funds include user stamp fees to fund marine fish species research and recreational abalone management.

The 2006-07 budget of the Department was 23 percent larger than its 2005-06 budget, at least in part reflecting an OPC/DFG joint work plan, with increases in bond funds and some increased fees and reimbursements, but lower general fund appropriations. In 2008-09, the general fund appropriations declined, and allocation from bond funds fell back to 2005-06 levels, resulting in a 26 percent decline in total revenues from 2006-07 and a nine percent decline from 2005-06.

The sources of money for the Marine Region had been commercial fishing licenses, taxes on commercial landings, and permit fees. Recreational fishing programs were also funded by their own revenues. Federal sources

[63] http://www.lao.ca.gov/2009/bud/feb_overview/feb_overview_031309.pdf.
[64] FGC §711
[65] Department, *Budget Fact Book*. January 10, 2008

such as the Federal Aid in Sport Fish Restoration Act of 1950 (Dingell-Johnson Act) and the Interjurisdictional Fisheries Act of 1986 provided additional revenues for specific activities or as reimbursements.

Table 5 reports the information that is currently available about funding and staffing of the Marine Region and of the MLMA program within the Marine Region. Funding and staff levels rose and fell from year to year similar to the Department as a whole. Overall, MLMA funding and staff declined dramatically in the 2002-2006 period, but have since returned to somewhat greater proportions of Marine Region funds than in the early period shown (14 percent vs. 8 to 13 percent) and a larger proportion of staff (now 17 percent vs. 5 to 10 percent through 2006-2007).

The Commission gained new responsibilities in the MLMA: approving FMPs, requesting and receiving reports from the Department, and providing guidance in implementation of fisheries management policies. While not having oversight powers in relationship to the Department, the Commission's exercise of their regulatory powers has great impact on the Department, users of marine resources, and the public. The Commission also has a very large work load associated with issuance of individual licenses and permits (e.g., for commercial fishing vessels or for limited entry fisheries) and subsequent enforcement actions, requests for transfers of permits and licenses, and other actions. While the Department manages MLMA processes, the Commission is responsible for approving FMPs and fishery-related regulations and handling appeals of permits and revocations. The Commission does not have a separate budget and only recently was identified as a "program" in the Department's budget. In 2009-2010, the Commission was budgeted for $1.379 million and was authorized for 7.8 personnel years.

Figure 5.

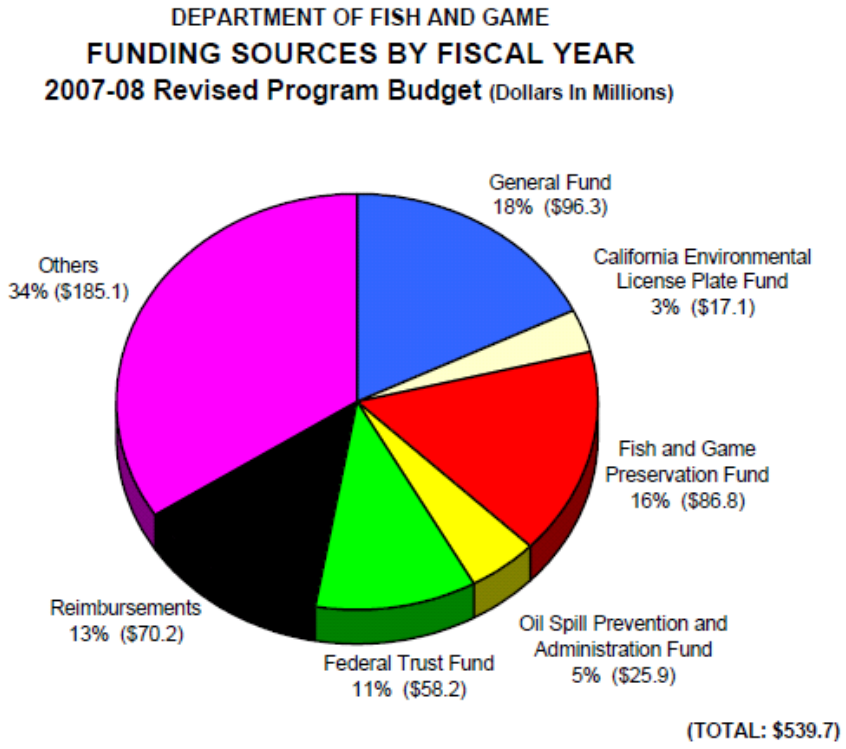

Table 5. Budget and staff working on marine issues in the Department of Fish and Game

Fiscal Year	Total Marine Region Budget	Total MLMA Funding	Total Marine Region Staff	MLMA staff
1999-2000*	$20,832,808	$2,800,000	203	10
2000-2001*	$24,535,104	$2,100,000	213	11
2001-2002*	$23,681,557	$2,400,000	213	11
2002-2003*	$20,114,107	$2,400,000	197	12
2003-2004*	$18,337,137	$900,000	173	9
2004-2005	$15,008,906	$829,000	116	9
2005-2006	$14,114,226	$900,000	114	9
2006-2007	$23,041,932	$3,235,000	152	15
2007-2008	$21,308,874	$3,055,000	153	26
2008-2009	$18,379,000	$2,655,000	148	26
2009-2010	$18,239,000	$2,655,000	154	26

Notes:

1. In fiscal years 1999-2000 through 2003-2004, enforcement staff is included in Marine Region staff total.
2. For these respective years, enforcement staff totaled 37, 46, 55, 53, and 50 positions.
3. Technical staff, including biologists, environmental scientists, economists, statisticians, GIS and managers is 70-75 percent of total marine region staff in the last four years.

Source: Data provided by Marine Region for this report.

In summary, examination of the comparative economic value of marine fishing in the California economy and the budgets and personnel available to the Department and Commission is sobering for those interested in and working in this important policy arena. *Budgets and personnel provided are modest and highly variable. There is little prospect for substantial increases and no evident way to reduce cyclical fluctuations in available budgets and personnel under current law.*

With a limited and shrinking resource base, the Department has been struggling to meet the challenge of the MLMA and other fisheries management actions. The Commission equally struggles in its policy making and regulatory roles. In the years immediately following passage of the MLMA, for example, the Commission was supported by staff paid for with grants from private foundations. DFG staff interviewed (and quoted anonymously in the "NFMP debriefing" document) noted that mandates, such as the NFMPand the MLPA, often required personnel to be pulled from other projects, resulting in difficulty in successfully implementing policies and sustaining momentum in programs.

Scientific capacity

Historically, DFG was a respected science organization and contributed important new knowledge about fisheries to the scientific literature. This contribution has fallen off considerably as resources have been squeezed. Lack of resources (financial, professional) is often cited as an obstacle to achieving the vision of the MLMA. The data poor state of most fisheries means that DFG is starting from a very low baseline of information to achieve MLMA goals or effective fisheries management in general.

DFG staff has broad responsibilities: gathering information from fisheries, understanding how fisheries operate, developing regulations, presenting information before the FGC, interacting with constituents, and responding to legislative and FGC needs, among many others. These demands, as well as limitations in expertise, influence the amount of scientific work the Department can realistically hope to carry out. As a result, DFG must utilize scientific information generated from outside: academia, other agencies, contractors, and collaborative efforts with fishermen.

DFG produces much of the routine scientific and statistical data that it uses for management.[66] Probably most important is its role (sometimes in collaboration with other agencies) in gathering and analyzing fisheries-dependent data, which is often the only source of data on abundance trends and is used as input for statistical stock assessments. (Fisheries-dependent data are gathered as part of the fisheries management processes (e.g., catch records). Fisheries-independent data are gathered by research projects not directly associated with fishery management.) DFG also carries out some fisheries-independent surveys, such as diver surveys to assess abalone abundance in fished and unfished areas. Remotely-operated submersible vehicles (ROVs) are used to assess fish populations in fished and unfished areas as well. Herring populations in San Francisco Bay are estimated by hydro-acoustic surveys and surveys of herring eggs. DFG staffers also conduct research to gather Essential Fishery Information, or EFI, but it is difficult to gauge its extent for this report.

Recently, DFG has instituted a number of programs for improving fishery-dependent data gathering, particularly in the sports fishery, and has been able to assemble data to move a number of finfish species from the *data poor* to data-moderate categories. However, there is concern that DFG lacks the capacity (personnel and budget) for detailed quantitative data gathering from the majority of fisheries that it manages. There is also concern that, even if detailed quantitative data were available, DFG does not have sufficient trained staff to conduct quantitative stock assessments or to interpret the results of such surveys. The Marine Region currently has a few respected experts in statistics and population dynamics. State hiring processes also make it difficult for DFG to attract and retain highly qualified staff, according to interviews and comments on the draft report.

The variability of state funding for DFG discussed above also influences the amount, quality, and continuity of scientific work carried out by DFG. Programs may be initiated during flush times, but terminated or reduced in scope when times are lean. DFG has a history of successfully engaging with academic researchers to fill gaps in EFI and to conduct data analyses. Academia and other research institutions (e.g. CalCOFI) can also address research questions that are beyond current DFG capabilities (e.g. genetic stock identification, large-scale egg and larval surveys). Outside

[66] See, e.g., http://www.dfg.ca.gov/marine/research.asp

agencies are not likely to be fully committed to DFG priorities, however, as they have their own statutory obligations and missions. For multiple reasons, California should make it a priority for DFG to rebuild and retain a solid in-house capacity for science.

Lessons Learned

1. Setting aside differences over priorities and methods, the budgets of the Marine Region and the Commission over the past decade have fallen short of basic requirements for achieving significant progress on short- and long-term MLMA goals. These budgets are not likely to increase substantially in the near future, which will require policy makers and managers to focus resources on highest-valued actions and seek ways to leverage available resources. A clear management plan specifying which tasks have priority, with deadlines for work products and allocation of resources, is one tool to support choices that are clearly linked to goals and objectives. Decision making in the absence of such a plan is likely to appear purely discretionary and contribute to frustration and conflict. [67]
2. The MLMA committed the state to an ambitious agenda for improved management of living marine resources and marine ecosystems. However, it will take a significant effort and a rethinking of current approaches for the Department to increase the number of data-rich fisheries and assemble data needed for the management of other living marine resources and adoption of EBM, as required by the MLMA.[68] One challenge is devising approaches that can succeed despite the "interruption" of planned work to respond to new crises or new directives.
3. Decision making based on science is a key to success in resource management but the Department's historic status as a respected science organization has faded. Reasserting this leadership role, perhaps through seeding and leading ambitious collaborative science projects, is needed. OPC may provide future support in this area.
4. Budget is a significant factor that constrains the ability of the Commission to provide meaningful MLMA policy guidance to DFG and well-informed decision making on fisheries management issues. Increasing resources for the FGC should receive high priority if there is an expectation that the Commission will fulfill its MLMA role.

[67] It is beyond the scope of this report to present a broad evaluation of Marine Region organization, staffing, and management. That said, it is clear that MLMA implementation is affected by a basic lack of resources, including staff. This report offers a single specific recommendation for increasing available staff resources. One step that merits attention is a re-organization of DFG that establishes the Marine Region as a division reporting to the Director, rather than as one of seven regions. The Marine Region simply is not like other terrestrial regions in the state: it covers the entire 1,100 miles of coast, includes extensive commercial and recreational activity and tourism, and faces direct impacts from ocean change. Interviews and research suggest that its needs are not well understood or, more importantly, addressed under the current DFG organization. The Department—and others—pointed out in comments to this report that there is precedent for such a restructuring of the Marine Region and questioned the value of returning to that organizational structure.

[68] Comments on the draft of this report included a significant argument for shifting away from information gathering and focusing tightly on methods for effective management with limited information. This is the type of "rethinking" that should be addressed directly by the Commission and Department.

Improving Knowledge and Applying it to the MLMA

The conceptual model for management of marine living resources in Figure 1 identifies two categories of knowledge: (1) physical, biological, and human systems, and (2) institutional, policy, and management tools. This section evaluates California's record in gathering and applying knowledge in both categories over the first 10 years of the MLMA.

Understanding of relevant physical, biological and human systems

The MLMA places considerable emphasis on the importance of good science for effective fishery management.[69] As summarized by Weber and Heneman (2000):

> "Fishery management decisions are to be based on the best available scientific and other relevant information, including what the MLMA calls essential fishery information. Essential fishery information includes the biology of fish, population status and trends, fishing effort, catch levels, and impacts of fishing" [93].

There is substantial evidence that many California fisheries are reduced. Since 1995, there have been significant decreases in commercial landings, revenues, and vessels, with a general understanding that these declines are attributable primarily to a failure of fish populations to recover from a combination of coastal development and pollution, overfishing, and other problems. The coast of California falls within the larger California Current Large Marine Ecosystem. As Halpern et al. (2009) have shown, this ecosystem is heavily affected by a broad array of human activities and is highly sensitive to impending climate change.

The iconic salmon fishery collapsed several years ago, and at least two environmentally-sensitive and commercially-important species, Pacific herring and market squid, are susceptible to environmental changes such as ocean temperature. The herring fishery is of concern because it is managed under a relatively "modern" framework and was recently closed because of population declines.[70] The squid fishery is of concern because effort continues to expand in the fishery (discussed above) yet there is currently no program to estimate biomass or stock status.

On the other hand, there is some evidence that these recent declines may be reversible. In a recent survey of the status of global fisheries in 10 large marine ecosystems around the world, Worm, et. al. concluded:

> *"*However, biomass has recently been increasing above the long-term average in Iceland, the Northeast U.S. Shelf, and the California Current, while remaining relatively stable or decreasing elsewhere." [71]

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[69] This paragraph and several others in this section are drawn from a paper prepared by Michael Healey and Ralph Larson, two members of the MLMA-LL research team, for the draft report, entitled "Science and the MLMA." The full paper is a separate document submitted to the OPC along with this final report.

[70] The Commission voted to close the San Francisco Bay commercial herring fishery in September 2009. According to reports, scientists are uncertain about what is causing steep population declines.

[71] Worm *et al.* "Rebuilding Global Fisheries." *Science,* Volume 325. July 31, 2009. 578-585.

The authors attribute the increasing biomass in the California current (which extends from southern British Columbia to Baja California) to use of four of eight possible management tools (gear restrictions, fishing capacity reduced, total allowable catch reduced, and closed areas). Worm *et al*.'s analysis was based, however, on only a small number of the many species managed by California.

The MLMA gives detailed guidance about EFI— its acquisition, quality, application and dissemination. EFI listed in the MLMA includes "information about fish life history and habitat requirements; the status and trends of fish populations, fishing effort, and catch levels; fishery effects on fish age structure and on other marine living resources and users, and any other information related to the biology of a fish species or to taking in the fishery that is necessary to permit fisheries to be managed."[72] The first plank in the information platform was to be an annual report on the status of California's sport and commercial fisheries. Each report was to cover one-fourth of the fisheries so that information on every fishery was updated every four years.[73]

The Master Plan and FMPs required under the MLMA rely heavily on EFI. For example, the Master Plan elaborates the statutory definition of EFI to include both biological and socioeconomic variables:

Biological EFI	**Socioeconomic EFI**
Age and growth	Employment
Stock distribution	Expenditures
Ecological interactions	Resource demand
Indices of abundance	Revenue
Movement patterns	User/industry demographics
Recruitment	
Reproduction	
Total mortality	

The Master Plan scored all California fisheries as either "data rich," data moderate," or "data poor" based on existing information. Using this scoring system, only the two species of kelp [listed in the Master Plan] had a majority of biological variables in the data rich category. Among the remaining fisheries, only California halibut was reasonably well known biologically, with 4 variables in the data rich category and 4 in the data moderate category. Socioeconomic variables were data poor for all fisheries. This and other analyses indicate that the data for most California fisheries is inadequate for preparation of "single model" FMPs that are required to address all specifications in the MLMA.[74] Table 6 (Table 4-2 from the Master Plan) illustrates the lack of EFI for the ten species identified as candidates for preparation of the FMPs required by the MLMA.

[72] Fish and Game Code, Ch. 2, Sec. 93; MLMA Ch. 2. Marine Life Definitions.
[73] §7065
[74] *Science and the MLMA*, p. 3.

FMPs that have been completed in the first MLMA decade include research programs to gather EFI but contain no timetable for gathering these data and moving species from data poor to data moderate or data rich. Overall, progress in building a base of EFI for most species has been slow. In 2008, Botsford and Kilduff analyzed 149 fisheries in California organized into eight groups, with the results shown in Table 2. Landing data are available for over 90 percent of these fisheries, and size composition of catch is available for 60 percent. The life histories of 86 percent of the fished species are understood. In contrast, the age composition of only 22 percent of fisheries is known and stock assessments are available for only 31 percent of the fisheries.

This analysis suggests information needed to manage for long-term sustainability is being developed. More broadly, it is important to note that the MLMA anticipated managing species with varying levels of information. The tools employed need to match the available information. Equally importantly, fishery management policies can increase essential information over time, allowing use of different management tools which require better information. As an example of how new policies can improve information available, all of the nearshore stock assessments now available [for seven species, but only five have been used in management] have taken place after passage of the MLMA.

As noted above, the MLMA and the Master Plan both require socioeconomic data as well as EFI. But socioeconomic data are virtually non-existent for most fisheries and the FMPs completed so far provide only limited insight into the social and economic aspects of fishing. The NFMP [covering 19 species] identifies a list of socioeconomic EFI and suggests some ways these data could be used, but does not provide a model or framework for prioritizing socioeconomic data or for incorporating the results of socioeconomic analyses into fishery management. If regional management anticipated in the NFMP is to become a reality, better understanding of socioeconomics will be necessary in order to achieve the "fairness" principles in the MLMA.

Table 6. Fishery information reported in Master Plan, 2001

Table 4-2. Status of essential fishery information (EFI) for the 10 highest priority fishery management plans (FMPs) identified in the Master Plan. R = data-rich, M = data-moderate, and P = data-poor (see text for definitions of these categories).

FMP	Species	EFI	Age and growth	Stock distribution	Ecological interactions	Indices of abundance	Movement patterns	Recruitment	Reproduction	Socioeconomics	Total mortality
Sea Urchins	Red sea urchin		R	P	M	M	R	M	R	P	M
	Purple sea urchin		R	P	M	M	R	M	R	P	M
California Halibut	California halibut		R	R	R	M	R	M	R	P	M
Nearshore Sharks and Rays	Brown smoothhound		M	P	P	P	P	P	M	P	P
	Gray smoothhound		M	P	P	P	P	P	M	P	P
	Pacific angel shark		M	P	P	P	M	P	M	P	P
	Shovelnose guitarfish		M	P	P	P	P	P	P	P	P
	Bat ray		M	P	P	P	P	P	M	P	P
Surfperches	White seaperch		P	P	M	P	P	P	M	P	P
	Redtail surfperch		P	P	P	M	P	P	M	P	M
	Pile perch		P	P	M	P	P	P	M	P	P
	Shiner perch		M	P	M	M	M	P	M	P	P
	Walleye perch		P	P	M	P	M	P	M	P	P
	Black perch		P	P	M	P	M	P	M	P	P
	Barred surfperch		M	P	P	M	M	P	M	P	M
	Rainbow surfperch		P	P	P	P	P	P	M	P	P
	Striped seaperch		M	P	M	P	M	P	M	P	P
	Rubberlip seaperch		P	P	P	P	P	P	P	P	P
Sea Basses	Barred sand bass		R	R	M	M	M	P	R	P	M
	Kelp bass		R	R	M	M	M	P	R	P	M
Spiny Lobster	California spiny lobster		R	P	M	M	M	P	R	P	M
Sea Cucumbers	Giant red sea cucumber		M	P	P	P	P	P	M	P	P
	Warty sea cucumber		P	P	M	P	P	P	P	P	P
Subtidal Snails	Kellet's whelk		P	P	P	P	P	P	P	P	P
	Wavy top shell		P	P	P	P	P	P	P	P	P
Intertidal Invertebrates	Top shells (*Tegula spp.*)		P	P	M	P	P	P	P	P	M
	Giant owl limpet		M	P	M	M	M	P	P	P	P
Kelp	Giant Kelp		R	R	M	R	R	R	R	P	R
	Bull Kelp		R	R	R	M	M	R	R	P	M

Table 7. Information available on California fisheries, 2008

		Number of species in category with these data						
Category (from Leet, et al. 2003)	**Total number of species**	**Landings**	**Effort**	**Size composition**	**Age composition**	**Stock assessed**	**Life history**	**No data**
Nearshore inver-tebrates	19	18	8	5	0	0	16	1
Nearshore finfish	68	65	46	47	10	13	54	3
Coastal pelagic species	5	5	3	1	3	2	5	0
Highly migratory species	15	15	7	9	3	7	13	0
Groundfish	19	19	16	19	12	19	18	0
Salmon	4	4	3	4	3	3	4	0
Estuarine invertebrates	6	1	2	0	0	0	6	5
Estuarine finfish	13	8	4	5	1	2	12	5
TOTAL	149	135	89	90	32	46	128	14
% of total		90.6	59.7	60.4	21.5	30.9	85.9	9.4

Source: Adapted from Louis W. Botsford and D. Patrick Kilduff. *The data-richness spectrum and sustainability of California fisheries.* Workshop: Managing *Data poor* Fisheries. December 2008

In addition to requiring EFI and socioeconomic data, the MLMA also set a new direction—ecosystem based management (EBM)-- for fishery management by seeking to ensure both sustainable fisheries and healthy marine ecosystems. The intent to move toward EBM is affirmed in the three FMPs discussed above, but none of the documents state what EBM means and how it will affect management. The NFMP lists a number of possible indicators of fishery effects on the ecosystem but does not provide any conceptual model or framework that would connect these variables with fish production or management. Without these kinds of organizing frameworks it is difficult to assess how management will proceed, whether it will be sustainable, and how the management system will respond to future changes.[75]

Finally, information on recreational take is improving, a critical need. The recreational take is low in some fisheries, such as market squid or northern anchovy. But recreational fishers are responsible for all abalone taken and are active in the near shore fishery: one analyst concluded recreational fishers were responsible for landing more tons of vermillion rockfish in Southern California than commercial fishers from 1970 through 2003.[76] The WSB FMP directly addresses large recreational catches. The state, through both DFG and OPC, has initiated efforts to improve data on recreational fisheries, including improvements to the California Recreational Fisheries Survey, Commercial Passenger Fishing Vessel (CPFV) data, and the "report card" programs for abalone and spiny lobster.[77]

Lessons Learned

1. Whatever the broad patterns may be, it is clear that California lacks the robust data needed to guide management as the MLMA envisioned in 1998 and requires today.
2. The MLMA sought to place fishery management, and the management of other living marine resources, on a solid foundation of scientific information about EFI, socioeconomic information, and understanding of the health of living marine resources other than fisheries. But progress towards this goal has been slow. Most fisheries are still *data poor*, and the Department has yet to make significant progress towards defining – much less towards gathering and using systematically – information about socioeconomics and living marine resources other than fish.

[75] Several commenters pointed out that the draft report failed to define or fully discuss EBM and saw this as a significant shortcoming.

[76] Alex MacCall. *Recreational Fishery Monitoring and Stock Assessment*. PowerPoint presentation to the Pacific States Marine Fisheries Council Recfin Workshop, August 2006, Portland, OR.

[77] The importance of improved information about recreational catch and impacts was emphasized by several reviewers of this draft report. Here is one example: "[M]ore attention should be given to recreational fishing in the report. This is a difficult area but is much more important to sustainable management of California's marine resources than would appear from the report." Here is a second comment: "If the MLMA cannot adequately manage both commercial and recreational fisheries by directly controlling the fishing mortality rate generated by both types of fisheries, it will not succeed in achieving sustainability."

3. When EFI is lacking, scientists agree that the best course is precautionary management – i.e., setting lower harvest levels and using various regulatory tools to limit impacts on fisheries and other living marine resources. Sometimes this creates incentives for fishermen to work with scientists to gather better information; in other cases, it encourages fishery participants to resist the Department's management approach in multiple forums including the FGC and Legislature.
4. While the Master Plan sets out priorities for EFI, it is not clear that DFG's decisions about what information to gather are based primarily on that plan.

Understanding of relevant institutional, policy, and management tools

Earlier parts of this report described California's current institutional arrangements for implementing the MLMA and focused on the problem of fragmented authority. That analysis also reviewed the use of specific policies and tools over the first decade of the MLMA: the Master Plan, FMPs, other management measures such as catch limits (Table 2), and restricted access. The management of new and emerging fisheries also was discussed, along with the role of adaptive management.

Successful management of marine living resources depends on a systematic effort to gather, analyze, and apply knowledge about institutions, policies, and management tools (Figure 1). According to a recent report prepared by the West Coast's four Sea Grant programs: "A major challenge to resource managers and other decision makers in the region is the unmet need for ecosystem-level natural and social science research and information to provide a sound scientific basis for decisions about how best to understand, conserve and rationally use marine resources."[78] This section of the report briefly reviews the significance of these topics and the current lack of a systematic approach by California to benefit from the experiences of other states and countries, and suggests opportunities for improving knowledge.

Institutions

California's institutional approach to marine resource management principally involves the Legislature, Commission, and DFG, with an indirect coordination and resource capability available through the OPC. As analyzed above, this approach contributes to fragmented authority and single-species management. Other states have different institutional structures, and other countries with significant fisheries—such as Canada to the north—also offer potentially useful examples.

Policies

California's policies for managing marine resources under the MLMA, other state laws such as the MLPA, and federal law currently reflect an *ad hoc* approach. As a group the policies are strongly in-

[78] http://seagrant.oregonstate.edu/research/RegionalPlanning/. The 2009 report is titled "West Coast Regional Marine Research and Information Needs," and is the result of a three-year effort.

fluenced by the historic focus on single-species, command-and-control management that emphasizes harvest (Table 4). There is a lack of broad precautionary rules for data-poor fisheries. An example of developing broad precautionary rules for data poor fisheries would start with the categories of species in Table 7 for which size and age composition data are available for less than 50 percent of all species and no stock assessments exist. These criteria would include nearshore and estuarine invertebrates, most nearshore and estuarine finfish and most highly migratory species. For any species meeting these criteria and for which the state has management responsibility, precautionary rules could be developed for the category. As data became available over time, management could shift to individual species.

The Department claims that its policy approach to individual fisheries is consistent with precaution and cites examples for individual fisheries. The Department also asserts that its policies have achieved sustainability, but the data foundation needed to support this assertion is lacking. The Commission's policy on restricted access creates opportunities for precaution, but the policy is not applied consistently. California has resisted experimentation with catch shares, and adaptive management has not been systematically employed. Finally, the role of MPAs in overall marine resource management has not been articulated.[79]

Perhaps even more than knowledge about institutions, knowledge about fishery and marine management policies is an essential element of improving California's ability to achieve its broad goal of sustainability. There is a range of experimentation occurring with catch shares, for example, that merits attention and even a test in California.[80] There is significant learning about the role of MPAs, and increased understanding of models for adaptive management. Research for this report indicates efforts to bring this knowledge to bear in California are uneven at best, and a coherent structure for gathering, evaluating, debating, and applying knowledge is missing.

Management tools

The MLMA rests on core assumptions about the ability to gather information sufficient to develop FMPs. This assumption does not match the record of California's first 10 years of MLMA implementation. Only three FMPs have been developed, which means that most of the state's fisheries are managed using other tools. The Department's interpretation of data requirements for FMPs—reflected in the Master Plan—and the costs of gathering, analyzing, and synthesizing that data, have severely limited the use of FMPs as a management tool. The MLMA identifies FMPs as the principal tool

[79] The draft report generated multiple comments about the need for more explicit and consistent use of precaution given unevenness of available information. One view is that the Commission should adopt a set of default management approaches based on precaution. These could both promote sustainability and create incentives for individual fisheries to support collection of data needed for FMPs.

[80] The New England Fishery Management Council approved a voluntary catch shares proposal for multiple ground fish species in 2009, and NOAA endorsed that approach in March 2010. See: http://www.nefmc.org/press/press_releases/2010/NOAA_NRfinal.pdf.

for managing fisheries resources but provides sufficient flexibility to manage fisheries without the full extent of information needed to satisfy the "data rich" standard for FMPs in the Master Plan. In addition, there is significant activity among fishery researchers and managers at the state and federal levels about how to effectively manage "data poor" fisheries. The Department sponsored a workshop on this topic in 2008 and research for this project indicates this topic is rich with possibilities for improved management tools.

Comments on this report highlight an important set of choices for the state about improved management tools. One view noted above is that the state should devote its limited resources to improving knowledge about managing under data-poor circumstances. In broad terms, this view argues that developing tools for improved data gathering, and then actually gathering data, should be a lower priority than improving management with existing data. Another view is that information gathering should be a priority, along with a more flexible interpretation of the FMP tool. While this report endorses the latter view, that endorsement includes support for increased use of data-poor fisheries management tools. A full exploration of new and emerging knowledge about all management tools should be a priority for improving the MLMA.

RECOMMENDATIONS

Policy makers and managers have greatest control over (1) institutions and policies, and (2) competent and effective implementation. Reliable information is needed to evaluate progress toward achieving the MLMA policy goal of sustainable use of living marine resources. Effective collaboration and interactions with others improves understanding of relevant physical, biological and human systems and of relevant institutional, policy and management tools to inform management actions. The recommendations which follow address all these issues. They are organized to address elements of the basic model for this report (Figure 1) and deficiencies discussed in the body of the report. Each recommendation includes a reference to specific elements of the framework shown in Figure 1.

RECOMMENDATION 1: DEVELOP A BASIC, PRACTICAL MANAGEMENT PLAN FOR LIVING MARINE RESOURCES, CONSIDERING THE MLMA AS ONE TOOL AMONG THOSE AVAILABLE.

This initial recommendation addresses a striking deficiency in California's marine resource management: the lack of a basic, understandable plan. To address this, the FGC should draft a practical, achievable management plan for the next three years that includes goals, objectives, resources, and timeframes to manage living marine resources. The Department should cooperate with the Commission

in developing the draft plan.[81] The management plan should (a) clarify expectations among policy makers, managers and stakeholders about work to be accomplished in the near future, (b) focus energy, and (c) provide a framework for assessing progress toward sustainability and EBM. These steps are critical to more effective management of living marine resources.

Framework Elements Addressed: Sound Institutions and Policies, and Effective and Competent Implementation.

The draft plan should include:

1. Realistic targets for budget and staffing of the Commission for the three-year period. Given the current fiscal situation of California, a likely prudent assumption is no budget augmentation during this three-year period, so emphasis should be given to objectives and management actions that are consistent with current resource levels. Similarly, a prudent assumption is that the budget of the Department's Marine Region will be unchanged.
2. Selection of priority actions among all anticipated regulatory items requiring Commission action and establishment of milestones for progress. A plan for spiny lobster is one possibility. Management options for a limited commercial red abalone fishery off San Miguel Island is another.[82] Consideration of the priority of non-regulatory actions, such as completion of the update to the MLMA Master Plan, should be deferred until a schedule for addressing anticipated regulatory actions is complete.[83]
3. A priority on developing management approaches that encompass more than a single species. The current and foreseeable constraints on available funds for data gathering and FMP development argue for better approaches to utilizing the basic FMP tool required by the MLMA. The statute does not mandate that FMPs focus only on a single species, and there is one example of an existing multi-species FMP for near-shore species. This focus will also afford the opportunity to articulate with MPAs: are there opportunities for FMPs that would align with MLPA study regions and habitats,

[81] Legal counsel for the Department has commented that while the Commission sets policy for the Department the Director is the appointing authority for its employees and "[t]he Commission cannot command the substantial diversion of Department resources that the preparation of this plan entails."

[82] For recent activity by the FGC regarding San Miguel Island see http://www.dfg.ca.gov/marine/armp/sanmiguelisland.asp. This is not a recommendation regarding the appropriate priority for any given item but rather a recommendation that a clear path to decisions in specific time periods be identified for all anticipated regulatory actions.

[83] Regulatory actions, including FMPs, can be simply stated. The single sentence "All fisheries without a quantitative stock assessment shall be managed in accordance with the precautionary approach of setting TAC at 50 percent proxy MSY based on recent catch data" is a fishery policy that could become a regulation. It reflects the precautionary approach of Restrepo *et al*. and would provide an incentive for fishers to support improved data collection and analysis.

establishment of MPAs by the FGC, and monitoring and research including the Monitoring Enterprise?

Importantly, this recommendation does not focus on the MLMA alone, but rather on management of living marine resources, including use of tools available in the MLMA. Shifting the focus to the goals of sustainability and EBM and conscious consideration of which tools will promote progress toward those goals within available resources is preferable to focusing serially on individual policies, including the MLMA. It is also far preferable to expenditure of resources without conscious direction and stated expectations of what can be achieved and what, realistically, cannot. In any three-year period, public resources will be spent managing living marine resources: the FGC will meet, the DFG will be staffed, OPC will operate, and some legislative attention will be given to these issues. In simplest form, this recommendation is to give conscious, public attention to the use of those resources for the common goals of sustainable use and EBM. The management plan can be very simple and short. If the Commission staff (plus any available DFG resources) requires additional support to develop the plan, it should seek such support from other sources including the OPC and the Natural Resources Agency.

The plan may incorporate improvements in developing information, including science and appropriate roles for stakeholder involvement (discussed below), as they are available. However, completion of the management plan should not be delayed for these improvements as it can be adjusted as necessary later. The management plan should evolve over time as required to achieve the goals of sustainability and EBM. The management plan should be informed by the provisions of the MLMA, including those regarding a Master Plan. If experience demonstrates that those provisions are not appropriate they should be modified, including through any needed "clean up" legislation.

Time periods:

- FGC charge to staff, by June 30, 2010
- Staff completes plan draft, by November 30, 2010
- FGC public hearing and action on management plan by February 1, 2011[84]

Framework Elements Addressed:

Sound Institutions and Policies

RECOMMENDATION 2: ADAPT CURRENT INSTITUTIONS AND POLICIES FOR GREATER SUCCESS WITHIN AVAILABLE RESOURCES

This recommendation specifically addresses the limited and fluctuating resources available to manage living marine resources, the modest overall economic value of fishing, and challenges of indi-

[84] These timeframes assume basic continuity in MLMA implementation following next November's elections 2010. They are subject to available resources and workloads, as well as other factors.

vidual "money poor" fisheries whose economic value is insufficient to support expected data collection, research and management. The recommendation encompasses four elements that seek to use existing institutions and policies most effectively given current resources:

A: The Commission should develop a policy that ensures the privilege of harvesting public trust resources carries an obligation to pay for the costs of collecting and analyzing data and the management actions needed for sustainable management.

Fishery participants benefit directly from harvesting public trust marine resources. In light of the legislature's stated intent to move fisheries management to more scientific, data-based decision making, there is a clear need for reliable data and continued management. A majority of the state's fisheries are data-poor and the state cannot afford the costs of collecting, analyzing, and applying data for all those fisheries. Equally, fisheries are expected to pay costs for their management, which includes development of the management tools, their implementation and adaptive management. The Commission, in conjunction with DFG, should develop and implement a policy that requires fishery participants, both commercial and recreational, to bear the costs of data collection necessary for effective management, including development of FMPs and subsequent adaptive management. The same general expectations apply to emerging fisheries: management processes should conform to the requirements of section 7090 of the MLMA.

Implementing this policy may require difficult decisions regarding management of fisheries of modest economic returns that are limited their capacity to fund data collection and other management costs. Among the options to address this issue may be (a) multi-species plans, (b) spatially-bounded plans, or (c) limiting the fishery to a level consistent with the data which can be obtained and management tools which can be used,[85] or some combination of these and other approaches.[86]

B: Successful co-management of fisheries requires a high degree of trust and respect between fishers and managers. At present the necessary trust and respect appears to be lacking in most fisheries. DFG should take the initiative to develop pilot projects in collaborative data gathering and other aspects of fishery management with willing fishers as a step toward developing the necessary trust and respect.

The MLMA and Master Plan promote a collegial and collaborative approach to FMP development and implementation through constituent involvement. DFG, however, appears to interpret constituent involvement rather narrowly as a consultative process with DFG firmly in control. The NFMP

[85] One option that could serve dual purposes of precaution and creating incentives for data collection would be to set Total Allowable Catch based on 50 percent of proxy Maximum Sustained Yield, consistent with the well known "Restrepo" approach to precautionary management. Some comments on the draft report that argue for default management may be consistent with this option.

[86] While beyond the scope of this report, the Legislature may wish to develop a broader "fee for use" approach applicable to all marine resource activities including those where no harvest is involved to address management needs, including enforcement and monitoring. The MLMA recognizes the importance of these values. *See, e.g.*, *Guide to the MLMA* at 3.

describes a number of successful and beneficial projects in which managers, academics and fishers worked together and suggests that more such projects would be a good idea but does not identify any particular candidate projects. Benefits of fisher's knowledge and fleet infrastructure in management as well as the engagement of fishers as part of the process are important components of effective resources management. Ultimately, collaborative research and management provide a way to enhance effectiveness of management and possibly to also reduce costs. Moreover, California has valuable successful experiences on which to build and many other fisheries around the world have also made progress in developing trust and respect among fishers and managers which can be a basis for changed practices in California.

C: Redirect resources devoted to individual fishing permit issues.

One consequence of policy fragmentation is the complexity and inconsistency of license and permit frameworks for different fisheries. For example, the rules for permit transfers are not consistent across fisheries, and the lack of consistency creates confusion and unnecessarily increases time demands on DFG staff. In conjunction with the FGC, DFG should develop and implement a program that significantly reduces the overall resource demands associated with marine fishery permitting, including appeals.[87] The program should simplify, clarify, and bring consistency to license and permit terms and requirements. The intent of this program is to allow DFG to devote more resources to developing its internal science capacities and focusing on MLMA implementation programs including data-gathering, FMP development, and support for pilot programs to evaluate co-management. An additional policy goal is to keep commercial fishing licenses among active fishers and reduce the use of those licenses as valued components of an “investment portfolio” by individuals not actively fishing, behaviors which make management more difficult and divert Commission and DFG resources from their core missions.

Action should be pursued to focus the energy and resources of DFG and the Commission on broader marine resource policy and away from actions affecting only individual resource users. To the extent initial steps to shift responsibilities have been taken by the FGC, these should be supported and further steps identified and pursued. Other agencies in California have experience with Administrative Law Judges or other approaches for similar roles, and other states have addressed relationships with individual resource users differently. To the extent legislation may be required this need should be identified immediately and made part of the overall strategy for achieving significant efficiencies.

D: Continue and complete conversion to electronic record keeping for all fisheries data.

DFG should develop an approach to convert all fishery data collection and record keeping to electronic format, including permits and licenses. This approach should include potential solutions to barriers posed by state procurement systems. This approach should be developed in consultation with the FGC.

[87] See, e.g., FGC §§ 7852.2, 7853; and 7857-58.

Framework Elements Addressed: Sound Institutions and Policies, Competent and Effective Implementation

RECOMMENDATION 3. ENSURE ADEQUATE INSTITUTIONAL AND POLICY AUTHORITY AND CAPACITY TO SUCCESSFULLY ACHIEVE THE GOAL OF SUSTAINABLE USE OF LIVING MARINE RESOURCES

Policies and management authority for living marine resources are fragmented. This lessons learned analysis has focused largely on the Commission and the Department and their respective authorities. Some issues affecting living marine resources are outside of these authorities, including the interface between land-originated wastes or volumes and timing of stream flows into the oceans.

This recommendation includes two specific elements:

A: Improve the capacity of the Commission and focus its work on broader policy and management roles and away from individual resource user actions.

There is good reason to believe that enhancing the FGC capacity in multiple categories will improve management of living marine resources and MLMA implementation. A more capable and focused Commission could work successfully with the Department in establishing and maintaining effective programs in the face of limited resources and consistent pressure from narrow interests to advance their agendas. At present, the Commission lacks capacity to fulfill its current responsibilities let alone expanded responsibilities. This conclusion also applies to the Marine Resources Committee created as a result of the MLMA. The project team considered multiple options for achieving this objective:

- Create a separate marine resources commission, as envisioned in the original MLMA legislation, that includes marine science and fishery participation expertise
- Create a standing external advisory committee to the FGC on marine resource stewardship, including both MLPA and MLMA, filled by people with demonstrated expertise by training or experience
- Enhance the resources and capacity of the Marine Resources Committee of the Commission
- Take the MLPA model of a Blue Ribbon Task Force/Science Advisory Team and expand it to cover broader marine resource stewardship following completion of the MPA planning phase
- Establish an independent budget for the Commission

No specific recommendation among these options, and others which can be developed, is offered in this report. Whatever changes are made must result from interactions among the Commission, the Legislature, the Department, and other interests.[88] Any addition of capacity will

[88] The Department did not endorse any of the four options in the draft report and raised questions or objections for each one. A consistent comment was: "It is unclear how the processing of FMPs will be improved by [cite

require resources that will be hard to find in the state's current and likely future fiscal situation. For this reason, any capacity proposal must identify a source of ongoing funding, including the possibility of a fee imposed for all use of marine resources, e.g., including uses that do not involve harvest.

B: The Legislature should transfer full authority for interpretation of marine fishery management legislation and management of state fisheries to the FGC [and DFG] or other policy making body. The Legislature should not hear appeals from individual fishery groups, either recreational or commercial, for legislation to "fix" their specific problems.

California's current institutional arrangements among the Legislature, FGC, and DFG for managing living marine resources perpetuate fragmentation of authority, create inconsistent policies, and divert limited resources from core tasks to serve individual fisheries.[89] Fragmentation of authority in fishery management, particularly legislative intervention on individual fisheries, undermines effective marshaling of the state's limited resources for MLMA implementation.[90] The Legislature should support science-based decision making over single-fishery preference and reduce fragmentation. There should be no direct or indirect legislative appeal of individual fishery management decisions, e.g., a DFG decision about priority species for FMPs, or the content of a FMP. The Legislature should focus on oversight that is linked to the management plan described in Recommendation 1 above, in addition to budget.

The Legislature transferred some authority for species and ecosystem management to the FGC and DFG under the MLMA, and this likely contributed to reducing fragmentation of authority.[91] However, the Legislature retained the ability to set policy for some individual high-value species and has exercised that authority multiple times since passage of the statute.[92] This lingering fragmentation of authority creates multiple opportunities for single-interest groups or fisheries to "shop" their ideas: they can pursue single-species objectives with DFG, the FGC, the OPC, and the Legislature, sometimes concurrently. According to representatives of both the Department and Commission this system contributes to unproductive and even harmful friction between the FGC and DFG and a lack of unified leadership on marine resource management.

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proposal]." Simply improving the "processing" of FMPs is not the purpose for these options, but rather improving capacity and shifting focus.

[89] The "Treanor Report" addresses related issues, recommending a constitutional amendment to: (1) increase the number of Commissioners from 5 to 7, establish a separate budget for the Commission, increase staff for the Commission itself, mandate that the Commission appoint the Director of the Department, give the Commission oversight/approval of the Department's budget, and change the name of the Commission to the Fish and Wildlife Commission. Robert Treanor, April Wakeman, and Tom Raftican. "The Treanor Report: A Look at the California Department of Fish and Game and the Fish and Game Commission," August 2009, Page 38.

[90] One commenter suggested that reducing fragmentation should be the top priority for this report.

[91] FGC §7051(b). The failed MLMA "Lite" effort amended this provision and arguably would have broadened the authority of the FGC and DFG.

[92] AB 571, discussed earlier in this report, is a recent example.

The option to seek legislative action if state agencies are unresponsive raises significant questions, particularly given the current lack of marine resource experience in the Legislature and the consequences of a legislative enactment. One recent example already mentioned is legislation directing that the OPC establish the Dungeness Crab Task Force (DCTF). According to interviews the DCTF legislation was an outcome of a political strategy by a small group interested in this single fishery.[93] The DCTF legislative mandate effectively moves that fishery forward in the priority system for FMPs, regardless of the Master Plan.[94]

There is no question that oversight and budget authority are bedrock roles for the Legislature, and that constituent, i.e., voter, communication is a fundamental task for the state's legislators. Legislating species- or fishery-specific legislation, however, diverts increasingly limited resources within DFG. Interviews within and outside DFG indicate that the Department lacks personnel resources to address legislative demands without pulling staff, sometimes from a very small group of highly trained scientists, from critical technical tasks related directly to the MLMA (and MLPA). Moreover, while constituent service is a core responsibility of elected officials, narrow legislation aimed at a single species or single community are not consistent with the MLMA's goal of ecosystem-based marine resource management. This narrow, single-species focus is more reflective of political influence than of the science-based policy-making that is an MLMA priority.

One other perspective offered during interviews for this report is that institutional fragmentation is exacerbated by current dynamics involving recreational and commercial fishery participants. This is a complex and sensitive topic, with multiple threads, and beyond the scope of this report to fully describe let alone evaluate. The following merit consideration as possible factors influencing fragmentation that undermines effective marine resource management:

- The MLMA itself represents a basic competition between recreational and commercial fishers for harvest share. The statute reportedly received critical last-minute support for passage and signature from recreational fishing advocates who saw, in part, an opportunity to limit the commercial near shore fishery, which had historically been fished primarily by recreational fishers.
- The halibut trawl bill is a frequently cited example of recreational fishers seeking to reduce commercial take for their own benefit.
- There appears to be a relatively low level of agreement on the impacts of recreational fishing in California, due in part to arguments about data. Commercial fishery impacts are relatively

[93] This report does not take a position about the importance of issues being addressed by the DCTF for that fishery and its participants.

[94] Dungeness crab is not one of the three species prioritized for a FMP in the 2001 Master Plan. In fact Dungeness crab is not on the list of invertebrate species developed for consideration of FMP priority. See pp. 3-6 (Table 3-3), 3-8.

better understood, and some observers appear convinced that recreational fishing advocates are fundamentally opposed to improving data for their fisheries or to a scientific discussion of impacts on fish populations. As discussed above, information on recreational fishing is being improved and this effort should be given continued priority by DFG and the Commission.

- There appears to be a significant and growing difference in the relative influence of commercial and recreational fishery participants, with commercial influence declining and recreation influence perceived as steadily increasing and supported by significant resources.
- In addition to new MPAs, one legacy of the MLPA planning process may be improvements in understanding of interests and communication among some individual commercial and recreational fishery participants and conservation advocates that have the potential to reduce conflicts over allocation.

RECOMMENDATION 4: IMPROVE MANAGEMENT OF LIVING MARINE RESOURCES BY INCREMENTAL STEPS FEASIBLE WITH LIMITED RESOURCES

Framework Elements Addressed:
Effective and Competent Implementation

As shown in Table 2 and Table 4, almost all major fisheries in California are managed with a variety of tools, though only a few are managed with formal FMPs. However, the effectiveness of current management is questioned for fisheries in decline and limited information about emerging and low volume fisheries provides an uncertain foundation for evidence-based management. The characterization as a data poor" fishery can contribute to hesitation to undertake management actions. Similarly, lack of data contributes to hesitation to more fully incorporate ecosystem approaches in fishery management. Meanwhile, a network of state MPAs is being created, based on an ecosystem perspective, but the role of that network for the management of fisheries or other living marine resources is not well articulated.

The recommendations in this section emphasize incremental steps which can improve management of living marine resources with limited resources.

A. Balance management actions and data collection, but structure management processes to increase information about living marine resources, effectively moving toward "Fishery Information and Management Plans."

Lack of information should not preclude or delay management action and available information on living marine resources should increase over time. Fishery policy making and management over the next decade should give high priority to both effective management given existing information and to improving information about living marine resources. No single factor explains why only a few FMPs are completed to this point under the MLMA. However, the general lack of EFI is consistently identified as a significant factor. More recommendations regarding science and EFI follow below, but formal recognition of both the importance of information in fisheries management, including FMPs, and the reality that *management practices can be developed for data-poor fisheries* is fundamental. A shorthand way of capturing this is a change in understanding, if not legal terminology: the goal is to develop effective Fishery *Information* and Management Plans (FIMPs) in which management actions improve information and are informed by it, rather than "FMPs" based on information available at a single point in time. [95]

Implementing this recommendation requires (1) establishing measures of sustainable use of living marine resources (including measures now available) and planning to improve the breadth, accuracy and usability of additional measures over time, and (2) working effectively with others who contribute information about the status of living marine resources, including universities, fishers, other agencies and other sources. Information gathering is costly, and should be explicitly directed to improving the ability of managers and policy makers to evaluate progress toward sustainability.

An immediate step should be to convene one or more workshops to address a straw proposal developed by DFG that builds on ideas and progress from the data-poor fisheries workshop in December 2008. That workshop identified a number of approaches that appear to merit follow up.[96] The objective should be a specific policy proposal for adoption by the FGC that describes how management plans, in-

[95] The Department's legal counsel commented that there is no legal authority for creating "a new product" called Fishery Information and Management Plans. Counsel further commented that the MLMA "values timeliness over completeness of data" and that the statute directs preparation of FMPs based on the "best scientific information that is available, on other relevant information that the department posses, or on the scientific information or other relevant information that can be obtained without substantially delaying the preparation of the plan. FGC §7072(b)." The report's recommendation does not anticipate creation of a new product: it proposes a balanced approach that increases information about living marine resources. This could include devoting resources to analyzing and actually utilizing information already collected but not integrated into decision making. The Department's citation to the MLMA's emphasis on timeliness is notable in light of the inability of the Department to complete any FMPs absent statutory direction. This report supports adoption of approaches that result in timely decision making and does not support approaches that would perpetuate current dynamics.

[96] See, e.g., papers by Ditchman and Prince. These initial recommendations are based on a review of workshop presentations for this project.

cluding FMPs, will focus on improving EFI. This proposal should be consistent with any future modifications to the Master Plan.

B. Set a clear timetable and specify the resources necessary to gather Essential Fishery Information (EFI).

DFG is charged to assemble a database of EFI for each species managed by the state. EFI establishes a benchmark for the scientific data required for effective fishery management. The Master Plan provided a list of variables that constitute EFI, which included socioeconomic variables. The Master Plan also scored fisheries as data poor, data moderate or data rich. Most state fisheries were data poor, indicating that there were major gaps in EFI. Formal stock assessment was not possible, indicating a need for strong precautionary management. The FMPs that have been completed include research programs to gather EFI but no timetable for gathering these data and moving species from data-poor to data moderate or data rich. There is a mixed record at imposing some form of precautionary management on most species that reflects their data poor state. DFG has assembled data to move some species into the data moderate class. But progress in building a base of EFI for most species is slow. Specific steps for this recommendation include defining preferred stock assessment model(s) and linking EFI needs to data required to implement the stock assessment model so that management needs are met in an efficient manner. This work should be linked to the management plan described in Recommendation 1.

C. DFG (in collaboration with the OPC and the FGC) should organize a series of workshops offered by academics and practitioners knowledgeable about effectively incorporating science and information and new policy tools into fisheries management.

A key lesson learned from this report is that evidence of sustainable fishery and marine resource management is mixed at best and does not support a claim of success that can be measured across many species. In too many cases, information required to make a robust judgment regarding sustainability is missing. In some cases species are in decline and current management tools have not yet returned them to sustainable levels. With a limited and shrinking resource base, DFG has been struggling to meet the challenge of day-to-day management under the MLMA and other fisheries management legislation. The FGC equally struggles in its marine policy making and regulatory roles under the MLMA, in part due to information issues. The OPC does not have direct roles in fisheries management but will benefit from increased understanding of fisheries management. Phipps et al. (nd) state that: "Conventional data collection and stock assessment methods, which require large amounts of time and resources, have become a bottleneck in California Fishery Management Plan (FMP) implementation, and in the transition of fisheries to science-based management." DFG is open to alternative methods that are less time-and resource-intensive but these must still satisfy stiff quantitative requirements. This is not only a bottleneck for traditional species-focused management. Expanding the context to include socio-economic considerations and EBM creates additional data

bottlenecks. OPC includes information and science roles in its activities, but its authorizing legislation does not clearly link those competencies to support of management of living marine resources through the authority of the Commission and the Department.

California is not unique in facing the challenges of incorporating improved information and science to support new tools in managing living marine resources. California is also not unique in having limited budgets and personnel and needing to make hard choices about strategic use of management tools. Investments in learning from others can have substantial benefit. Existing approaches in California (e.g., CALFED Science Program and Independent Science Program, MPA Monitoring Enterprise) should be examined for lessons. Personnel at all levels within DFG, the FGC and OPC should be encouraged to participate in these workshops. This effort should be considered as on-going, but with annual review to ensure relevance and effectiveness as part of the management plan described in Recommendation 1.

D. DFG and the FGC should clearly articulate policy regarding MPAs and fisheries.

None of the three state FMPs consider how to integrate MPAs into fishery management. The NFMP identifies MPAs as a primary means of conserving essential fish habitat but provides no real guidance on how existence of MPAs affects fisheries management. As the network of MPAs is established and protection of identified areas begins it is timely to directly address how MPAs will affect fisheries management actions.[97]

Managers and fishery participants need to be clear about whether fish within MPAs are to be considered part of the fishable stock or whether these subpopulations are to be excluded from stock assessments and setting of Total Allowable Catch or other limits to support precaution or more robust management. A workshop to discuss the implications of various policy options may help clarify the choices. The timing and content of such a workshop should support, and not disrupt, the MLPA planning process.[98] Once the policy is clarified, DFG should task a technical advisory committee with developing recommendations for how management models and decisions should take account of the presence of MPAs.

[97] The Department's legal counsel provided this comment: "The interrelationship between fisheries and MPAs has been extensively articulated in the MLPA process. MPAs include marine conservation areas—where fishing can be allowed—as well as 'no take' state marine reserves. The question of whether to count fish within MPAs in a stock assessment is only an issue only [sic] if (a) their take within the MPA is prohibited and (b) the fish are sedentary and would not move out of the designated area. In any case, a stock assessment should arguably account for all individuals, since that number more accurately predicts overall productivity as well as providing a base for determining quotas or total allowable catches."

[98] In particular, this recommendation is not a criticism of the MLPA approach to design of new MPAs. Some commenters suggested a more critical appraisal of the MLPA process would have been appropriate.

E. Clarify the Ecosystem Based Management (EBM) model and how it relates to EFI, habitat protection/restoration, and fishery management.

The MLMA set a new direction for fishery management, emphasizing long term sustainable fisheries over short-term harvest oriented management. Under the MLMA, fishery management was to be part of the overall management of marine ecosystems to ensure both sustainable fisheries and healthy marine ecosystems. MLMA prescribes EBM to achieve this goal. The intent to move toward EBM is affirmed in FMPs, but none of the documents state what EBM means and how it will affect management. The NFMP lists a number of possible indicators of fishery effects on the ecosystem but does not provide any conceptual model or framework that would connect these variables with fish production or management. Without these kinds of organizing frameworks it is difficult to assess how management will proceed, whether it will be sustainable, and how the management system will respond to future changes. Some basic ecosystem thinking could be incorporated into FMPs and all fisheries management actions during routine status reporting, such as food web diagrams to identify predator prey relationships, which may impact other fisheries, and any known relationships between ocean climate cycles and species productivity that may impact future yields.

Over the longer term, California policy makers, managers and users will be advantaged by increased understanding of factors affecting living marine resources and of tools for sustainable management of those resources. Conscious effort should be directed to increasing this understanding, even in periods of limited resources, as it provides the promise of more success in the state's efforts.

RECOMMENDATION 5. SYSTEMATICALLY INCREASE SCIENTIFIC KNOWLEDGE AVAILABLE TO INFORM MANAGEMENT ABOUT LIVING MARINE RESOURCES

Framework Elements Addressed:
Improve understanding of relevant physical, biological and human systems

A. Continue the policy of peer review of FMPs and other important management actions.

MLMA and the Master Plan established that FMPs would be subject to peer review. This is an important advance in the use of scientific expertise in fisheries management. Reviews of the WSB FMP and NFMP suffered from delays in plan preparation and time constraints and uncertainty about how best to proceed. However, the reviews did help legitimize the scientific basis of the FMPs. Experience from past peer reviews should be used to streamline the process to ensure the most efficient use of both reviewers' and DFG staff time. The CALFED science program established a process that has worked reasonably well and DFG could use experience from this program to help improve its own peer review process.

B. Improve the stature of DFG as an organization that runs on a foundation of good science to enhance its credibility as a management organization.

DFG needs to reaffirm the importance of science in sustainable fishery management and the Department's commitment to obtaining good science. At least some staff with the ability and training to undertake good science should be protected from the demands of other management duties and allowed the opportunity to conduct science relevant to implementation of the MLMA, perhaps as leaders of collaborative research teams involving other agencies (e.g., National Marine Fisheries Service) and academics. The successful history of engaging with academics to fill gaps in EFI should be more vigorously pursued and where feasible should be extended to engage fishers and other interest groups.[99]

C. Identify science topics which could inform policy making and management and organize workshops, symposia or other vehicles to assess and make available understanding available to policy makers and managers. Among the possible topics are:

- *Quantitative and conceptual models that underlie management.* Mathematical stock assessment models that provide estimates of yield from data on catch, effort, age structure and growth are fundamental to traditional fishery management. The structure of these models differs among kinds of fisheries (e.g., finfish, shellfish, and crustaceans) but there are well-established models for most kinds of fisheries. Ecosystem-based models that link harvested species to their habitat and to other species in the community can enrich both single-species management and multispecies management. These models provide structure to fishery management science; however, the models were not used explicitly to inform the research programs identified in FMPs.

- *How the broad range of habitat alterations that human activities cause in coastal waters (including estuaries and coastal marshes) are likely to impact productivity of commercial and recreational fisheries and offer ways to mitigate those impacts.*

- *Implications of both cyclical and long-term changes in ocean conditions on California fish stocks and how knowledge of these effects could be incorporated into management.* CalCOFI has long been a focus for the analysis of ocean climate variation and its effect on the marine biota of California and the CalCOFI Symposium in 2009 addresses "Forecasting Fishery Productivity in the California Current," provides a useful starting point.

- *The California Current Large Marine Ecosystem.* The coast of California falls within the larger California Current Large Marine Ecosystem. As Halpern et al. (2009) have shown, this ecosystem is heavily impacted by a broad array of human activities and is highly sensitive to impending climate change. The West Coast Governors Agreement on Ocean Health (WCGA 2006) called for collaborative action on research and education and coordinated manage-

[99] One commenter recommended strengthening this recommendation by encouraging DFG to augment its current pool of technical analysts, and using creating means to obtain expertise such as interagency personnel agreements, or semi-retired scientists from academia or other agencies.

ment to address regional issues in the California Current. It is time to take a more vigorous approach to implementing the WCGA.

RECOMMENDATION 6. SYSTEMATICALLY INCREASE THE UNDERSTANDING OF AVAILABLE INSTITUTIONS, POLICIES AND TOOLS TO INFORM MANAGEMENT OF LIVING MARINE RESOURCES

While California has structures and practices for bringing information and science into policy making regarding management of living marine resources, much less attention has been given to systematically increasing the understanding of institutions, policies and management tools. As suggested by recommendation 5, increased attention should be given to more effective use of science and information and specific recommendations largely build on existing structures or processes. There are no analogous structures and processes regarding institutions, policies and tools.

Framework Elements Addressed:
Improved understanding of institutions, policies, and tools

A. Develop processes to systematically collect, assess, and apply knowledge about institutions, policies and management tools relevant to California living marine resources.

This recommendation can be pursued in a variety of ways, including some which do not incur additional direct costs. An important start is increased reflection, assessment and learning from current activities. Those current activities include not only the implementation of California's policies and management practices, but also state staff participation in PFMC or other resource management processes and existing participation in professional conferences, workshops and other events, plus the flow of ideas and recommendations from interest groups and users who participate in marine policies. The press of current work is always present, so effort is required to look for improved ways of achieving the policy goal of sustainable management of living marine resources. One advantage of a formal work plan which is updated on a regular schedule (recommendation 1) is establishing routines of examination, reflection and possible change.

Other options include assigning the responsibility for identifying possible improvements to a designated senior manager, to short brainstorming sessions with a mix of state officials, interest group representatives, users, and academics, to charging a sea grant fellow or post-doctoral individual to assemble background information on the basis of literature searches and interviews.

B. DFG should convene an advisory committee of social scientists, including economists and social anthropologists, to develop a strategy and a plan for defining essential socioeconomic information and how it can be used in management of fisheries.

Socioeconomic data are virtually non-existent for most fisheries and current FMPs do not provide much insight into the social and economic aspects of fishing. The NFMP identifies a list of

socioeconomic EFI and suggests some ways these data could be used but does not provide a model or framework for prioritizing socioeconomic data or for incorporating the results of socioeconomic analyses into fishery management. If regional management is to become a reality, better understanding of socioeconomics will be necessary in order to achieve the "fairness" principles in the MLMA. Actions under this recommendation should be done within the context of continuing budget constraints and the role that social and economic considerations are expected to play in sustainable fisheries. An initial workshop might be followed by a pilot project (funded through Sea Grant or other appropriate mechanism) to test the ultimate cost and usefulness of socioeconomic EFI in fishery management.[100]

TAKING THE NEXT BIG STEP: INTEGRATED MANAGEMENT OF LIVING MARINE RESOURCES

California can improve implementation of the MLMA, largely by more effective focus of existing resources and authority, and recommendations regarding such improvements are given above. Making progress on these recommendations will improve California's management of living marine resources. A more ambitious agenda can be imagined in response to a broader question:

"How can California move from its current situation of considerable successes, but also challenges, in achieving the goal of sustainable use of living marine resources, to clear world leadership in this important effort?"

In short, instead of focusing on implementing the MLMA narrowly, or even the full set of existing management tools, ask what is needed for successful management of living marine resources across two or three generations of Californians.

One approach would be to move toward integrated resource management. Current institutions, policies, programs, and even science efforts are characterized by fragmentation and modest efforts to understand and manage interrelationships. This is not a call for "tight" control over any current policy making body, program or science enterprise. In contexts of complexity, uncertainty and high levels of change (certainly attributes of living marine resources), systems characterized by organizational fragmentation but high levels of transparency and interaction, working on a foundation of resource allocation directed to achieving desired results, are usually most nimble and effective.

When assessed in terms of long-term capacity along these lines, California has some important building blocks in place already and next steps can be identified. From this assessment it is clear, however, that if California policy makers choose to engage policy making more broadly, they should give high priority to building institutional capacity.

[100] Several reviewers raised a version of the following question: *Why recommend more conferences or meetings that carry costs and uncertain results?* One response is that sometimes a workshop or structured conversation is exactly what is required to identify or clarify problems and potential solutions. A second response is that the state is uniquely situated to convene experts from different disciplines, promote integration, and focus and encourage research.

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APPENDIX ONE:

Passage and Implementation of California's Marine Life Management Act

May 18, 2010

LESSONS LEARNED
from California's Marine Life Management Act

TASK ONE REPORT:
Implementation of the MLMA

May 18, 2010

Prepared by (in alphabetical order):

J. Michael Harty, Michael C. Healey, Suzanne Iudicello,
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Executive Summary

The California Marine Life Management Act (MLMA) of 1998 has been described by individuals involved in its passage and implementation as "dramatic change," a "paradigm shift," and a "new course for management of the State's living marine resources." The legislation was initially introduced by Assembly Member Fred Keeley in February 1997 as AB 1241. That initial version proposed an umbrella statute that would provide a framework for managing all manner of marine life—interactions between birds and fishing nets, depredation of catches by marine mammals, spatial management and marine reserves, allocation and conservation.

While the legislation signed by Governor Pete Wilson in 1998 was considerably narrower in scope than AB 1241 as introduced, it nonetheless called for substantial changes in the way fishery management was conducted in California. New requirements included improved science, wider constituent involvement, and regulatory decision-making supported by fishery information and constrained by limits that would insure sustainable catches. The Legislature transferred to, or created authority for, the California Fish and Game Commission (Commission) and California Department of Fish and Game (Department). However, the Legislature retained policy-making authority for numerous commercial fisheries, including several of high value.

Effective policy implementation depends on specific requirements, powers conferred, resources available, and remedies provided. The changes in legislative language as the MLMA was enacted resulted in a statute with limited explicit requirements, limited powers, no continuing provision of resources, and no remedies for failures. While the intent of the original AB 1241 could understandably be characterized as dramatically changing policies on use of California ocean resources, the MLMA as enacted was narrower in its aspirations. At least as importantly, some of the provisions of AB 1241 intended to achieve more effective policy making, such as establishing a "Marine Life Management Commission" with significant regulatory authority, were removed and/or weakened before passage of the bill. The absence of a stable funding stream and competing demands for scarce resources set the stage for uneven progress in MLMA implementation.

The Commission and Department achieved three of the act's milestones within three years of passage, including approving Fishery Management Plans for white seabass and the nearshore fishery, development of a MLMA Master Plan and publishing the first Status of California's Living Marine Resources. However, significant management activity under MLMA principles and guidance slowed after 2002 in response to an economic downturn, state budget cuts, and an eclipsing of the MLMA by the higher profile process of the Marine Life Protection Act (MLPA), which originally was part of AB 1241 but was enacted separately a year later. The market squid Fishery Management Plan was adopted in 2004, responsive to legislative direction in 2001. The Abalone Recovery and Management Plan adopted in 2005 does not follow the MLMA and no commercial abalone fishery exists in California. In sum, three

fisheries (white seabass, nearshore and squid) currently operate under MLMA Fishery Management Plans. Since passage of the MLMA, significant amendments have been made to the Fish and Game code sections managing valuable fisheries, including Dungeness crab and halibut, without reference to the MLMA.

This report is the first in a set of three documents being prepared to assess lessons from implementation of the MLMA. This report is intended to be descriptive. It will provide a foundation for further research, public input and discussion, and writing of a second report evaluating implementation of the MLMA scheduled to be published this fall. A third report, scheduled to be published at the end of the year, will provide recommendations to improve future implementation of the MLMA.

This initial report has four parts. Part 1 describes the general context for enactment of the MLMA. It covers the basis for fishery management, the evolution of California and federal fishery management in the years leading up to enactment of the MLMA, initial goals and proposals of the sponsors of AB 1241, and the final version of the bill. Part 2 analyzes how the MLMA changed California's policy approach to fishery management. It reviews the statutory language, different expectations about what the Act might accomplish, and the funding available for implementation. Part 3 describes the implementation of the MLMA to date. It focuses on products specified in the Act, including the Master Plan and Status Reports, the Fishery Management Plans for nearshore fisheries and white seabass, and on other plans and regulatory activities. Part 3 also includes a short summary of amendments to the MLMA. Part 4 is a brief conclusion that notes recent changes in federal legislation and explains how this report provides a foundation for subsequent reports focused on evaluation and recommendations.

The information in the report is taken from the statute and legislative history, California Fish and Game Code, regulations, published reports and documents, and interviews with persons who had direct experience with MLMA enactment and implementation.

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Credits for cover photographs:

Lobster pull: Matt Kay and Sam Shrout, taken at Santa Rosa Island

Blue rockfish in kelp: Curt Degler, taken at Bluefish Cove, Point Lobos

Sheephead: Ben Troxell, taken at Channel Islands

Part 1: The Context for Enacting the Marine Life Management Act

MLMA proponents sought major changes in use of ocean resources

The authors of the "Sea Life Recovery and Management Act of 1997 [Sea Life Recovery Act, AB 1241]," which eventually became the "Marine Life Management Act of 1998 [MLMA]," sought fundamental changes in California public policies regarding use of ocean resources. The initial bill sought to address California ocean life management in the broadest sense, including more than fisheries, as detailed below. The bill finally enacted as the Marine Life Management Act of 1998 reflected significant redrafting, inclusion of expert advice, and negotiation over a two-year period. The revisions occurred in a context of increasing public awareness and concern about the dangers of over-exploitation of fisheries, debates about policy responses, and overlapping governmental decision makers.

The years leading up to and immediately following the passage of the MLMA marked a period of profound change in the fishing world. Policy approaches changed in response to cover stories in national magazines describing the collapse of New England groundfish and Pacific coast salmon, widespread public awareness of worldwide declines in fish populations, and the entry of foundations and environmental advocacy groups into the debate on overfishing and bycatch. Policy making previously characterized as responsive to specific fishing groups shifted to a national policy debate about the long-term management of fisheries. This shift culminated in major reform in the federal management structure as amended in the 1996 Sustainable Fisheries Act. The emergence of new policies such as area management and rights-based systems added complexity to what had been a system designed mainly to determine total allowable catch and allocate catch among competing user groups.

In California, the period preceding passage of the MLMA included events such as net bans, wildlife-fishery conflicts, allocation disputes between sport and commercial users, and closure of the recreational abalone fishery except north of San Francisco Bay (no commercial take of abalone is allowed in California). During the late 1990s, west coast salmon abundance had declined to only a fraction of historical levels, damaging the economies of coastal communities in Northern California. Northern Coho salmon were listed as "endangered" under the federal Endangered Species Act [ESA] in 1997, after a long battle among state and federal agencies, lawyers, the courts, and advocacy groups. By 1999, 26 distinct population segments of five salmon species were listed as either endangered or threatened under the ESA, 11 of them in California.[1] Just as on the national scene, conservation and environmental advocates had taken a more active role in fishery management, and in 1992 the first environmentalist was appointed to the federally created Pacific Fishery Management Council [PFMC] groundfish advisory panel.

[1] E. Buck, Congressional Research Service, "Pacific Salmon and Steelhead Trout: Managing under the Endangered Species Act." March 2006.

The drafters of what was to become the Marine Life Management Act derived its principles from the larger national debate about ending overfishing, protecting habitat, reducing bycatch, employing ecosystem principles to fishery management, and sustaining important natural resources. Figure 1 arrays major events related to fisheries on a timeline. Seen in the sweep of events related to fisheries shown in Figure 1 and the evolution of California marine resource authorities seen in Table 1 below, the MLMA is one policy-making effort in a series of institutional design and policy-making efforts initiated long before 1998 and continuing through 2009, with additional changes anticipated in the future. Appropriately, the Figure 1 time line includes not only policy making but also important marine fisheries events or actions, most often linked to a decline in abundance. These changes in understanding of declining fish populations were the stimulus for changes in policies.

Figure 1: Timeline of fisheries related events, 1990s-present

California			Federal
MLMA Events	Other		
	• Limited access in various fisheries prior to 1994-95	1994-95	• SALMON DISASTER DECLARATIONS: U.S. Dept. of Commerce declares federal fishery disaster, enabling release of emergency disaster relief assistance. 5/26/1994 FR doc 94-22078 (Sept. 2, 2994); Aug. 2, 1995; 61 Fed Reg. 17879-17881 (April 23, 1996)
		1996	• MAJOR REFORMS: Passage of Sustainable Fisheries Act. Reauthorization of Magnuson Fishery Conservation and Management Act. 96 Pub. L. 561, 94 Stat. 3275
• Abalone closure		1997	• California salmon listed as endangered/threatened (62 Fed. Reg. 3308 (Jun. 18,1997)
• Legislature passes MLMA AB1241		1998	
	• Legislature passes MLPA • FGC Policy on Restricted Access	1999	
		2000	• PACIFIC GROUNDFISH DISASTER: Declaration of federal fishery disaster in west coast groundfish. The Secretary of Commerce announced the determination of a commercial fishery failure on January 19, 2000.
• First Status of fisheries published as California's Living Marine Resources: A status report • Master Plan		2001	
• White Seabass FMP • Nearshore FMP	• Channel Islands Marine Protected Areas adopted	2002	
• Status report updated with additional species		2003	• Pacific Council incorporates California Rockfish Closure Area, with modifications, into federal area closures to protect groundfish.
• Market squid FMP adopted 2004	• Ocean Protection Council created. Public Resources Code 35600-35625	2004	
	• ARMP adopted	2005	
• Status Updates & State of Fisheries		2006	• Magnuson Stevens Reauthorization Act: California, Oregon and Washington delegated authority to manage Dungeness crab. 104 Pub. L. 208
	• Central Coast MLPA package adopted	2007	
• MLMA Lite (AB 2532) Vetoed	• Dungeness Crab Task Force (SB 1690) created by Legislature, August 2008.	2008	• Secretary of Commerce announces Salmon disaster declaration November 2008, continued in 2009
		2009	• Amendments to WC groundfish plan by PFMC; stocks rebuilding; quota program adopted. 74 Fed Reg 9874 (March 6, 2009)

Policy basis for fishery management

Ocean resources are considered public trust resources and are open to access by all citizens.[2] States grant the public the right to fish, but have a duty to protect and preserve ocean resources.[3] Management of marine fisheries in the United States involves three basic jurisdictions: federal, state, and international. Because fish populations often overlap jurisdictions, management is shared among states, between the federal government and the states, or between the federal government and other countries through bilateral or multilateral agreements. For example, vessels fishing off California's coast in the deep ocean for tuna may be governed by an international agreement administered by the Inter-American Tropical Tuna Commission. Vessels targeting herring or sardines beyond state waters are governed by federal regulations. Nearshore fisheries like squid and crab may come under state or federal regulation, while inshore shellfish harvest is entirely under state regulation.

The United States asserted control over its continental shelf (defined as less than 200 meters in depth) in 1945[4], established a 200 mile fishery conservation zone in 1976,[5] and asserted control over waters within 200 miles of shore in 1983.[6] Within this larger zone, the federal government has exclusive management authority for fisheries that occur in the so-called U.S. Exclusive Economic Zone, or EEZ. The EEZ is that area of the ocean that extends from the seaward boundaries of the coastal states (three nautical miles, in most cases) to 200 nautical miles off the coast of the United States.[7] Generally, a state has authority over fisheries out to three miles, and the federal government has authority from three to 200 miles. Individual states exercise management authority over fisheries that occur within their territorial waters, both fresh and saltwater. Interstate compacts and commissions on the At-

BOX 1.
CALIFORNIA CONSTITUTION ARTICLE 4 SEC. 20. (a) The Legislature may provide for division of the State into fish and game districts and may protect fish and game in districts or parts of districts. (b) There is a Fish and Game Commission of 5 members appointed by the Governor and approved by the Senate, a majority of the membership concurring, for 6-year terms and until their successors are appointed and qualified. Appointment to fill a vacancy is for the unexpired portion of the term. The Legislature may delegate to the commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. A member of the commission may be removed by concurrent resolution adopted by each house, a majority of the membership concurring.

[2] *See, e.g.,* Arnold v. Mundy, 6 N.J. L. 1 (N.J. 1821) (landowner may not stop others from gathering oysters). For treatment of public trust, coastal states and fishery management, *see,* Ocean and Coastal Law and Policy, ABA 2007, at 52-53.
[3] Coastal States Organization, "Putting the Public Trust Doctrine to Work: the Application of the Public Trust Doctrine to the Management of the Lands, Waters, and Living Resources of the Coastal States," [2d ed. 1997] at 17-18.
[4]. President Truman, Proclamation 2667. http://trumanlibrary.org/publicpapers/index.php?pid=159&st=&st1=
[5] Magnuson Fishery Conservation and Management Act, 16 U.S.C. 1801 *et seq*., Pub. L. 94-265 (1976) [MFCMA]
[6] President Reagan declined to sign the Law of the Sea Convention, but established an Exclusive Economic Zone over living and non living resources within 200 nautical miles of the United States coast. http://www.oceanlaw.org/index.php?name=News&file=article&sid=73
[7] Texas, the Florida Gulf Coast, and Puerto Rico have fishery jurisdictions extending nine nautical miles offshore.

lantic, Gulf, and Pacific coasts provide coordination for shared resources among the states.

Beginning in 1852, California asserted a state interest over California fishermen wherever they fished, and over vessels fishing in California waters or delivering landings, i.e., fish, to California ports. The Board of Fish Commissioners, the first wildlife conservation agency in the United States, was created in 1870 "to provide for the restoration and preservation" of fish in state waters. As seen in Box 1, the current Fish and Game Commission [Commission] was established by the state constitution in 1940[8] to protect and propagate fish, with powers to be delegated by the Legislature. The present Commission is tasked with making policy to guide the Department of Fish and Game and has general regulatory powers to set seasons, bag limits and methods of take for fish and wildlife species taken by hunters and anglers.[9]

What is now the Department of Fish and Game [Department or DFG] was established first in the 1920s as a Division of Fish and Game within the Department of Natural Resources. The Department is now one of eight departments under the California Natural Resources Agency. Among its other functions and duties, the Department is responsible for both stream and ocean fishery management programs, projects, and operations. Commercial fishing is limited to the ocean and bays of the state. The Marine Region, where ocean fishery authority resides, is one of seven regional divisions in the Department. Table 1 shows a history of California's living marine resource management authorities.

[8] Article 4, Section 20

[9] Fish and Game Code §§ 200-220.

Table 1. California marine resource management

Year	Action
1850	California statehood
1852	First California Fish & Game Act
1870	Board of Fish Commissioners created
1885	First Marine Patrol launched
1909	Fish and Game Commission reflects additional authority re: conservation
1927	Division of Fish & Game established by legislature; assumes administrative functions of Commission
1937	Fish and Game Commission membership increased from 3 to 5
1940	Constitutional amendment details terms, duties of commissioners
1945	Constitutional amendment delegates authority to regulate sport fishing and hunting
1947	Legislature establishes Marine Research Committee to aid commercial fisheries
1951	Reorganization Act elevates Division of Fish & Game to Department
1952	Marine Research Bureau becomes full branch
1957	Marine Resources Region created
1961	DF&G becomes part of new Resources Agency of California
1969	Department reorganizes to make Marine Resources a separate function for ocean management and protection; advisory committee established
1990	Marine Resources Protection Act directs commission to establish ocean ecological reserves
1997	Statewide Marine Region established
1998	MLMA enacted; delegates more authority to commission to manage commercial fisheries
1999	MLPA enacted to create an improved network of marine protected areas
2004	Ocean Protection Council created by Ocean Protection Act
2007	First package of MLPA marine protected areas adopted for Central Coast

Sources for Table: Department Strategic Plan, 130 Year Anniversary article.

Box 2. MFCMA National Standards

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield (see Glossary) from each fishery for the United States fishing industry.

2. Conservation and management measures shall be based on the best scientific information available.

3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and inter-related stocks of fish shall be managed as a unit or in close coordination.

4. Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

8. Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

9. Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

10. Conservation and management measures shall, to the extent practicable, promote safety of human life at sea.

Federal fishery management

The enactment of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1976 was a turning point in the evolution of commercial and recreational fishing in the United States. Prior to the MFCMA most regulation was carried out by individual states and focused on fisheries within state waters. The purpose of the MFCMA was to prevent overfishing, especially by foreign fleets, and to allow overfished stocks to recover. The statute effectively "Americanized" fishing off the U.S. coast by establishing the Fishery Conservation Zone (FCZ) to exclude foreign fishing vessels.[10] This zone was later expanded to include activities besides fishing, and a U.S. Exclusive Economic Zone (EEZ) was declared in 1983.[11] Although some fish stocks recovered, such as Atlantic herring and mackerel, some experts argue that one consequence of the MFCMA was to replace foreign overfishing with domestic overfishing.[12]

The MFCMA created the current fishery management council system and set standards by which these bodies would manage fisheries in their regions.

[10] 16 U.S.C. §1821, Pub. L. 95-354 (1976). In the period from the 1960s to 1970s, more and more nations extended their fisheries jurisdictions, and the U.S. was one of numerous states that adopted 200-mile fishery zones.

[11] Presidential Proclamation 5030, Exclusive Economic Zone of the United States of America. 48 Fed. Reg. 10605 (March 10, 1983). Even though the U.S. did not join the U.N. Convention on the Law of the Sea until much later, acceptance of the agreement as customary international law influenced the proclamation of the EEZ. The Third United Nations Convention on the Law of the Sea, Dec. 10, 1982, 21 I.L.M. 1245. (Entered into force 16 November 1994) (hereinafter UNCLOS).

[12] M. Weber, FROM ABUNDANCE TO SCARCITY (2002), at 177-178; J.P. Wise, FEDERAL CONSERVATION AND MANAGEMENT OF MARINE FISHERIES OF THE UNITED STATES (1991) at 7.

The national standards (as amended) are provided in Box 2.

Significant additional federal reform occurred in 1996 with passage of the Sustainable Fisheries Act [SFA] and in 2006 with reauthorization including further directives from Congress to halt overfishing.[13] The SFA addressed overfishing in national standards, definitions, and requirements for councils, and in fishery management plans. The SFA set deadlines for fishery councils to update their fishery management plans, stop overfishing, and rebuild depleted fisheries. If the councils failed to take action, the Secretary of Commerce was mandated to step in to take conservation measures. The statutory language was interpreted in regulation and a series of technical workshops to elaborate on how the National Marine Fisheries Service would implement a precautionary approach.[14] The 2006 amendments to the Magnuson-Stevens Fishery Conservation and Management Act prohibited fishing more than maximum sustainable yield, or MSY, for economic or social reasons and mandated that fishery management plans define overfishing using "objective and measurable criteria for when the fishery . . . is overfished."[15]

While the MFCMA had been silent on the issue of bycatch, the 1996 SFA reforms added a definition of bycatch[16] and a new national standard calling for action to avoid bycatch or minimize it where it cannot be avoided.[17] Bycatch reduction is now part of required conservation and management measures in all fishery management plans. Protection of essential fish habitat (EFH) was explicitly cited as a purpose of the SFA and it required councils to develop measures to identify and protect essential fish habitat in fishery management plans by minimizing, to the extent practicable, the effects of fishing on EFH.[18]

California fisheries management before the MLMA

Fisheries management was complex before passage of the MLMA, was not made simpler by that Act, and remains very complex. The challenges of sorting out authorities of the Commission, the Department, and the Legislature are significant and are rivaled by the complexity of determining the authority of the State in relation to that of the federal government. Complexity, ambiguity, frequent disagreement and shifting interpretations frequently provide the context for policy implementation in the United States' federal system, and there should be no surprise that these issues arise in fisheries management policies.

[13] The Sustainable Fisheries Act amended the MFCMA and renamed it the Magnuson-Stevens Fishery Conservation and Management Act. This statute is also referred to as the Magnuson-Stevens Act, or MSA. Congress reauthorized the MSA in 2006 with significant amendments.
[14] Restrepo (Convenor) *et al*. 1998. *Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 of the MSFCMA*. NOAA Technical Memorandum NMFS-F/SPO July 1998.
[15] 16 U.S.C. 1853(a)(10).
[16] 16 U.S.C. §1802 (2)
[17] 16 U.S.C. §1851a(9)
[18] 16 U.S.C. §1853a(7); 16 U.S.C. §1855b(1)-(4).

Prior to enactment of the MLMA, California fishery management authority was exercised by the Legislature, the Department, and the Commission. The remainder of the state's commercial fisheries were generally "open access," meaning anyone could fish, unless regulated specifically by federal or state law. According to the Marine Region's website, management under this division of responsibility was "complicated, piecemeal, and oftentimes untimely, with necessary regulatory changes only occurring after much political deliberation and approval by both the Assembly and the Senate."[19] The pre-MLMA management approach has been described in legislative history, hearing records and interviews for this report as *ad hoc*, constituent casework, where industry and processor representatives had the ear of long-term members in the Assembly and Senate and relied on them for "quick fix band aids."

BOX 3. Legislatively Managed Fisheries

Barracuda, California (§§8382, 8384, 8386)
Bonito, Pacific (§8377)
Clams (§§ 8340-8343, 8346)
Croakers (spotfin croaker, yellowfin croaker, and California corbina; §8373)
Dungeness crabs (§§8275-8284)
Far offshore fishing (§§8110-8114)
Grunion (§8381)
Hagfish (§9001.6)
Halibut, California (§§8391-8392)
High seas interception salmon (§§ 8120-8123)
Marlin (§8393)
Scallop (rock, speckled; §8345)
Shark, angel (§8388)
Shark, leopard (§8388.5)
Shark, white (§§5517, 8599)
Skipjack (§8378)
Striped bass and sturgeon in nets (§8370-8371)
Surfperch (species not primarily inhabiting rocky reef or kelp habitat in nearshore waters; §8395)
Tuna (bluefin, yellowfin, albacore; §§8374-8376)
Yellowtail (§§8382, 8384, 8386-8387)
And, all other species not specifically listed in either Title 14 or Fish and Game Code §8140 and not primarily inhabiting rocky reef or kelp habitat in nearshore waters.

By the time the MLMA was introduced, the Legislature had enacted detailed fishery management measures including licenses, permits, fees, landings taxes, record keeping and reporting requirements, seasons, bag limits, gear restrictions, participation in federal buy-back programs, findings on state-federal fishery conflicts, reduction plant rules and standards, aquarium collection policies, enforcement policies, penalties, and limited entry programs covering dozens of species. The Legislature had also created advisory committees for salmon, Dungeness crab, recreational and commercial abalone fishermen, squid, gill and trammel net users, and sports fishermen interested in the Bay Delta Sport Fish Enhancement Stamp Fund. The Legislature specified how money from marine fishing fees, licenses, taxes and stamps would be spent. Commercial marine species for which the Legislature has complete management authority are listed in Box 3 with reference to the respective Fish and Game Code sections. However, term limits had resulted in departure of most legislators experienced with fisheries by 1998.

[19] http://www.dfg.ca.gov/marine/faqindx.asp FAQs: How has the Marine Life Management Act changed the responsibilities of the California Department of Fish and Game and the Fish and Game Commission?

According to its strategic plan,[20] the Commission's authorities before passage of the MLMA numbered more than 200 specific powers and duties, all of them delegated by the Legislature. These authorities included complete management for sport fisheries, including species taken in both sport and commercial sectors.[21] In addition, the Legislature had authorized the Commission to manage commercial fishery capacity reduction plans, and manage both sport and commercial fisheries for tidal invertebrates, kelp and aquatic plants, mussels, shrimp and prawns, abalone, sea urchins, and about two dozen fish species. The Legislature had also delegated limited authority to the Commission for management of commercial fisheries for a number of species managed under FMPs developed by the PFMC: coastal pelagic species (anchovy, mackerel, squid,[22] sardine), highly migratory species (sharks and swordfish), salmon, squid and groundfish. This authority was limited to adopting regulations not in conflict with the federal rules. The Commission also had authority for issuing and revoking permits for lobster. The Legislature also had directed the Commission to establish a capacity reduction program and provided authority to establish a fee system to be used to assist in federal buybacks of fishery permits and vessels.[23]

The Department collects and assesses information on marine species, provides scientific information to the Commission, implements and enforces regulations adopted by the Commission or enacted by the Legislature, implements and enforces federal fishery laws, has the authority to conform state regulations to federal rules, and monitors the effects of regulations. The budget for the Marine Region is funded by revenues from general funds, environmental license plate fees, federal trust funds, fishing licenses, landing taxes, permit fees and enhancement stamps. According to the Guide to the Marine Life Management Act, the Marine Region received its first major appropriation from the General Fund in FY 1999-2000 to implement the MLMA.

Before MLMA, the Department also managed in accordance with legislative delegations, captured in the Fish and Game Code. The general provisions outlining the Department's authority are found in Sections 1-89.1, 700-714, 850-858, 1000-1019, 1700, 1802, 2000-2019, and other chapters and sections related to conservation, wetlands, endangered species, importation and so on.

Sections of the Fish and Game Code related to fisheries and enacted prior to 1998 (though some were amended by the MLMA) are found in §90-99.5 (Marine Life Definitions), §1590-1591 (Marine Managed Areas), §2760-2765 (Fisheries Restoration), §6900-6930 (Salmon, Steelhead Trout and Anadromous Fisheries), §7100-7400 (Sport Fishing), §7600- 9055 (Commercial Fishing). The Department has authority to issue commercial fishing licenses, but the Commission has authority to revoke them. The Legislature delegated to the Department some duties for salmon management; authority to open and

[20] *California Fish & Game Commission Strategic Plan*, Dec. 4, 1998, p. 10

[21] This meant potentially different rules, adopted by different levels of government in response to different interests, for the same species being fished in the same state waters.

[22] The PFMC has delegated market squid management to the state as long as measures are consistent with the federal plan.

[23] Fish and Game Code §§7630, 8100-8104, 8125-8126.

close crab, halibut, shark and swordfish fisheries; duties to conduct research, begin development of a plan, and meet with an advisory committee for market squid. Perhaps the most stunning example of the tri-partite management system was the scheme for herring.[24] The legislature delegated regulatory power to the Commission, but directed the Department to meet with stakeholders to discuss the policies and regulations set by the Commission. The statute set some rules about permits, including a complex point system to evaluate experience that would qualify an applicant for a permit, but left it to the Commission to determine who had "experience." The Department had to issue the permits, but in accordance with the legislature's criteria, and within limits on the number of permits set by the Commission. The Commission and the Department both had authority to revoke permits, but some cases for reissuance were mandated in the statute. Some fees were set in the statute, and the Commission was delegated authority to set others. The fishery is managed with substantial data and the plan included a CEQA document. The herring management approach operated for about 20 years with considerable public involvement and recognition, but recent stock declines led the Department to recommend closure in the ocean fishery (see Part 3 "Other Plans").

California fishery management interacts with the federal system in several ways, and the MLMA does not appear to have changed these interactions. Federal laws governing take of marine mammals, sea birds and endangered or threatened species pre-empt state fishery law. California was recently delegated authority under federal law to manage Dungeness crab.[25] Though the state always had management authority for Dungeness crab in state waters and could regulate California fishermen in federal waters in the absence of an FMP, or any fishermen landing crab in California ports, The Department could not regulate fishing activity by fishermen from another state fishing in federal waters off the California coast and landing in another state. California, Oregon and Washington had already agreed to work together for the benefit of the Dungeness crab fishery, but the federal legislation was necessary to enable the three states' managers to control activity at the borders between the states.

Some California species, such as sharks, are covered under federal management plans developed by the Pacific Fishery Management Council. The Department's Director, or his or her designee, is a voting member of the PFMC. State regulations that cover species also managed in federal waters may be stricter than federal rules, but not less stringent. California is part of a multi-state compact that created the Pacific States Marine Fisheries Commission in 1947 as a means to help harmonize regulations governing the harvest of species that occur in waters of California, Oregon, Washington, Idaho and Alaska.[26] The Department's director, a member of the legislature and an individual serve as commissioners. The PSMFC does not have regulatory powers: it serves primarily as a coordinating and funding entity, which fosters activities such as the tri-state Dungeness crab committee, research projects, and maintenance of

[24] Fish and Game Code §§ 8550-8559.

[25] Magnuson-Stevens Reauthorization Act, Pub. L. 109-479, Sec. 302(e) as amended through Jan. 12, 2007.

[26] Pacific States Marine Fisheries Commission Compact. Pub. L. 332, amended by Acts approved October 9, 1962 (Public Law 87-766, 87th Congress, 76 Stat. 763) and July 10, 1970 (Public Law 91-315, 91st Congress, 84 Stat. 415). (California F&G Code Section 14000-14002)

data bases of landings for both recreational and commercial fisheries. (See Section on Science for a list of California projects through the PSFMC)

Restricted access

Restricted access, in various forms, is a complex fishery management tool employed by California prior to and following passage of the MLMA. One challenge in implementing (and understanding) any policy (in this case the MLMA) is that it must be implemented in the context of other policies and other policy tools which plausibly address the same policy objectives. Restricted access policies illustrate these issues as the MLMA is implemented. A background paper on restricted access fisheries, including application of limited entry and restricted access in California is included at Appendix 1. Subsequent reports will take up evaluation of the use of the two sets of policy tools and possible recommendations for their more effective use singly or together.

Table 2 summarizes the fishery, species and gear types of California fisheries that have some form of restricted access. Some restricted access programs preceded the Commission's 1999 policy or were developed under other authority, as noted in the table.

Since its adoption, the policy has been the topic of Commission discussions at meetings in 2005, 2007, 2008 and currently. Review and adaptation of the policy is listed as a long-term priority on the Commission's policy agenda. There is some discrepancy between the policy and the MLMA about whether restricted access programs are to be reviewed every four years or every five years. There also have been problems with inconsistent standards for inclusion in limited entry fisheries between the Commission's policy on permits (Section 5) and the statutory requirement for inclusion of licensed fishermen in limited entry programs (Code Section 8101-8104). This conflict arose in the market squid fishery FMP, for example. A review of the restricted access provisions of the Dungeness crab program in 2002 found that it was only partially consistent with the Commission's policy and failed to limit the number of traps used in the fishery, therefore not achieving any actual reduction in effort.

TABLE 2. Restricted Access Commercial Fisheries

Fishery	Species	Gear	Authority	Restriction/Date
Salmon	Coho, Chinook, pink salmon	Troll, gillnet	Legislature; PFMC FMP	Limited entry permit (1983)
Herring	Pacific herring, sac roe	Gill net	Commission	Sac-roe fishery is limited entry (1973-1974)
Coastal pelagics except squid	Anchovy, sardine, smelt, mackerel	Purse seine, lampara, brail and dip nets	PFMC	Limited entry (1999) capacity goal (2003)
Nearshore finfish	See NFMP Chapter 2, FGC 8586(a)	Traps, lines	Commission	Restricted access (2002)
Dungeness crab	Dungeness crab	Traps	Legislature	Vessel-based restricted access (1992)
Cucumber	California sea cucumber, warty sea cucumber	Dive	Legislature and Commission	Permit (1992); limited permits (1997-1998)
Lobster	California spiny lobster	Traps	Legislature	Restricted access (1997)
Spot prawn	Spot prawn	Traps	Commission	Restricted access (2002); vessel permit (2004)
Pink shrimp	Pacific ocean shrimp	Trawl	Commission	Limited entry 2001 (northern region)
Urchin	Purple, red sea urchin	Dive	Commission	Restricted access (1989); effort reduction (1990)
Finfish trap	All finfish south of Point Arguello	Trap	Commission	Restricted access (2002)
Highly Migratory species	Highly migratory sharks, swordfish, tuna	Drift gillnet, longline	Legislature, PFMC plan carries forward for these and other gears	Limited entry (2004)
California halibut	California halibut	Gillnet, trawl	Legislature and Commission	Halibut permit program (2006)
Market squid	California squid	Seine, brail and light boats	PFMC/Commission	Restricted access 2005; permit moratorium 1998
Groundfish (not nearshore)	Sablefish, sole, rockfish,	Longline, trawl, set lines, gill and trammel nets	PFMC	Limited entry (1992)

The goals of the authors of the MLMA are adjusted in the legislative process

The drafters of Sea Life Recovery and Management Act wanted to create a framework to address California ocean life management in the broadest sense. They did not set out to create a law focused on fishery management plans. Their broad vision was a statutory umbrella under which managers could tackle all manner of wildlife-fishery conflicts: seabird entanglement in gillnets or sea lion predation of sport boat catches, area management, recovery of depleted species, marine habitat restoration, and ecosystem protection for all marine and tidal areas. The Legislative Counsel's digest described the measure as follows:

The bill would create the Marine Life Management Commission and would delegate to that commission the authority to determine and declare, by regulation, state policy on marine ecosystems, anadromous fisheries and their habitat, and ecosystems, marine mammals, birds, fish, invertebrates, and other wildlife and their habitats in the coastal zone and all marine and tidal waters of the state.[27]

The proposed legislation was a response to a shift in public opinion and the political balance among stakeholders. California's commercial landings, and the related influence of industry in the Legislature, were declining during the mid-1990s, while the influence of recreational anglers and conservation advocates was on the rise.

Author and new Assemblyman Fred Keeley also wanted to get away from legislative micromanagement of California's commercial fisheries. The accepted practice was that industry representatives went to specific members of the Assembly and Senate committees (Water, Parks, and Wildlife or Natural Resources in the Assembly, Natural Resources and Wildlife in the Senate) with requests for "fixes" for their respective fisheries. The case-by-case legislative responses were not consistent in their requirements for information or management approach. In comments to the Assembly Committee on Water, Parks and Wildlife, Keeley once called the result "a hodgepodge of complex, inconsistent regulations" that took authority away from the Department and Commission.[28]

A practical problem with this way of setting fishery policies was that the need to adopt in-season management adjustments did not follow the legislative calendar. Additionally, term limits (taking effect after the 1996 election) nearly eliminated the institutional knowledge of fishery management from key committees in the 1997-1998 sessions. Departing legislators of 20 or 30 years took with them knowledge of the fishing ports, the key participants including commercial and recreational fishers, fishing-related businesses, and environmental and conservation advocates; new legislators lacked this knowledge.[29]

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[27] AB No. 1241, Feb. 28, 1997.

[28] Hearing analysis for Assembly Committee on Water, Parks & Wildlife, concurrence in Senate amendments, 8/27/98

[29] A dramatic illustration of the consequences surfaced when the Department and Commission recognized that abalone was in serious trouble in 1997. Managers had to rely on 180-day emergency authority to close recreational and commercial fisheries, but required introduction and passage of a bill in the Legislature to continue the

Although it differs in several ways, MLMA drafters drew from the federal SFA [discussed above], including policy tools based on concepts about scientifically based catch limits, halting overfishing, avoiding bycatch and protecting and restoring essential habitat. As introduced, the bill declared a policy of long-term sustainability and conservative management, explicitly calling for application of the precautionary approach to management decisions. It included a three-tiered system[30] of fishery management, based on availability of "essential fishery knowledge," with more risk-adverse management for fisheries with the least information. The measure required the gathering of *Essential Fish Information* to guide the preparation of fishing management plans, prescribed research and observer programs, and defined and prohibited fishing methods that were destructive of sea life. The original measure also called for creation of a "Marine Life Management Commission'" separate from the Fish and Game Commission, with specified representation among the members, significant policy and regulatory authority, and paid staff.

Shortly after introducing the bill in his freshman term in the Legislature, Keely started over and asked for a re-drafted bill that would set general policies for all marine life management, and left out considerations of marine protected areas, the commission, marine mammals and birds, and focused on specific policies for fishery management. By the time the bill was considered by the Assembly Committee on Water, Parks and Wildlife in 1998 it had been amended considerably.[31] One of the bill managers recalls that there were multiple lists of amendments, negotiations, and changes of words, phrases and entire sections in the course of achieving the compromises required for passage of a bill.

In the final legislation, the proposal for a separate Marine Life Management Commission was pared down to a Marine Committee within the Commission. The definitions of "precautionary approach" and "ecological safeguard" were gone, as was the initial mandate for a three-tiered approach to setting limits based on the availability of data. Legislators also removed the section on "Marine Ecosystems Replenishment Zones," (although in the following year the Legislature passed the Marine Life Protection Act, or MLPA, which called for a network of marine protected areas along California's coast).

The final version of the MLMA detailed procedures by which the Department would gather essential fish information, prepare fishery management plans, and issue regulations, thus providing legislative authority for the Department to set policy and develop management measures to regulate com-

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measure. The relevant committees, however, had new members with no history on the issue, no constituent context, and no experience dealing with hearing rooms full of unhappy stakeholders.

[30] "The department, with the advice and concurrence of the commission, shall establish and adopt, by regulation, a program for managing three categories of marine and anadromous fisheries. The first category of fisheries shall be those established fisheries that, with the advice and concurrence of the commission, the department finds meet the criteria of essential fishery knowledge, as defined by the commission. The second category of fisheries shall be those established fisheries that, with the advice and concurrence of the commission, the department finds do not meet the criteria of essential fishery knowledge,. The third category of fisheries shall be all new or developing fisheries." AB 1241 Sec. 72231.

[31] Though the bill was introduced in 1997, and referred to CWPW, it was postponed, and taken up "with author's amendments" in Jan. 1998. Complete bill history, AB 1241.

mercial fishing of certain species. In enacting the MLMA, the Legislature agreed to shift decisions about fishery management of selected species to the Commission and Department. The Legislature chose not to transfer all management authority, however; it retained authority for fisheries it had historically regulated.[32]

After hearings and mark-ups in the two Assembly committees and a floor vote, the bill passed to the Senate in late January 1998. From its first hearing, where no opposition was recorded in the legislative analysis, the bill garnered objections from a half dozen industry associations and 13 individuals. The Governor's office opposed the measure "to the eleventh hour" according to legislative observers. The bill managers also note that the Department was on record in opposition to the measure. Also on the supporting side were a dozen conservation and public interest groups, 27 individual scientists and the California Association of Professional Scientists, 50 individuals, anglers, divers, the Pacific Coast Federation of Fishing Associations and every major California newspaper.[33] The Senate Natural Resources, Senate Appropriations and Senate Rules Committees all exercised jurisdiction over the bill and the Senate adopted it in late August. The Assembly concurred in the Senate amendments and the Governor signed the bill on September 30, 1998.

After the legislative negotiations, compromises, amendments and word changes, here is one insider's view of the result: "greater delegation of authority by the Legislature to the Fish and Game Commission and the Department of Fish and Game, the priority of long-term benefits and sustainability over short-term benefits in our use of marine resources, an ecosystem perspective that includes more than fisheries, and a strong emphasis on science-based management developed with the help of those most knowledgeable and concerned about the health of the ocean and our fisheries."[34]

[32] The extent to which policies of the MLMA have been applied to management other than through creation of a FMP is dicussed in the main report.

[33] Legislative counsel analysis; San Diego Earth Times (1998); see, e.g. Sacramento Bee, "Victory at Sea," Sept. 17, 1998.

[34] Assembly Member Fred Keeley, letter covering publication of Guide to the MLMA. It is worth noting that these comments do not emphasize simplification or reduction of management complexity.

Part 2: How the MLMA Changed Fishery Management

The MLMA specified in language several fundamental elements of fishery management : it explicitly declared that the purpose of management was sustainability;[35] it increased authority in the Department and Commission; it described specific tools and policies that bolstered the scientific basis for decision-making; it made fishery management plans the primary tool for management; and it prescribed a planning process that emphasized constituent involvement. However, the Legislature remained deeply involved in fisheries policies. Notably, responsibilities shifted to the Commission included only fisheries where the Legislature had not yet developed policies. As seen in Table 3, one of the highest value fisheries, market squid, is managed under an FMP, while another, Dungeness crab is not managed by the Commission under a plan, but by the Legislature with statutory measures.[36] Of the other high value species, none is included in an FMP developed by the state, though several are in FMPs developed by the PFMC and the Department reportedly is considering development of an FMP for lobster.

[35] The mission statements of the Department and the Commission are slightly different. The mission of the Department of Fish and Game is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and ***for their use*** and enjoyment by the public. (1990-2009) The Mission of the California Fish and Game Commission is, on behalf of California citizens, to ensure the ***long term sustainability*** of California's fish and wildlife resources. (1998) Emphasis added.

[36] In fact, the Legislature recently directed formation of a Dungeness crab task force by the Ocean Protection Council. This initiative reportedly is on hold due to California's budget crisis.

Table 3. Top Ten California Fisheries for 2007 and Policy Responsibility

Rank	LANDING WEIGHT		LANDED VALUE	
	Species	Pounds	Species	Landed Value
1	Sardine, Pacific	178,480,103	**SQUID, CA MARKET**	$29,093,312
2	**SQUID, CA MARKET**	108,990,594	***Crab, Dungeness***	$26,892,110
3	Anchovy, Northern	22,901,916	Sardine, Pacific	$8,218,158
4	**Sea Urchins**	11,131,171	Salmon, Chinook	$7,835,240
5	Mackerel, Chub	11,060,845	**Lobster, CA Spiny**	$6,915,601
6	***Crab, Dungeness***	11,024,395	**Sea Urchins**	$5,400,279
7	Sole, Dover	6,100,906	Sablefish	$4,872,745
8	Hake, Pacific (Whiting)	5,888,062	Swordfish	$3,126,635
9	Sablefish	3,240,434	**Prawn, Spot**	$2,879,716
10	Sole, Petrale	2,019,594	Sole, Dover	$2,376,031

Species for which the F&G Commission shares management with the Pacific Fishery Management Council.

Species managed solely by the California Legislature.

Species the F&G Commission manages.

SPECIES THE F&G COMMISSION MANAGES WITH FMPS DEVELOPED UNDER THE MLMA.

Source: National Ocean Economics Program, http://noep.mbari.org/LMR/topTenResults.asp?selRegions=PF&selStates=6&selYears=2007&selOut=display&noepID=unknown

MLMA provisions and policies

The MLMA contains findings, policy statements, objectives, mandates, and both optional and prescriptive tools and procedures, all of which incorporate the idea of sustainability. At the core, and the driver for each of these elements, is the overarching policy of conservation, sustainable use, "and, where feasible, restoration of California's marine living resources for the benefit of all the citizens of the state."[37] The word "sustainable" is used 16 times in the 10 sections of the MLMA. This is a distinction from the prior management paradigm that emphasized management for use and accommodation of the needs of user groups according to interviews for this report. (Before its repeal by MLMA, § 1701 of the Fish and Game Code directed managers to "conserve, utilize and manage" marine resources and promote commercial fisheries.) In a strategic plan published in 2000, the manager of the Marine Region described the new policies and directions mapped by the MLMA as "the most significant changes to management of California's ocean resources in 50 years."

[37] §7050(b).

One reason MLMA was seen as substantially different from previous law was its emphasis on maintaining the health of fish populations and the ecosystems that support them. Its extension of sustainability to the ecosystem and biodiversity, beyond the target resource, was seen at the time as broadening the scope of conservation. The stated objectives of the MLMA's sustainable use policy are:

- conserve ecosystems and marine resources,
- allow and encourage only sustainable activities,
- recognize non-consumptive values as well as the economic value of marine resources.
- support and promote scientific research,
- use best scientific information available or other information that can be obtained without delaying plan preparation,
- engage all stakeholders,
- promote education and information on the status of resources, and
- foster regional and international cooperation.[38]

Box 4. Precautionary Approach

"The precautionary approach implements conservation measures even in the absence of scientific certainty that fish stocks are being overexploited. In a fisheries context, the precautionary approach is receiving considerable attention throughout the world primarily because the collapse of many fishery resources is perceived to be due to the inability to implement timely conservation measures without scientific proof of overfishing."

NOAA Technical Memorandum NMFS-F/SPO-## July 17, 1998

The law requires that marine fisheries be managed to maintain the long-term sustainability of the resource and fishing communities by adhering to maximum sustainable yield, conservation and restoration of habitat, rebuilding depressed (overfished) stocks, and limitation of bycatch. It also describes a fishery management system that employs best available science, an open decision making process, and a fair means for dispute resolution; is responsive and adaptive to new information and changing conditions; and is reviewed periodically for effectiveness. The system is to reflect awareness of the long-term interests of user groups. The law does not require, but does provide guidance and options, for the Department to allow or encourage fishery participants to determine methods to reduce excess capacity, participate in research, and propose collaborative approaches to management.[39] Fishery regulations are to conform to the stated policies.[40]

In addition to changing the purpose of fishery management, the MLMA changed the structure and process of management. The MLMA transferred permanent management authority to the Commission for the nearshore finfish fishery, the white seabass fishery, emerging fisheries, and other fisheries for which the Commission had some management authority prior to January 1, 1999. The law required the Commission to form a Marine Resources Committee. The legislative analysis for the Senate Natural Resources Committee describes a "new balance of authorities" that increases authority for the Commis-

[38] §7050(b) (1) - (9).
[39] §7055, §7056 (a) - (m).
[40] §7058.

sion and Department, taking the details of management out of the Legislature while retaining "a significant amount of Legislative oversight."[41] Authors of the legislation agreed in interviews that the purpose was to give more authority to the Department and Commission, but with detailed guidelines written into the law to be sure both entities followed the desired process. The Senate analysis describes comprehensive decision guidance from the Legislature: "The bill lays out a series of checks and balances between the Department and the Commission tempered by comments from independent peer reviewers."

Section 8140 of the FGC states that "[a]ll fish, the taking of which is not otherwise restricted for commercial purposes, by state or federal law or any regulations adopted pursuant to those laws, may be taken at any time for commercial purposes." Interviews and research for this project revealed different views about the relationship of this provision to the MLMA's emphasis on long-term sustainability, and whether the MLMA reflects a basic shift in the management paradigm. For example: in situations where managers lack data to demonstrate sustainable catch levels , does the MLMA effectively create a requirement to demonstrate that harvest of a target stock will not cause harm? Are catch levels effectively limited by the role of precaution where EFI is lacking? Or may fishers catch as much of a species as they possibly can, without limit, absent explicit regulations? [42] There is a view that the MLMA created a default position in favor of protecting the resource from commercial activity until management measures for sustainable use could be adopted, whereas the prior approach was to allow any species to be harvested until the Department could show there was a reason to restrict that harvest. In some ways these different views reflect debate on the national and international scene about application of the precautionary principle to fishery management, defined in Box 4.[43]

The definition of "precautionary approach" and the specific requirement to use it were deleted from the MLMA in Senate amendments. Proponents of a strong interpretation of the MLMA argue that provisions calling for management by MSY, best available science, prevention of overfishing and rebuilding of depressed stocks, adaptive management, improved science and the extensive requirements for building a foundation of fishery information all point to an approach that embodies the precautionary principle. Evidence that this approach influences the Department is seen in the strategic plan adopted by the Marine Region after passage of the MLMA which includes the following strategy as a means to achieve the objective to improve management response and effectiveness: "Shift the 'burden of proof' from the management agencies to the fisheries. Develop a more precautionary approach to fishery management."[44]

The point of the precautionary approach is to manage with or without information, the latter requiring more risk-averse decision making. The role of fishery information—its acquisition, quality, application and dissemination—received considerable attention in the MLMA. The Nearshore FMP, cov-

[41] California Senate Natural Resources and Wildlife Committee, Bill Analysis, June 23, 1998.
[42] *See, e.g.*, FGC §7056; Guide to the MLMA at 17.
[43] *See, e.g.,* Guide to MLMA at 17; Congressional Research Service 2005; Restrepo *et al.* 1998.
[44] Marine Region Strategic Plan, Goal #3, at 36.

ered in more detail below, provides examples of the application of the precautionary approach in the absence of fishery information. The Act requires decision-making using the best available scientific and other relevant information. "Other" essential fishery information listed in the law includes "information about fish life history and habitat requirements; the status and trends of fish populations, fishing effort, and catch levels; fishery effects on fish age structure and on other marine living resources and users, and any other information related to the biology of a fish species or to taking in the fishery that is necessary to permit fisheries to be managed."[45] The first plank in the information platform was to be an annual report on the status of California's sport and commercial fisheries. Each report was to cover one-fourth of the fisheries so that information on every fishery was updated every four years. (§7065)

The MLMA requires that scientific information undergo peer review and provides options and tools for implementing that review. (§7062) The Department is to conduct and support research and encourage the participation of fishermen in the design of projects and collection of information. (§7060(c)) The Act also calls for preparation of research protocols for fisheries identified as highest priority. (§7074)

Fishery management plans [FMPs] are the primary basis for managing California's sport and commercial fisheries under the MLMA. (§7070) The MLMA requires that FMPs:

- be based on the best available scientific information,
- fairly allocate increases or restrictions on harvest,
- be developed with advice and assistance from fishery participants and other fishery institutions,
- undergo peer review,
- be available for public comment,
- be submitted to the Legislature for review if they would make inoperative a statute, and
- be accompanied by necessary regulations that are adopted in accordance with the Administrative Procedure Act.

The MLMA exempts FMP regulations from review under CEQA.

The law also calls for a template, a Master Plan, to be prepared by the Department and submitted to the Commission for approval. This Master Plan was to reflect science, constituent advice, and review, and was to set priorities for management, research, monitoring, and review. (§7073)

The contents of FMPs are also specified in some detail:

- a summary of available essential fishery information,
- a research protocol that describes monitoring and data needs,

[45] Fish and Game Code, Ch. 2, Sec. 93; MLMA Ch. 2. Marine Life Definitions.

- conservation and management measures,
- measures to reduce adverse effects on habitat,
- bycatch information and conservation and management measures to reduce bycatch,
- criteria to determine when a fishery is overfished and measures to address overfishing and rebuild the fishery, and
- procedures for review and amendment. (§7080)

An observer notes that the extensive detail on the contents and procedures for plan development were included to be sure that the intent of the provision as conceived by its proponents left little room for interpretation in how it was implemented.[46]

Only two plans were required to be prepared by a time specified in the Act: white seabass and nearshore fishery (§7072(d)).[47] The Department may contract for preparation of plans (§7075(b)). The Commission is to review and approve plans developed by the Department (§7075(a)), and to adopt regulations needed to implement those plans. The Commission is directed to hold at least two public hearings and to act on each plan or plan amendment within 60 days of receipt from the Department and to adopt accompanying regulations within 60 days of plan approval (§7078). The Department is also directed to specify types of regulations it could adopt without a plan amendment.

The last major tool in the MLMA that distinguishes the changed management paradigm is the emphasis on the role of constituents and detailed direction on how the Department and Commission are to engage stakeholders—fishermen, conservationists, scientists and others—in collaborative approaches to management. Section 7059 elaborates that the collaborative process will benefit science, decision-making, research, and development of plans and management measures. It encourages that meetings be located where the most stakeholders can be reached, and calls for improved communication, collaboration and dispute resolution and consideration of forms of co-management. The Department and Commission are to consider gear sectors, areas where fisheries occur, and both sport and commercial interests. The management system is to be open and inclusive of the advice and assistance of interested parties, including consideration of local knowledge. (§7056(h)) A reasonability standard for dealing with constituents is one of the measures of the effectiveness of fishery management. (§7056(m)) According to the Guide, the constituent involvement standards would also apply to adoption of regulations in fisheries that are not among the required FMPs, e.g. emerging fisheries.[48]

[46] The impacts of this level of legislative detail on MLMA implementation will be examined in future reports. This examination will extend to other aspects of the MLMA such as requirements for constituent involvement in policy development [see below].

[47] The Squid FMP in Fish and Game Code § 8425(b) was required by SB 201 (Stats. 2001, ch. 318).

[48] Guide, page 21 "The Legislature recognized the special place of emerging fisheries in the MLMA by calling for the Commission to "encourage, manage, and regulate" emerging fisheries using the policies of the MLMA [7090(a)]." In addition, the statute calls for compliance with FMP requirements (7090(e)).

The MLMA is codified within the Fish and Game Code and existing provisions (that were not repealed by MLMA) are applicable. Fisheries that were regulated by the Legislature prior to 1999 are not covered by the MLMA. Gear types specified in the Fish and Game Code are the only types that may be used, and all previous requirements for licenses, permits and fees remain in force. Fisheries that were designated as limited entry (discussed above) remain in that status. Conformance with federal fishery management plans remains the purview of the Department's Director, as does authority to promulgate regulations to conform to federal rules. Rules on administrative procedure apply to regulatory proceedings under MLMA as with any regulatory action by the Commission or Department. Existing law makes a violation of the requirements, prohibitions and regulations adopted under MLMA a crime.

Table 4 reports analysis of completed management plans compared to the required contents of fishery management plans laid out in the MLMA.

Table 4. MLMA Requirements Addressed by Management Plans

Plan	§7080 (fishery description)	§7081 (research)	§7082/§7083 (conservation)	§7084 (habitat)	§7085 (bycatch)	§7086 (overfishing criteria)
Herring	X	X	x			
White seabass FMP	X	X	x	x	x	x
Near-shore FMP	X	X	x	x	x	x
Squid FMP	X	X	x			
Abalone Recovery and Management Plan	X	x	x	x		x

Expectations for the MLMA vary widely

The changes in legislative language from the initial Sea Life Recovery and Management Act to what was signed as the MLMA [discussed above] seeded differing expectations about its implementa-

tion. A key example is seen in the deletion of explicit language on use of the precautionary principle in policy making. Many of the steps which could support use of that policy rule remain in the Act but the statute as adopted contains no explicit reference to the precautionary rule. Metaphorically, the "building blocks" remain, but with no legislative requirement of or guidance for their use.

Based on interviews for this draft report, there is disagreement about whether the MLMA as enacted is closer to a set of management mandates or a broad management philosophy. According to *The Guide to the MLMA*, there are two sets of policies set forth in the MLMA: general policies applicable to all marine life managed by the state, and general policies applicable to fishery management. In the fishery management general policies, there are both mandatory and discretionary elements for achieving them and also specific tools to be applied. According to authors of the *Guide*, "the policy statements provide the basis for much of what is in the bill and much of what is in the bill cannot be understood or implemented effectively if it is not grounded in those policy statements."[49] The scope of MLMA is defined in Section 7051: regulations shall apply only to ocean waters and bays, and the policies apply only to plans and regulations adopted after January 1999.

The Fish and Game Code states that "Unless the provisions or the context otherwise requires, the definitions in this chapter govern the construction of this code and all regulations adopted under this code," FGC § 2. The Code further states that "Shall" is mandatory and "may" is permissive," FGC § 79. With regard to general marine fishery policies, the MLMA uses "shall" in these contexts:

- management in accordance with the policies of 7055,
- preventing overfishing and rebuilding depressed stocks,
- maintaining sufficient resources to support recreational use,
- encouraging growth of commercial fisheries,
- managing fisheries according to specified objectives,
- taking action to engage stakeholders,
- obtaining essential fishery information,
- establishing a scientific peer review program,
- reporting annually on status of stocks,
- identifying fisheries that do not meet the sustainability policies,
- using FMPs as the primary basis for management,
- basing FMPs on the best available scientific information,
- allocating increases or decreases in catch fairly among participants,
- adopting a master plan, a white seabass FMP and a nearshore FMP by specified dates,

[49] Weber & Heneman comments on MLMA Lessons Learned Issues Draft for public comment, 2 April 2009.

- preparing FMPs that satisfy procedural and substantive requirements,[50]
- encouraging, managing and regulating emerging fisheries,
- preparing fishery research protocols for three priority fisheries, and
- adopting criteria for exempting protocols and plans from peer review.

While proponents of a strong interpretation of the MLMA argue that stated policies are directory, there are no statutory consequences or obvious grounds for citizen action if the Department's approach departs from those policies. One observer noted that if the Department developed a plan or the Commission passed a regulation that was "grossly" inconsistent there might be a basis to challenge it in court. A legislative analysis of MLMA points out that legislative oversight remains available, with the potential for oversight hearings to address "shortcomings with regard to implementing legislative mandates." In contrast, the federal Endangered Species Act allows non-governmental parties to petition for listing of species and challenge governmental actions, or failures to act, in court.

Proponents of a strong interpretation of the MLMA further argue that the entirety of the legislative history, not just the "mays" and "shalls" in the statue, argues for a policy interpretation rather than a legalistic one. The purpose of introducing the MLMA was to cause a major change in the way California managed its resources, a change in "the why, the what, the how and the who." *Why* changed from use to *sustainable* use; *what* changed from only those marine resources that managers could prove needed stewardship to *all marine resources and the system that supports them; how* changed from legislation to *scientifically-based plans* and *collaboratively, transparently developed* management measures; and *who* changed from primarily the Legislature and small constituencies to the Department, the Commission and *intentionally engaged* scientists and stakeholders. The policy statements in the MLMA, the directives to produce specific milestones and products, and the requirements for the process to produce them are of a piece and arguably required in order to give the MLMA meaning despite the absence of clear consequences.

Effective policy implementation depends on specific requirements, powers conferred, resources available, and remedies provided. The changes in legislative language as the MLMA was enacted resulted in a statute with limited explicit requirements, limited powers, no continuing provision of resources, and no remedies for failure to act. While the intent of the original AB 1241 could understandably be characterized as dramatically changing policies on use of California ocean resources, the MLMA as enacted was narrower in its aspirations.

As enacted, the tools the Department may use to meet the goals of MLMA are, at least arguably, discretionary. The MLMA provides discretion to the Department in how it conducts collaborative science, designs dispute resolution, promotes co-management, secures peer review, develops FMPs, iden-

[50] These include: ensuring FMPs include conservation and management measures that will result in sustainability, overfishing criteria, prevent or end overfishing, protect habitat, minimize bycatch and include procedures for review and amendment

tifies non-fishing sources of depressed fisheries, evaluates the management system, specifies measures to achieve sustainability, chooses the form to manage emerging fisheries, and imposes fees. Additional flexibility has been provided by amendments to the statute that extended deadlines for completion of mandatory elements.

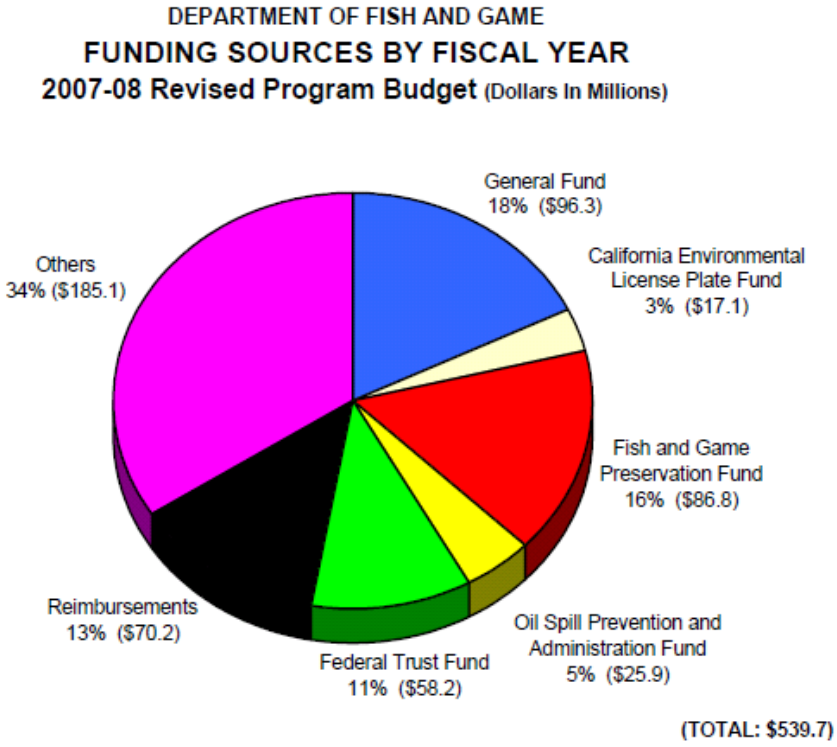
Part 3 of this report examines how the Department and the Commission have implemented the MLMA, including development of specified FMPs, and how policies and procedures in the MLMA have been employed to develop those plans or inform the promulgation of regulations and management measures in other frameworks.

Limited state appropriated resources for implementing the MLMA

The responsibility for implementing the MLMA lies with the Marine Region of the Department. The size and character of financial and human resources available to the Department generally, and the Marine Region specifically, are important to understanding implementation of the MLMA. The Department receives less than one fifth of its budget from the state General Fund, as shown in Figure 2.[51] The largest category of funds, "other," is mostly bond funds and the third largest, "Fish and Game Preservation Fund," includes sport fishing and hunting and commercial fishing license revenues and a number of dedicated funds. Examples of marine-related dedicated funds include user stamp fees to fund marine fish species research and recreational abalone management. The 2007-08 budget of the Department was a 23 percent increase over its 2006-07 budget, mostly attributable to an infusion of bond funds, plus increased fees and reimbursements, as general fund appropriations declined. For 2008-09, the general fund appropriations declined further and allocation from bond funds fell back to 2005-06 levels, resulting in a 26 percent decline in total revenues from 2006-07 and a 9 percent decline from 2005-06. Overall, the finances of the Department are characterized by limited General Fund support, reliance on fees, and reimbursements and allocations from bond funds, resulting in considerable volatility in available funds.

[51] . Department, *Budget Fact Book*. January 10, 2008

Figure 2. Department of Fish and Game Funding Sources, 2007-08



It is important to note that the commercial fishery management duties of the Department, though historically important, are just one part of the responsibilities in the Marine Region, which also has pollution prevention and other responsibilities. The Marine Region is in turn just one unit in the Department, which has an even larger mission. For comparison purposes, in FY2007-08, the program segment containing fishery management (Hunting, Fishing and Public Use) was 14 percent of the Department's overall budget. Within that program, management of commercial fisheries represented about a fourth of the program funding requirements.

With passage of the MLMA and its increased authority came increased resources, at least in the beginning. For the first time, the Marine Region received a general fund appropriation in budget year 1999-2000. Commercial fishing programs, according to the Fish and Game Code, were to be financed with revenues they generated.[52] Heretofore, the source of money for the Marine Region was from commercial fishing licenses, taxes on commercial landings, and permit fees. Recreational fishing programs were likewise funded by their own revenues, except for free sport fishing licenses, which were supported with general funds. Federal sources such as the Federal Aid In Sport Fish Restoration Act of 1950 (Dingell-Johnson Act) and the Inter-jurisdictional Fisheries Act of 1986 provided additional revenues for specific activities or as reimbursements. The 1999-2000 appropriation was specifically desig-

[52] FGC §711.

nated for implementation of the MLMA.[53] This boost enabled the Marine Region to hire additional staff to meet the statute's requirements.

Table 5 shows the budget for the Marine Region from 1999 to 2008, both in appropriation amount and positions. Staff explains that the Department's budget process does not give a means to tease apart amounts devoted to each implementation task or specific activity, so it is unclear whether budget requests from the Department or appropriations by the Legislature accounted for the additional costs of doing the increased science, constituent engagement and fishery management planning required by MLMA. Persons interviewed for this report observe that $4 to $6 million in additional general funds came to the Marine Region from 1999 to 2002.

Table 5. Department Marine Region positions and budget received, 1999-2006[54]

Fiscal Year	Positions	Total Allotment
1999-2000	203.5	21,340,494
2000-2001	213.5	25,118,538
2001-2002	213.5	24,281,973
2002-2003	197.5	20,729,393
2003-2004	173.5	18,924,488
2004-2005	116.5	15,665,395
2005-2006 2006-2007 2007-2008 2008-2009	114.7	14,820,977

Several things occurred following MLMA passage to limit the resources available for implementation. The legislature passed MLPA a year later, and the job of its implementation also resided in the Marine Region. Overall state revenue fell in 2002, and tight budgets for several years meant that the Department, like other agencies, had to relinquish general fund sources and reduce positions in the Marine Region. Consistent with common budgeting practices, including those of California, once general

[53] The project team understands from discussions that a Finance Letter supports this view but the team were unable to obtain such a letter for this report.

[54] *NOTE: This table is taken from the MLPA LL Report for the Central Coast. The data were provided by the Department. The LLT is working with the Department to provide updated information.*

fund appropriations are reduced the Marine Region does not get the money restored without a specific new appropriation.[55] The Legislature approved additional appropriations in 2006-2007; the extent to which these appropriations were directed to a specific program by the Legislature, as opposed to being made available to the Department for discretionary use in both MLPA and MLMA, is not clear at this time.[56] Additionally, the appropriations can be provided without an authorization to hire staff ("PYs"), making it challenging to develop the expertise and relationships needed for effective policy implementation.

Limited private and federal funding also supported the initial MLMA implementation efforts. Commonweal, a nonprofit organization, provided support for consultants who worked with the Department or Commission on restricted access polices, the Nearshore FMP, the Nearshore control rule, Nearshore science plan, the initial status review, master plan and the Guide to the MLMA.[57] A multi-year project to assist the Commission and Department with implementation of some elements of MLMA provided funding for policy staff for the Commission (1999-2003), public process consultants for the Department, and contributed scientific, technical and editing support for production of *California Living Marine Resources: A Status Report*, and production and distribution of a *Guide to California's Marine Life Management Act*. The consultants reported to either the Commission or to the Department.[58]

It is evident from the overall appropriation history for the Marine Region displayed in Table 5 that despite the investments made immediately following passage of MLMA and MLPA, available staff and resources to do the work decreased in subsequent years. [59]

[55] Interviews with Marine Region staff.

[56] The legislature also appropriated funds for use by OPC to support some aspects of MLPA/MLMA implementation.

[57] Grants from the Pew Fellows Program in Marine Conservation, the David and Lucile Packard Foundation, and Marisla Foundation to Commonweal applied directly to MLMA implementation from January 1999 through December 2002 totaled $465,000. Information about Commonweal is available online at http://www.commonweal.org/programs/ocean-policy.html.

[58] Grants from the David and Lucile Packard Foundation, NOAA, and the Jennifer Altman Foundation to the National Fish and Wildlife Foundation applied directly to MLMA implementation from January 1999 through December 2002 totaled $733,000.

[59] While the overall trend of declining appropriations to the Department for marine purposes is clear, information about any legislative allocations to specific programs, such as the MLMA, is not as easily obtained in public records. Additionally, the legislature also appropriated funds to the Ocean Protection Council to support marine programs, further complicating analysis.

Part 3: Implementation of the MLMA

This part describes efforts to implement the MLMA over the past 10 years. Key deliverables, such as mandated Status Reports and FMPs, are the organizing principle. At the same time, this description of MLMA implementation seeks to do justice to less visible resource commitments, actions, and outcomes. This part is descriptive and not evaluative by design; it is intended to establish most of the factual foundation for the second report for this project that will have evaluation as its focus.

The MLMA gives direction on both content and procedure for developing FMPs and other management measures. Two building blocks for development of fishery management plans and management measures are the report on the status of commercial and recreational fisheries of the state, and a Master Plan "that specifies the process and the resources needed to prepare, adopt, and implement fishery management plans for sport and commercial marine fisheries managed by the state."[60] The Status of Fisheries report is the intended vehicle for compiling the "essential fishery information" needed to develop a FMP.

Status report

The first status report was published in December 2001, shortly past the September 2001 deadline in the statute. An annual update was completed in 2003, and another update in 2006. The first report is a comprehensive compilation of available fishery information as well as information on other marine life such as marine mammals and seabirds. It is organized on an ecosystem basis rather than species by species (though species information also is provided), and it includes information on the human system dimension such as socio-economic information on communities, trade, landings, recreational fishing and effort. The status report was compiled collaboratively with partners from other agencies, academic institutions and organizations in an open, iterative, adaptive process, and was extensively peer reviewed[61] The report tracks the three requirements of MLMA Section 7066: (1) it identifies fisheries that do not meet the sustainability policies of MLMA; (2) it reviews restricted access programs; and (3) it evaluates the management system and makes recommendations on a fishery-by-fishery basis.[62] The second status report, published in December 2004, reviewed updates through 2003. It built on the first report and focused on developing groups of species to be reviewed on a rolling schedule, with criteria for how review topics would be chosen. The review covers 14 species[63], an overview of human use and

[60] §7073 (a)
[61] See comments by editors in Introduction, pp. 19-20.
[62] The authors of the report state that the views are not necessarily those of the Department or the Commission, but provide recommendations from procedural advice to scientific requirements to management measures to observations about market and catch trends. Appendix A, pp. 553 to 555.
[63] Giant kelp, bull kelp, sea palm, California spiny lobster, rock crabs, Dungeness crab, sheep crab, abalones, red sea urchin, purple sea urchin, sea basses, ocean whitefish, surfperches, California halibut.

harvest, biological characteristics of target species, status of the population with regard to MLMA sustainability goals, and a description of current management activities. In addition to Department contributors, the report acknowledges work from University of California, Santa Barbara; Humboldt State University, and California Sea Grant. The most recent status report was published in June 2008, and provides an updated review of an additional 15 species.[64] The latest report incorporates more fishery-independent data[65] than prior reports, and adds additional economic information. All status reports are available on the Marine Region website [http://www.dfg.ca.gov/marine/].

Master Plan

The MLMA called for submission to the Commission of a Master Plan by September 1, 2001. Box 5 provides the language of the MLMA that specifies what was to be in the Master Plan. The Master Plan was developed by a team of Marine Region staff with assistance from Commission consultants, beginning in April 2000.[66] A constituent involvement team of department staff and consultants provided advice and review. The master plan team tapped expertise from other working groups assembled to develop the Nearshore FMP, the Status of Fisheries Report, and peer review team. An ambitious timeta-

Box 5. MLMA §7073 Master Plan

(b) The master plan shall include all of the following:

(1) A list identifying the fisheries managed by the state, with individual fisheries assigned to fishery management plans as determined by the department according to conservation and management needs and consistent with subdivision (g) of Section 7056.

(2) A priority list for preparation of fishery management plans. Highest priority shall be given to fisheries that the department determines have the greatest need for changes in conservation and management measures in order to comply with the policies and requirements set forth in this part. Fisheries for which the department determines that current management complies with the policies and requirements of this part shall be given the lowest priority.

(3) A description of the research, monitoring, and data collection activities that the department conducts for marine fisheries and of any additional activities that might be needed for the department to acquire essential fishery information, with emphasis on the higher priority fisheries identified pursuant to paragraph (2).

(4) A process consistent with Section 7059 that ensures the opportunity for meaningful involvement in the development of fishery management plans and research plan by fishery participants and their representatives, marine scientists, and other interested parties.

(5) A process for periodic review and amendment of the master plan.

[64] Market squid, spot prawn, pink shrimp, ridgeback prawn, sea cucumber, pismo clam, cabezon, California Scorpionfish, gopher rockfish, kelp greenling, Pacific herring, Pacific salmon, white seabass, leopard shark, shortfin mako shark.

[65] There are two types of fisheries data collected by state and federal managers: fishery independent and fishery-dependent data. Fishery-independent data are obtained through activities such as stock assessment surveys and research conducted by federal, state, and university scientists. Fishery-dependent data are gathered from fishermen and processors through log books, trip tickets, and landing bills or collected by state and federal agencies through dockside contacts with both commercial and recreational fishermen, through telephone surveys that relate to recreational fishing activities (e.g., Marine Recreational Fisheries Statistical Survey), through mailed, e-mailed or telephone surveys that gather socio-economic information, and through observer programs that provide detailed commercial catch, effort, and bycatch data. National Academy of Science.

[66] As noted earlier in this report, Commission staff providing this support were funded through private sources.

ble called for completion of a draft for public comment by late January 2001.

The master plan team compiled definitions to policy statements, lists of fisheries, criteria for assessing what fisheries should come under plans, a format for plans, and other elements. They examined FMP examples from other states and CEQA formats, and debated tradeoffs involving single and multi-species plans. An MLMA Evaluation Advisory Committee appointed by the Director to assess many aspects of implementation spent at least one meeting commenting on Master Plan draft documents. A draft of the Master Plan was circulated for review from February 1 to March 7, 2001, revised to include public comments and presented to the Fish and Game Commission at its August 2001 meeting. Director Robert Hight at the time called the Master Plan and Status Report "significant steps in implementing the MLMA."[67]

The adopted document was finalized in December 2001, and included information on ecosystem approaches to fishery management, detailed instructions on preparation, contents and adoption of FMPs, a review of possible costs and a proposed process for developing guidance. The Master Plan discusses how managers are to address MLMA topics and issues such as bycatch and non-consumptive uses and provides a protocol for setting priorities among fisheries to be managed through plans. The Master Plan ranks sea urchins, California halibut, and nearshore sharks and rays as the species or species groups most in need of management plans based on explicit criteria and review of public comment. The Master Plan also defines essential fishery information and lays out a system for using, collecting, and setting priorities for acquiring essential fishery information. Detailed instructions, advice and examples for engaging constituents and conducting peer review are part of the document, along with appendices on dispute resolution and public involvement.

The Master Plan was to be reviewed four years after adoption and every four years thereafter[68], or more frequently to consider revisions based on significant changes or petitions from the public to change the priority of fisheries being considered for management plans. Some observers have suggested that the Master Plan was not completed soon enough to shape development of the nearshore FMP, as that effort was occurring simultaneously. Others have suggested that the Master Plan should be revised as guidance or rewritten to provide specific steps, chronology and content rather than discussion. Numerous views on options for revising the Master Plan were captured in consultant-led debriefings and evaluations conducted with Marine Region staff, advisory group members, plan team participants and peer reviewers.[69] The Department reportedly has taken steps internally to revise the Master Plan, including modifications to the list of priority species for developing additional FMPs, but no revision has been presented to the Commission.

[67] Marine Management News, Sept. 2001. Available online at http://www.dfg.ca.gov/marine/newsletter/0901.asp#milestones

[68] Master Plan, Section 7.2.

[69] Debriefing document on Nearshore FMP, p. 29. Undated hard copy provided by Department.

White seabass plan

The MLMA specified completion of FMPs for white seabass and nearshore fish species. Early versions of the legislation posited management plans for every sport and commercial fishery by the end of 2009,[70] but amendments pared this down to white seabass and the nearshore fishery. Earlier legislative action in 1995 had called for a pilot FMP for white seabass to explore whether it was possible to come up with environmental analysis equivalent to the requirements under CEQA. In response, a plan was developed in 1995 through the cooperative efforts of academic and federal fishery scientists, consultants, and fishery constituents, approved by the Commission (without any accompanying regulations) and submitted to the Legislature. The Legislature heard the resulting bill in committee but did not pass it out for further consideration. According to Senate analysis, public and committee member concerns about the adequacy of the analysis in the plan stopped its passage. The concerns were that the analysis in the plan did not achieve "functional equivalency," which under CEQA means that the acting agency has conducted a thorough analysis of the effects of its decision on the environment and natural resources. Because the MLMA provided a very specific list of contents for a FMP, drafters had believed it would measure up to the functional equivalency test, and the Act states that plans prepared under its guidelines are exempt from further analysis under CEQA. At the time the Legislature was considering the MLMA, proponents of the white seabass plan folded that measure into the MLMA required plans, rather than try to pass it as stand-alone legislation.[71]

The white seabass plan prepared in response to the MLMA is a bit of a hybrid, in that it retains a CEQA-style format from the initial draft of the plan, but adds both content and procedures in response to MLMA requirements. In fact, the plan includes an appendix describing where responses to each of the MLMA requirements can be found.[72] The plan has been the object of some criticism by participants in its development for trying to incorporate both these policy approaches in one document.

White seabass are members of the croaker family and migrate between Mexican waters and the Southern California Bight. They are relatively large fish that have historically been an important species for both commercial and recreational fisheries. The 1995 legislation calling for a management plan was enacted because of declines in landings and conflicts between sectors [commercial-recreational] in the 1980s and 1990s. A hatchery program, funding by sport fishing stamp revenues, was begun in the 1980s to enhance the white seabass population and conduct research, and had released about a half million juveniles by 2000.

[70] If it had been enacted into law, this wording would possibly have required preparation of a few dozen FMPS. For example, 15 fisheries operate under one or another form of restricted access (Table 2) and 20 are under management by the legislature (Box 3).
[71] Legislative analysis (of AB 1241) for Senate Natural Resources & Wildlife, June 23, 1998.
[72] Appendix H. Location in the Fishery Management Plan of Each Requirement of the Marine Life Management Act. Final White seabass Fishery Management Plan, April 2002.

The white seabass FMP process ramped up constituent involvement and included scientific peer review. New sections setting forth essential fishery information called for by the MLMA added content on information gaps and research protocols. The plan retained its CEQA-like alternatives analysis, but the new alternatives included more options linked to the MLMA, such as a fishery control rule. The plan also identifies "points of concern" that could trigger action to limit catches or otherwise restrict the fishery [Box 6], and includes analysis of the quantity and quality of data about the white seabass fishery and how that affected management choices. Several mechanisms to address socio-economic and allocation concerns are part of the plan, along with criteria for handling allocation, filling information gaps, and conducting annual review of the plan and its management measures. One Department estimate puts the costs of adapting, adopting, and implementing the plan at approximately $1.4 million; no separate estimate of the costs of plan preparation alone has been located.

A major goal of this FMP is acquisition of information to move the fishery from a data-poor to a data-moderate or data-rich status, thereby enabling more data-based catch measures. According to the Marine Region website's summary of the plan, the cost of acquiring information (research, data collection, monitoring, and analysis) is estimated to be high. Short-term goals include a stock assessment for white seabass using existing and ongoing data sets and new fishery-independent information; determinations of the size at sexual maturity, hooking mortality of released fish, amount of bycatch, and validation of age/growth studies. Long-term research goals include development of more sophisticated stock assessments and models, expansion of hatchery-reared white seabass studies, collection and analyses of more socioeconomic data, cooperative research with Mexico, and implementation of an ecosystem-based management approach.

The key measure in the preferred alternative that was recommended by the plan team included setting optimum yield (OY) at a level determined to allow the population to recover yet permit fishing to continue. The plan team derived the initial OY of 1.2 million pounds by "making a precautionary adjustment" to a proxy for MSY calculated from an estimate of what the population would have been before commercial fishing. Young white seabass and spawning adults are protected through seasonal closures, gear provisions, and size and bag limits. Measures also include several triggers that would alert managers of the potential for overfishing and the need to take action. These "points of concern" (Box 6) have provided a framework for annual review of the fishery by Marine Region staff and an advisory panel consisting of representatives from the scientific community, recreational and commercial fishing industries, and environmental groups. The science advisory panel has reviewed the FMP and fishery

Box 6. White seabass FMP Section -- Points of Concern

1. Expectation OY will be exceeded
2. Changes in biological characteristics of white seabass
3. Overfishing conditions exists or is imminent
4. Significant changes to forage species availability
5. New information on status of white seabass
6. Errors in data or stock assessment

status each year since 2001-2002. The most recent reviews have indicated none of the triggers for action or points of concern have been reached and the population appears—based on the available information—to be recovering.

Nearshore Fishery Management Plan

Whatever their role—manager, observer, advisor, leader, reviewer, or stakeholder—participants in the development of the Nearshore Fishery Management Plan [NFMP] agree that it was complicated, complex, comprehensive, contentious, and time-consuming. A Department estimate puts the "overall costs" of the plan at $10.1 million, although it is not clear what portion of this estimate is attributable solely to plan development. By the time planning began, 124 nearshore species (those found in waters of less than 40 fm depth) had to be evaluated, 19 of which were ultimately included in the plan. Of those species, 14 are included in a federal management plan for groundfish. The nearshore fishery had grown rapidly, without much regulation, since the early 1990s. . The fishery included recreational and commercial sectors with multiple commercial gear types. The NFMP was the first plan to be developed entirely under the rubric of the MLMA and the process exemplified the policies and guidelines of the MLMA . Some argue that the NFMP should be a template for fishery management plans; others contend that it should not be used as an example of planning, organization, or writing. Regardless of characterizations of the effort, the NFMP was completed in 2002. It appears on its face to contain the requisite elements specified in the MLMA, and underwent scientific peer review, extensive public comment, evaluation, and subsequent updating by the Department and Commission.

Box 7. Species in Nearshore Plan and *Federal Groundfish Plan
*Black rockfish Sebastes melanops
*Black-and-yellow rockfish *S. chrysomelas*
*Blue rockfish *S. mystinus*
*Brown rockfish *S. auriculatus*
Cabezon Scorpaenichthys marmoratus
*Calico rockfish *Sebastes dallii*
*California scorpionfish *Scorpaena guttata*
California sheephead Semicossyphus pulcher
*China rockfish Sebastes nebulosus
*Copper rockfish *S. caurinus*
*Gopher rockfish *S. carnatus*
*Grass rockfish S. rastrelliger
Kelp greenling Hexagrammos decagrammus
*Kelp rockfish *S. atrovirens*
Monkeyface prickleback Cebidichthys violaceus
*Olive rockfish *S. serranoides*
*Quillback rockfish *S. maliger*
Rock greenling H. lagocephalus
*Treefish S. serriceps

Species marked with asterisk (*) are managed under federal policies.

History of nearshore management

Prior to enactment of MLMA the Commission managed finfish for the recreational fishery and through delegations by the Legislature for commercial fishing. Management measures passed by the legislature in the years preceding the MLMA included permits, gear restrictions, size limits, time and area closures, quotas, trip limits, and bag limits. State management was coordinated with federal actions taken by the PFMC. As nearshore groundfish fishing activity increased through the 1980s and into the 1990s,

state management became more restrictive, with reductions in allowable commercial catch and recreational bag limits, shorter seasons, and tighter controls on allowable gear. The legislature voted on these measures and the Commission put them into regulations. This regulatory tightening occurred during a period when federal rules also became more restrictive to reduce catches of overfished groundfish populations.[73]

Through 1999, the 14 species now federally recognized as nearshore groundfish (Box 7) were managed by the PFMC as part of a "*Sebastes* (rockfish) complex," not as separate species with species-specific measures such as quotas or trip limits. As the federal Groundfish FMP developed, certain species of groundfish were assessed and managed individually; the remainder of the species, including the nearshore species, continued to be managed as a group. In 2000, the *Sebastes* complex was divided into slope, shelf, and nearshore groups. The 14 actively-managed species were identified as the "nearshore rockfish," and in 2001 the Commission expanded the definition of nearshore finfish to include these species. Beginning in 2000, the PFMC set quotas specifically for the nearshore group, divided among geographical areas and types of permits (limited access gear types, and open access). These quotas did differentiate slightly among species, in that only a portion of the quota could be filled by species other than blue and black rockfish.

California, through the Legislature, Department and Commission, is permitted to regulate fisheries with measures more stringent than those adopted by the PFMC, but which must be at least consistent with federal rules. Appendix F of the NFMP lists tables of regulations affecting nearshore fisheries over time in California, but not whether these regulations were initiated by legislative or Commission action. California's Nearshore Fisheries Management Act (NFMA), passed in 1998, granted the Commission additional authority to enact regulations for management of both the recreational and commercial nearshore fisheries to assure the sustainable populations of nearshore fish stocks. The NFMA defined the nearshore fishery and its stocks, declared the need for a management program, set minimum size limits for the commercial take of 10 nearshore species, and authorized the Commission to enact regulations in the nearshore fishery. Some of the regulations affecting both commercial and recreational fisheries were prompted by the determination by federal managers that some groundfish species (such as bocaccio, canary rockfish, yelloweye rockfish, cowcod, and ling cod) were overfished. Others came in response to the emergence of the commercial live-fish fishery for nearshore species in state waters.

The nearshore fishery received significant attention in the Legislature and the MLMA for several reasons. The nearshore zone was a focus of recreational angling from shore, private boats, and charter vessels and of spear fishing by divers through the 1980s and early 1990s. Intensity of fishing varied geographically, but was most concentrated near ports and other points of entry: fishery managers saw some indications of local depletion due to recreational fishing. Although the recreational fishery had been expanding, it was the development of the nearshore commercial live fish fishery that set the stage

[73] Summarized from Nearshore FMP, Chapter 2, pp. 94-103.

for action. This new fishery came about partly in response to the closure of the gill net fishery in the nearshore zone and partly in response to high prices for premium, fresh fish, sold mainly in Asian markets. This fishery grew rapidly, leading to diverse concerns among recreational fishers, fisheries biologists, academics, and environmental advocates.

According to one participant, the growth of the live fish sector "infuriated" some people in the recreational fishery, who had seen the nearshore zone as an area they could easily get to without much expense, and that had not been affected by large-scale offshore fisheries. Because the nearshore zone was familiar to non-extractive users and to marine ecologists who carried out a great deal of research there, the audience of concerned stakeholders expanded beyond historic participants in recreational and commercial fishing. A member of the NFMP development team cites this concern and anger over the virtually unregulated growth of the commercial fishery as the main driver behind the development of the NFMA and the provisions in the MLMA pointed at regulation of emerging fisheries. The collapse of some deeper-water rockfishes and other groundfish and the ever-tightening restrictions in the federal plan were all part of the backdrop to legislative action.

Development of the Nearshore Plan

The MLMA called for a plan regulating nearshore groundfish to be adopted by January 1, 2002, in accordance with the policies and FMP guidelines in the Act. At the same time the legislature was developing the MLMA, then-Senator Mike Thompson had introduced the Nearshore Fishery Management Act. In the final days before Gov. Wilson signed the MLMA, negotiators agreed to include the NFMA in the MLMA, and the bill was the last signed into law that year. The NFMA sections laid out some specifics about plan contents including permits, interim measures, size limit penalties, and a funding mechanism. The Legislature cited these factors as contributing to the need for action:

- increasing fishing pressure,
- life history characteristics,
- gaps in information on the species and their habitats, and
- lack of a management program.

The Commission and Department laid out a three-stage process for completing the NFMP:

1. Commission action on four proposals: a control date for limited entry, a moratorium on new permits, a petition to allow trap fishing, and gear specifications on traps to avoid marine mammal entanglement,
2. Commission consideration of Department recommendations for size limits, additional species, gear limitations, and area closures, and
3. development and approval for a full fishery management plan.

The NFMP itself was unencumbered by prior legislative or Commission action or processes [because the NFMA was incorporated into the MLMA] and was developed not only on a clean slate, but with considerable resources from the Legislature and the Department, as well as public-private partnerships that enabled the Department to receive additional limited assistance.[74] In addition to including the key content elements required by the MLMA *(see below)*, the plan development process reportedly devoted substantial resources to constituent involvement and peer-reviewed, best available science. These efforts are discussed below in detail.

Constituent involvement

Constituent input in the NFMP effectively began with facilitated, small-group conversations in 13 coastal communities in May-June 2000. These meetings provided a venue for Marine Region staff to interact with constituents, discuss the interim regulations, elicit ideas for the management plan, and encourage interested stakeholders to participate. In February 2001, the Department conducted three "scoping" workshops in different locations to present a proposed outline for the NFMP and solicit input on a variety of issues. In that same month, the MLMA Evaluation Advisory Committee reviewed the goals and objectives of the NFMP and offered advice on other issues. In a public meeting in April 2001 the Department presented "issue papers" on approaches to management that had been developed based on interim regulations and input from constituents, and solicited further input.

The Department also convened an Advisory Committee for the Nearshore FMP. The Committee was made up of 37 members and alternates, selected from nominees, representing environmental interests, recreational fishing and diving, commercial fishing, charter boat operators, and academia, each group including representatives from different regions of the state. The Committee met six times with a professional facilitator (smaller subcommittees met or discussed issues separately) between January and September, 2001, usually for two days each time. The Committee heard presentations, reviewed and discussed materials prepared by the Department and identified questions for Department responses at the next meeting. The Committee reworked some sections of the draft FMP, including the problem statement, goals and objectives statement; added some new approaches; and provided a consensus approval of several sections of the FMP. According to a member, the Committee did not reach consensus on several contentious aspects of the plan: fishery control rules, the use of Marine Protected Areas in fishery control rules, and allocation.

The Commission held four meetings for input on the plan and heard public comment at three regular meetings.

Reviews of the constituent and public involvement process offered a range of opinions: some viewed it as the most important aspect of the NFMP process and others characterized it as predetermined and political. Some participants (including Department staff) saw value in using outside, contract

[74] See the discussion of private and federal funding above. See also: *NFMP*, Appendix P. The peer review panel conducted its work with support from UC Davis under contract with the Department.

facilitators while others did not. The Committee was seen as both helpful and confused. The scientific peer review team noted that it was difficult to determine from the draft FMP how the constituent input was actually employed. Some portions of the NFMP indicate material that was developed or modified by the Committee, but the Department and Commission received constituent input in different forums and it is difficult to determine exactly how stakeholder views influenced the development of the NFMP. The Department received—and responded to—hundreds of comments on the NFMP. The compilation of comments is included in an appendix to the plan.

Science in the NFMP

The NFMP appears to reflect extensive scientific input. Department researchers had been engaged in studies of nearshore fishes and fisheries, which contributed to the overall knowledge base. Their research was directed, among other things, toward basic EFI details such as growth rates, movements, and diets of nearshore fishes, analysis of geographical distributions, population and fishing trends in fish stocks, responses of populations to climatic change, and innovative fishery-independent methods for assessing nearshore fish abundance, biomass, habitat relationships, reproductive success, and responses to marine protected areas.

In addition, Marine Region staff assembled information from the literature on research conducted by academic, federal, and other scientists on nearshore fishes and habitats. The NFMP team sought direct contributions from scientists outside the Department in workshops and peer review panels, as well as in collaborative efforts between the Department and outside scientists. The Department also had the benefit of methods used in other jurisdictions, such as the PFMC, to set allowable catch levels based on population models, and had reviewed different approaches to regional management and allocation.

Box 8. Collaboration with Outside Scientists for Nearshore FMP

-"Assessing and Managing Resident Marine Species;" two-day workshop sponsored by California Sea Grant in June 1999. Academic and non-DFG scientists, for benefit of DFG personnel.

-survey of regarding potential utility of various methods of fisheries management as applied to the nearshore fishery

-presentations by scientists

-discussion sessions

-"Nearshore Research Protocols and Data Gaps," one-day workshop, January 2001. DFG and about half dozen outside scientists.

-discussion of DFG efforts to determine and prioritize research needs and methods

-Peer review. As mandated by the MLMA, the NFMP underwent peer review.

-Main peer review: 6 outside reviewers (3 out of state, none out of country) independently reviewed the FMP, then met together to finalize a common report.

-Peer review of redraft of "fishery control rules" section of NFMP by two outside reviewers (both in-state)

-"Research Protocols" team, 2001-2002. DFG and outside researchers help to develop plans for research. Met several times during 2001-2002, and again in 2003, to develop protocols for further research. This was both brainstorming and the concrete development of the CRANE (Cooperative Research and Assessment of Nearshore Ecosystems) sampling program.

-further developments of CRANE: collaborative implementation of one year of sampling in 2004 (NOAA funding, part of Coastal Impact Assistance Program, to mitigate effects of offshore oil drilling). Partial report published (http://www.dfg.ca.gov/marine/fir/pdfs/crane.pdf)

Box 8 provides a summary of efforts to solicit information and advice from scientists outside the Department.

The NFMP does not state explicitly how all of the scientific information was used. Some of the recommendations by the peer-review panel were not included in the final document, such as inclusion of additional important nearshore species, description of fiscal resources needed for acquisition of EFI, and response to the concern that it would be difficult, under the plan, to determine whether a species (especially a data-poor species) were actually being overfished. Other peer-review recommendations were included in the final version, such as addressing serial depletion (the effects of fishing on the least productive species in a group of species managed together); adoption of more conservative fishery control rules than the PFMC; adoption of four state regions (not three); and dropping a draft approach of designating certain percentages of area in MPAs in favor of relying on the MLPA, though the NFMP itself does provide criteria for MPAs that would make them useful for nearshore fishery management.

The collaborative effort on developing research protocols and earlier sessions with outside scientists reportedly helped to establish research principles and protocols, including methods for conducting surveys, the use of no-fishing reserves to supply comparative data for assessing stock status, and the effects of fishing on the ecosystem.

A member of the Advisory Committee observed that much up-to-date science was used in the final NFMP, including methods for setting catch levels for species under data-moderate conditions that are similar to those used by the PFMC. The final NFMP set important thresholds for population biomass at higher

levels than the PFMC normally uses, as a precaution against overfishing and to help mitigate any ecosystem effects of fishing.

The NFMP also provided for regional Department management to account for regional differences in oceanography, species' distributions, growth rates, population productivity, and prosecution of the fishery. It calls for innovative methods of population and ecosystem assessment that include comparisons of areas subject to different levels of fishing (including MPAs) and advanced underwater habitat mapping.

Components of the final nearshore FMP

According to the introduction to the NFMP plan, the core of the project was to develop a management strategy to meet the MLMA's primary goal of sustainability by meeting several objectives:

- preventing overfishing,
- rebuilding depressed stocks,
- ensuring conservation, and
- promoting habitat protection and restoration.

The NFMP set out five goals, each one addressing an aspect of fishery management and in combination providing an integrated approach to meeting MLMA sustainability guidelines.

Goal I: Ensure Long-Term Resource Conservation and Sustainability—Ecosystem health, sustainability of fisheries, rebuild depressed stocks, limit bycatch, maintain health of habitat, coordinate with adjacent coastal states.

Goal II: Employ Science-based Decision-making—Adaptive, cooperative and collaborative data gathering, periodic review.

Goal III: Increase Constituent Involvement in Management—Open decision-making process, involve constituents in planning, and research protocols.

Goal IV: Balance and Enhance Socio-economic Benefits—Provide for non-consumptive use, coordinate commercial and recreational fisheries, consideration of long-term interests of people dependent on fishing, mechanisms to resolve disputes.

Goal V: Identify Implementation Costs and Sources of Funding—Fees, resources to acquire EFI, alternate sources of funding.

Discussions leading to the draft FMP considered potential use of MPAs as both places where near-intact ecosystems might persist, and as reference points for measurement of the ecosystem effects of fishing (under data-rich conditions). One participant notes that the Department's first effort to implement the MLPA in 2001 had implications for the nearshore plan related to marine protected areas. Conservation groups got more involved in the NFMP process, interviewees observe, because they

thought they could get some protection for nearshore species through that vehicle when the MLPA process foundered.

Evaluation of ecosystem effects of fishing was spelled out clearly (under data-rich conditions), and ways of modifying fishing in response to ecosystem effects were identified. Failing data-rich scenarios, allowable levels of fishing were identified conservatively to allow larger populations of fished stocks and potentially less effect on the ecosystem. The selection of a TAC as a proxy for OY followed a formula more conservative than federal practices for groundfish. Restrepo's precautionary approach was also used to provide a buffer for both sustainability and ecosystem health in data-poor conditions. Regional management also would aid in establishing more localized effects of fishing on ecosystems since ecosystems vary geographically. However, this approach depends on the development of research programs, the implementation of regional management, and the implementation and enforcement of MPAs. The research necessary to support data-rich levels of ecosystems management is very intensive and expensive, especially if it is replicated regionally throughout the state.

In order to foster sustainability of nearshore fisheries, the NFMP established three levels of knowledge of a fishery (data-poor, data-moderate, and data-rich), and rules for establishing catch levels at each knowledge level. Control rules were based in part on Restrepo's precautionary approach, but provided original details of management in data-moderate and data-rich conditions. As with the consideration of ecosystem health, the plan adopted control rules for data-moderate fisheries that are more conservative than federal practice. The NFMP described areas of research that would provide the EFI that would allow management to move from one knowledge level to another. Regional management would also allow for recognition of geographical variation in biological characteristics and abundance of fished species. MPAs are noted as a buffer for mistakes in management, miscalculations of bycatch, and other data gaps. Alternatives for a restricted access program were discussed as a way of reducing capacity in the fishery.

However, while records from the fishery would probably be sufficient to detect overfishing in data-moderate and data-rich scenarios, it is possible that overfishing could go undetected in data-poor scenarios. Regional management would be required to detect more localized effects of fishing, and a successful restricted access program for the commercial fishery would be required to reduce capacity in that sector of the fishery. One thing missing from the fishery control rules is guidance on how to adjust catch levels (if at all) once MPAs have been implemented. The issue is whether to consider biomass within the MPA as part of the entire population biomass, and set catch accordingly (which would effectively increase the rate of catch per unit of area in the area outside of MPAs), or to consider only the biomass in the areas outside of MPAs, and set catch accordingly (which would reduce the total allowable catch levels). This reportedly was a contentious issue in the Advisory Committee meetings.

As a measure to address the objective of rebuilding depressed stocks, the NFMP included control rules for data-moderate stocks that provided a higher threshold for a stock to be considered overfished than federal practices and specified the development of rebuilding plans.

Limitation of bycatch of nearshore species, though not addressed in detail, is discussed under restricted access methods, gathering of catch data, and use of MPAs. Bycatch of deeper-water species from depressed populations has become more of a concern, because it may limit landings of some nearshore species caught in association with the deeper-water fish whose catches are restricted. Coordination with adjacent states is done in part through the PFMC, to manage stocks straddling the California-Oregon border.

An extensive list of research programs was presented in the NFMP to improve the data used in management. These included:

- gathering more data on vital statistics of some species,
- learning more about geographical ranges and geographical variation in species,
- mapping habitat distributions,
- monitoring "recruitment" of young fish into the population,
- developing of single-species assessments to move some species to data-moderate management,
- developing of improved fishery-dependent data-gathering programs for commercial and recreational fisheries,
- developing of fishery-independent data (using MPAs, collaborating with industry),
- gathering more information about ecosystems (particularly using MPAs), and
- gathering socioeconomic data.

Most of these programs as outlined in the FMP were intended to be carried out on local levels, so that the spatial aspects of the species and the fishery could be determined. Items under Goal IV (Socioeconomic benefits) discussed non-consumptive uses such as observation, photography, and research on near-natural populations and ecosystems. These issues may be addressed through MPAs, and perhaps by conservative management of fishing.

The plan tackles coordination of commercial and recreational fisheries through a framework for allocation. Observers note this was one of the most contentious issues in the development of the NFMP. Allocation decisions by the Commission were based on historical landings and catches, discussed at full Commission meetings. In contrast, the federal management plans had determined total allowable catch (for most species, based on half of recent total catches), subtracted the recent levels of recreational catch, and allotted the remainder to commercial fishing. The plan includes sections on manage-

ment, enforcement, research, stock assessment, cost projections, but no specific measures on dispute resolution mechanisms.

The requirement to evaluate long-term interests of people and communities dependent on fishing was to be resolved by gathering regionally-based data on levels of fishing, and regionally-based socioeconomic data, and then using regional advisory groups to help evaluate community needs. A restricted access program for the commercial fishery may help to ensure that those commercial operations remain in the fishery, though this has not always occurred when restricted access has been implemented.

As noted above, the Department has estimated the overall costs of the plan at just over $10 million, with no separate estimate of plan preparation costs. The "preparers" lists in the document alone indicate a tremendous effort. Outside facilitators and constituent involvement experts were retained with external sources of funding.[75] Private funds also were used to pay for scientific advice on development of the control rule and staffing for the commission. Peer reviewers received a modest honorarium, and advisory committee members were reimbursed for meeting costs. Scientific contributors to parts of plan development volunteered their time, and some advisory committee members participated as part of their jobs. Others were volunteers, also representing constituencies. Department staff members indicated significant job stress during the development of the FMP, in part because the organization of the effort changed over time, and in part because the overall effort was so large, according to the "NFMP Debriefing" document. Many comments in the "NFMP Debriefing" document indicated that the workload was high, the deadlines too short, and the assignments too fluid. Some felt that their normal duties had to be neglected when they were assigned to the plan.

Since the NFMP's adoption, the Department has reported on implementation in two updates, the most recent in 2006. California continues to co-manage 16 of the 19 species covered in the NFMP. The Department has representatives on the PFMC Groundfish Management Team and the Science and Statistical Committee (SSC). The Department proposes catch limits based on its more conservative harvest-control rules and these are usually promulgated by the Commission. The Department collaborates with Groundfish Advisory Panel, a constituent group of the PFMC, SSC, and NOAA fisheries biologists in developing stock assessments and other fishery information. Participation in federal management helps to coordinate management of species found in Oregon and Washington, as well as California, according to managers interviewed for this report.

The NFMP had called for delegation of management authority within California of all 19 species to California control. This would allow some measures that would be more difficult to undertake in the Federal process, however this concept has since been abandoned. Regional management was a major component of the final NFMP. The Department has instituted a regionally-based permit system for commercial fishing, and has now established regional monitoring of both commercial and recreational

[75] Public process consulting to support MLMA implementation was funded in the amount of $216,682 from grants to the National Fish and Wildlife Foundation from NOAA and the David and Lucile Packard Foundation..

landings. Some collaborative research programs are directed towards locally-based EFI. However, the Department currently does not have the resources to conduct regionally-based assessments and therefore cannot set regionally-based quotas. Interviews suggest some Department scientists believe a coastal, rather than regional, scale is sufficient for management. Even for statewide assessments California benefits from collaboration with federal authorities. As noted below, it has redirected the contracts for regional advisory panels.

Nearshore fishery permits were first required in 1999, when more than 1200 were issued. This number decreased to around 500 by 2002 and more recently to around 200. Since then a full restricted access program was instituted for the shallow nearshore fishery, setting regional goals for the number of permittees. The number of permits has decreased by attrition since then, but has not yet reached the goals. Moratorium permits for the deeper nearshore species were issued in 2003, and there has been some attrition in the number of permittees. An ad hoc statewide Groundfish Task Force of constituent representatives is consulted periodically by the Department, particularly for biennial review of regulations, and for some in-season adjustments of the fisheries. The NFMP called for regional advisory committees to participate very directly in the regional management of the nearshore fishery; in fact they were considered a central part of the entire program. However, a contract for development of these committees was redirected, and the committees have not been established. The issue is funding, at two levels: funding for operation of the committees themselves, and funding for the regional stock assessments that would have been used as input for the regional committees. As noted above, there also appears to be a difference in scientific views about the importance of regional assessments.

General provisions of the MLMA

As noted above, the MLMA can be read as directing the Department to increase both constituent involvement and scientific input in all of its decisions regarding marine resources, not just in development of FMPs. Some change has occurred in both these areas.

Constituent involvement

In addition to the activities aimed at engaging constituents and stakeholder groups in the development of specific plans such as those for white seabass and nearshore fisheries, the MLMA expressed a policy favoring participation of stakeholders above and beyond conventional hearings and notice and comment rulemaking. It calls for this emphasis in development of all regulations, not just those associated with FMPs, as well as research plans, the annual status report, and other activities. The law describes fair and reasonable dealings with constituents as a measure of effectiveness (7056(m)).

The Department undertook numerous activities related to implementation of the constituent engagement policy of the MLMA. These included: designation of an in-house team to oversee MLMA

implementation activities, particularly constituent outreach; hiring a team of consultants to provide public communications, constituent engagement and facilitation services; convening an advisory group to oversee implementation of MLMA; conducting an all-staff training in public communication and constituent outreach tools and approaches, compilation of a handbook of tools, tactics and best practices for outreach and communication; inclusion of extensive constituent outreach guidance in the Master Plan; development and launch of an updated website; inclusion, documentation and response to public comments in each of the new or revised FMPs; expanded notice procedures for public hearings; addition of hearing and meeting sites intended to meet the MLMA directive to "foster participation, meetings should be conducted in those areas most affected by decisions" [7059(a)(4)].

It is less evident that the Department followed through on other MLMA recommendations related to constituents. The call for dispute resolution mechanisms, integration of constituents in the design and execution of research programs, or "collaborative and cooperative" approaches such as co-management, community-based management and similar means to devolve authority have not materialized, though some user groups, such as sea urchin divers, have pursued and support the concept of such programs. According to persons interviewed for this report, the new requirements went beyond the familiar territory of engaging with sport and commercial fishermen, and that in some cases it was difficult for Department staff to reach out to new constituents, such as conservation advocates.

Finally, interviews suggest the Department has looked to the PFMC process to address some MLMA constituent engagement objectives related to implementation, at least for the Nearshore FMP. This approach shifts costs of public outreach to the federally supported process while still providing opportunities to raise the interests of California constituents.

Science-based management

As with constituent engagement, the MLMA makes the use of science as the basis for management applicable not just to FMPs or regulations, but the foundation that informs every activity of marine resource management. It calls for collaborative science, partnerships with academic and scientific institutions, peer review, development of research protocols and priority setting for research activities, engagement of the scientific community in the development of plans and conservation measures. (7050(b)(6), 7056(g), 7060, 7062, 7074, 7075, 7081.)

Actions in fulfillment of these policies are clear in the Master Plan, the Status Reports, and the two mandated FMPs. In addition, the Department contracted for a report on the use of peer review, and sought scientific peer review on existing plans and measures. The Department also participates in partnerships with the Pacific States Marine Fisheries Commission, the Pacific Fishery Management Council and NOAA Fisheries on an array of research, stock assessment, and other scientific projects. According to persons interviewed for this report, the science demands of the MLMA, while laudable, were chal-

lenging, time consuming and expensive, particularly given that information collection is traditionally fishery-dependent.

Other plans and regulations

In addition to delegating authority to the Commission and Department to develop plans for specific fisheries, the MLMA directs that other fisheries be managed by the same policies, and designates fishery management plans as the preferred tool. Since enactment, the Department and Commission have adopted a recovery and management plan for abalone and a fishery management plan for squid, and have begun development of a plan for Pacific herring.[76] In keeping with MLMA policies, a peer review of stock assessment science for herring, an updated stock status report, and expanded opportunities for public involvement have been added to the existing regulatory framework and annual review of management measures. Annual catch quotas are based on spawning biomass estimates, age structure analysis, and up-to-date oceanographic information. For the 2008-09 season, the Commission adopted a more conservative quota based on Department recommendations and studies showing low spawning returns 2006-2007 and 2007-2008, as well as declining size-at-age.[77]

The Legislature limited recreational abalone fisheries to north of San Francisco Bay in 1997 based on Department recommendations and studies showing a precipitous decline in abalone populations. There is no commercial fishery for this species. Subsequent legislation mandated an Abalone Recovery and Management Plan [ARMP] to be completed before January 2003.[78] The plan is not laid out as an FMP under MLMA's formulation and does not incorporate MLMA policies. The Commission adopted the ARMP in December 2005. The management portion of the ARMP establishes guidelines for determining allowable take levels and for closing and reopening fisheries. During the first seven years of ARMP implementation, management of any future potential commercial fishery will occur with limited resources under an interim plan that sets a total allowable catch level and uses established criteria to guide regulatory change. However, because the interim plan operates in a data-limited environment, it follows a precautionary approach to setting take. The plan uses marine protected areas as refugia from take for all abalone species. If additional resources become available, a long-term management plan may be implemented using zonal management with take allocated through an abalone tag system. Within the past three years, an Abalone Advisory Group was convened to provide the Department and Commission a range of alternatives for managing a potential commercial fishery at San Miguel Island in southern California. Results from that public process have yet to be completed or presented to the

[76] Sea Urchins are listed on the Marine Region MLMA website as one of the species for which there is a management plan, but at present there are only regulations adopted by the commission in consultation with the California Sea Urchin Commission and the Department. The San Diego Watermen's association has proposed a community based management approach for their fishery. *See,* The San Diego Sea Urchin Project, November 2008.
[77] Department, Fisheries Forum Annual Report for 2009. Available online at http://www.dfg.ca.gov/marine/fforum2009.asp
[78] Fish and Game Code §5522.

Commission. The recreational abalone fishery continues to operate with use of a "report card" system that provides data from which annual catch is estimated.

At the request of the fishing industry, prior to MLMA (1997), the legislature called for called for a report on the squid fishery with recommendations for a "conservation and management plan" covering certain enumerated subjects.[79] Concerns about excess capacity, expansion of the fleet, and fluctuations in squid relative to El Nino events provided momentum for the legislation. In 2001, the Legislature passed a bill requiring the Commission to manage the squid fishery under the MLMA as of January 2002. After much consultation with two advisory groups and stakeholders from all sectors, the Marine Region published a draft plan for public review in April 2002, and eventually presented a proposed fishery management plan and accompanying regulations to the Commission in 2004. Marine Region staff told the commission that the FMP was "developed under MLMA provisions."[80]

The Department's proposal had a goal of curtailing expansion in the fishery, conserving the squid resource, and reducing the potential of overfishing. The Department recommendation included:

- a control rule,
- a harvest cap of 118,000 tons,
- restricted access and options for reducing capacity to match the cap,
- time and area closures to avoid conflicts, avoid protected species and allow uninterrupted spawning for squid,
- requirements for logs, and
- restrictions on lights and gear.

According to the Department the recommendation was consistent with the federal plan developed by the PFMC. The plan was presented as a framework that would allow the Commission to make annual adjustments without amending the plan. Stakeholders testified that fixed catch limits were included in the plan, rather than in regulations, thereby locking in a number rather than a calculation or process.

Measures that raised the most concerns during public testimony and Commission debate were those related to the quota, capacity reduction, the window for qualifying for permits, treatment of transferable and non-transferable permits, and the cost of permits. Conservation advocates claimed that the annual catch limit did not comport with the MLMA because it was based on MSY, not MSY reduced to produce an objective of OY.[81] It was based on the highest landings ever recorded, did not include consideration of dependent species, or include information on population dynamics, and was therefore not precautionary. Industry advocates disputed whether the proposal honored grandfather rights provided

[79] Fish and Game Code § 8426(c)
[80] Transcript of Commission meeting, Aug. 27, 2004; statement of Dale Sweetnam.
[81] §7056(a)

in other fishing legislation. After a lengthy and, according to some, chaotic debate, the Commission re-noticed the portion of the proposed regulations dealing with non-transferable permits. At its December 2004 meeting the Commission adopted criteria that addressed industry concerns that fishers would be excluded but effectively negated the stated purpose of the plan to reduce capacity. In fact, later descriptions of the Squid FMP eliminated capacity reduction as a stated goal, and there were more vessels making commercial landings in 2008 than permitted vessels making landings in 2007.[82] The plan set permit fees, closed some areas to use of lights, modified logbook requirements, and opened new areas to experimental market squid fishing.

The 2005/2006 fishing season was the first year of operation under the management plan. Since then, biologists have raised issues related to the fisheries operations on the spawning grounds and the need to allow for sufficient egg escapement. The most recent status report sets out a number of information needs critical to gathering fishery independent data that would aid management of the fishery. Landings in the Monterey area have declined since 2005, but biologists attribute this to environmental conditions.[83] In 2008, market squid was the second largest fishery in terms of volume and the most valuable fishery. Statewide, 76.5 million pounds (34,700 metric tons) of market squid were landed in 2008 with an ex-vessel value of $23.9 million.[84] In 2007, the fishery landed 109.7 million pounds (49,802 metric tons) and was worth $25 million. In 2008, 93 vessel permits, 62 light boat permits, and 22 brail permits were issued.

Amendments to the MLMA and related legislation

The Fish and Game Code sections that encompass the MLMA have been amended four times since enactment of the law in 1999. In 2001 the Legislature added market squid to the species for which the Department would develop a management plan [see discussion above]. SB 209 called for Commission action on a plan but set some provisions legislatively that were repealed upon completion and adoption of the market squid FMP. The following year, Assemblyman Keeley introduced and the Legislature passed a bill extending the deadline for development of the Master Plan to 2005. In 2004, the Legislature passed a measure granting the Commission authority to manage all bottom trawl fisheries not covered by federal or state FMPs, set specific requirements for trawl gear, closed certain areas to bottom trawling, and restricted the use of trawl nets in the pink shrimp fishery. A bill allowing the Commission to hire staff was passed in 2006, enhancing its capacity.

In 2008, the Legislature passed, but the Governor vetoed, a bill to authorize preparation of management frameworks for any state fishery. AB 2532, so-called “MLMA Lite” by proponents in the conservation community, would have authorized the Department to develop management measures

[82] Department, Fisheries Forum Annual Report for 2009. Available online at http://www.dfg.ca.gov/marine/fforum2009.asp
[83] Id.
[84] Id.

where there was insufficient information to develop a full FMP or where evidence of a decline indicated immediate management was necessary. It provided for an interim action plan and encouraged development of pilot co-management approaches and creation of advisory committees. The Governor's veto message cited lack of full development of concepts for co-management and unclear authority, and noted that he had signed AB 1690, establishing the Dungeness crab task force at the Ocean Protection Council, expected to develop a co- management framework for that fishery. Observers suggest that the measure failed because the Department argued it already had authority to take such actions under MLMA and opposed the bill. The conservation organization that developed and advocated for the measure, according to interviews, did not have the critical mass of support needed to get the bill signed in the Governor's office (there were only two groups on record in support of the measure, according to the legislative history).

Numerous other amendments to the Fish and Game Code specifying measures for halibut, Dungeness crab and other fisheries have occurred since passage of MLMA in 1998, commonly without reference to the MLMA. These measures either amended code sections for fisheries that were not managed by the Commission before 1999, such as halibut. In the case of Dungeness crab, federal law allowed California, Oregon and Washington (who already managed this species since 1996) to achieve a level playing field in managing fishers who fish in one state but unload in another. Although it did not amend MLMA, passage of the Marine Life Protection Act (MLPA) in 1999 has had a significant effect on implementation of MLMA. Persons interviewed for this report say that the Department exercised its discretion to shift some portion of staff and budget resources from MLMA implementation, including planning and constituent engagement activities, to the MLPA planning effort.

Part 4: Next Steps

This description of the context, enactment and implementation of the MLMA provides baseline information for the next steps in this "lessons learned" assessment of the MLMA. Among the points emerging which can inform assessment (Task 2) and development of recommendations (Task 3) are the conflicting expectations about the Act, the actual provisions of the Act, resources provided for implementation, and actual implementation processes. More information about MLMA implementation can be expected to develop during the next steps of this project, but this report provides a foundation on which to proceed.

Recent events demonstrate that the challenges that motivated the authors of the MLMA continue. For example, the iconic commercial salmon fishery has been closed in California for two years. And we have increased understanding of how actions in rivers and land uses affect ocean resources. For example, the National Marine Fisheries Service issued a Biological Opinion (June 2009) addressing the linkages between blocked access to spawning areas, water diversions, winter and spring Chinook, Central Valley steelhead salmon, the southern population of North American green sturgeon, and Southern Resident killer whales which rely on Chinook salmon for food.[85] The collapse of the salmon fishery demonstrates the challenges of managing complex, organic systems. Salmon are managed under a federal FMP with more resources and tools than are available under the MLMA and to the Department and still the runs of salmon decline to the point of requiring closure. A plan is not self implementing and does not guarantee success.

Federal laws and policy are also shifting. The PFMC has identified essential fish habitat for groundfish, coastal pelagic species (sardines, mackerel, northern anchovy, jack mackerel), salmon and highly migratory species. The PFMC identified estuaries, canopy kelp, seagrass and rocky reefs as habitat areas of particular concern, and identified "areas of interest" for further consideration. The areas off the California coast are listed in Box 9.

Box 9. California Habitat Areas of Interest

Seamounts including: Gumdrop Seamount, Pioneer Seamount, Guide Seamount, Taney Seamount, Davidson Seamount, and San Juan Seamount.

Also: Mendocino Ridge; Cordell Bank; Monterey Canyon; specific areas in the Federal waters of the Channel Islands National Marine Sanctuary; specific sites in the Cowcod Conservation Area.

Although there is no federal requirement for ecosystem-based approaches to management, the 1996 MSA amendments called for a report to Congress on the topic.[86] That report and increasing emphasis on ecosystem approaches led to formation of a task force that produced guidelines for ecosystem-based approaches to fishery management.

[85] The biological opinion is available at: http://swr.nmfs.noaa.gov/ocap.htm
[86] D. Fluharty, Chair, Ecosystems Advisory Panel, Report to Congress (1998).

In 2006, Congress again made substantial revisions to the legislation that governs federal fishery management. The 2006 MSA reauthorization[87] requires the regional fishery management councils to develop annual catch limits for all fisheries that are based on scientific recommendations and at a level that prevents overfishing. It requires scientific and statistical committees of the councils to provide recommendations for fishing levels and to disclose financial conflicts of interest. Fishery managers are directed to develop rebuilding plans that end overfishing immediately, and will be held accountable if they allow annual catch limits to be exceeded. The 2006 amendments called for another study on the state of the science for advancing ecosystem considerations in regional fishery management, but the effort is delayed according to NMFS. The PFMC has held joint sessions of its habitat committee and ecosystem-based fishery management interests, reviewed the state of the science and practices in other regions, and summarized current and potential steps to move toward an ecosystem-based approach.[88]

A national standard calling for analysis of the effects of fishery management measures on fishing communities requires federal managers to take into account the importance of fishery resources and their potential economic impacts on fishing communities.

The 2006 amendments also include extensive provisions aimed at increased application of rights-based programs, including limited access privilege programs (LAPPs). The LAPP provision includes new standards that affirm public ownership of the fish resources in U.S. waters, requires periodic reviews of the programs and measures to protect small-boat fishermen's access to fisheries, and specifies a term limit of 10 years on quota shares.[89]

Of potential interest to California communities are provisions that provide for "sustainability plans" that may be developed by fishing communities. Not only did Congress address many of the concerns that interest groups raised about access privileges and quota share programs, but it also took special note of fears of consolidation and the potential for quota programs to "ignore the community and next-generation fishermen who were not part of the initial allocation and could be forever priced out of the fishery."[90] Accordingly, the 2006 MSA now provides for limited access privilege program shares to be issued to communities and regional fishing associations. As of this writing, further action on guidelines had been postponed in deference to other priorities, though the agency has published non-regulatory technical advice on the benefits of various program design options.

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[87] Magnuson-Stevens Fishery Conservation and Management Reauthorization Act, Pub. L. 109-479 (Jan. 12, 2007).
[88] PFMC, Supplemental Attachment 4 (April 2007) *Draft Summary Minutes of a Joint Session of the Habitat Committee and the Ecosystem Based Fishery Management Subcommittee of the Scientific and Statistical Committee* (Nov. 14 2006).
[89] 16 U.S.C. §1853 (a).
[90] S. Rpt. 109-229 at 25. The intent of Congress regarding the kind of communities for which this provision is designed is spelled out in report language: The Committee intends the Councils to consider as ''traditional'' those uses that predate contemporary commercial fishing in smaller, isolated communities that can demonstrate historic dependence on combination fisheries or participation in the fishery during years that may not fall within the qualifying period for individual LAPPs. S. Rpt. 109-229 at 27

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MLMA LL Project: Partial Participant List

The following is a partial list of people who provided input through an in-person or telephone interview or other communication to the project. **This is not a complete list of contacts, information sources, or conversations for the project**. For example, the project team participated in several meetings of the MRC and gained the benefit of input from the Commissioners and members of the public in attendance, and also spoke with people individually during and after these meetings. These names do not appear below. This list also does not include the names of people or organizations who submitted written comments.

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Liquornik, Harry	Engels, Bob	Ostdahl, Maggie
Maasen, Jeff	Thomas, Roger	Reyna, Karen
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Miller, Chris		Wing, Kate

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	Mastrup, Sonke	
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	Ryan, Connie	
	Vojkovich, Marija	
	Wilson-Vandenberg, Deb	
	Wolf-Sciarrotta, Patty	
	Yaremko, Marci	

Glossary of Acronyms

ARMP	Abalone Recovery and Management Plan
CEQA	California Environmental Quality Act
CRANE	Cooperative Research and Assessment of Nearshore Ecosystems
CWPW	Committee on Water, Parks and Wildlife
DFG	Department of Fish and Game
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFI	Essential Fishery Information
ESA	Endangered Species Act
FCZ	Fishery Conservation Zone
FGC	Fish and Game Code
FMP	Fishery Management Plan
LAPP	Limited Access Privilege Program
MFCMA	Magnuson Fishery Conservation and Management Act (later renamed to Magnuson-Stevens Fishery Conservation and Management Act)
MLMA	Marine Life Management Act
MLPA	Marine Life Protection Act
MPA	Marine Protected Area
MSA	Magnuson-Stevens Act (see also MFCMA)
MSY	Maximum Sustained Yield
NFMP	Nearshore Fishery Management Plan
NFMA	Nearshore Fisheries Management Act
NOAA	National Oceanic and Atmospheric Administration
OPC	Ocean Protection Council
OY	Optimum Yield
PFMC	Pacific Fishery Management Council
PSMFC	Pacific States Marine Fisheries Commission
RFP	Request for Proposals
SFA	Sustainable Fisheries Act
SSC	Science and Statistical Committee

Appendix 1. An Overview of Restricted Access Fisheries

By: Michael Healey

Introduction

Purpose and scope of issue paper

This issue paper provides a brief overview of restricted access fisheries (RAF). It is intended to provide background material to the "lessons learned" study of California's Marine Life Management Act (MLMA) that is being conducted under contract to the Ocean Protection Council.

RAF are fisheries in which individuals or groups of individuals have been granted exclusive property rights to some component of the fishery. RAF of one sort of another have become quite commonplace in the past 3 decades (Beddington et al. 2007, Wyman 2008). The US, however, has been relatively slow to implement restricted access policies, particularly those involving catch shares. This paper will also discuss some of the reasons for resistance to RAF.

Definitions of RAF

As defined in the MLMA, a “Restricted Access Fishery” is a fishery in which the number of persons who may participate, or the number of vessels that may be used in taking a specified species of fish, or the catch allocated to each fishery participant, is limited by statute or regulation.

RAF is an umbrella term for a range of fishery policies that transfer some form of ownership rights for fish resources to individuals or groups of fishers. There are a number of ways in which such rights can be conferred and the terminology can be quite confusing. Hilborn et al (2005) define 3 broad classes of RAF representing increasingly exclusive rights to fish:

1. Limited entry fisheries in which the number of individuals or vessels permitted to fish for particular species is restricted by regulation. In most cases it is individuals who are licensed. However, the licenses are also typically associated with a particular size and class of vessel and the license holder cannot significantly alter his vessel without satisfying other regulations. Licenses may be freely transferable, transferable with restrictions, or not transferable.

2. Quota rights fisheries in which a permit to fish is associated with a particular share in the allowable catch or the allowable fishing effort. Individual rights to a share of the allowable catch go by various names such as Individual Quota, Individual Fishing Quota, Individual Vessel Quota. Quota shares or access rights may also be allocated to communities as in the Alaska Community Development Quotas (NRC 1999). Shares in allowable effort can involve allocation of a portion of allowable traps in a lobster fishery or allocation of a portion of allowable fishing time such as the days at sea policy for New England groundfish (Brodziak et al. 2008). Quota or other shares may be transferable or not. Other terms for this

broad class of fishery policies include Dedicated Access Privilege (DAP), or Limited Access Privilege (LAP) (Anderson and Holiday 2007). LAP is the term used in the reauthorized Magnuson Stevens Act.

3. Territorial Use Rights Fisheries (TURFS) in which individuals, groups or communities are given exclusive or semi-exclusive rights to fish within a designated section of shoreline or patch of ocean. Small scale TURFS have a very long history in pre-industrial societies and remain an important management policy in some modern nations (e.g., Weinstein 2000). The Alaska Salmon Enhancement Societies (Hilborn and Eggers 2000) are a form of TURF in which the society has exclusive rights to fish within a designated zone.

For any of these policies, individual fishers may band together to share equipment and catch. Cooperative agreements among fishers include the At Sea Processors Association, an agreement among the owners of 19 catcher/processor vessels to share resources and minimize costs in harvesting their quota shares in the Alaska pollock and Pacific whiting fisheries (www.atsea.org/), and other agreements facilitated by the American Fisheries Act of 1998 (Kitts and Edwards 2003).

A Brief Historical Perspective on Fishery Management Leading to RAP

Pre-industrial society fisheries were conducted from shore by traps or small seines or from small boats by hand line within a few miles of land. Without mechanization, and given the vastness of the sea, it appeared to observers in the 18th and 19th centuries that human's puny efforts could have no lasting impact on the sea (e.g., Anyanova 2008). With the rapid industrialization of fisheries after World War 2, it quickly became apparent that the limitless ocean hypothesis was a myth (Beddington et al. 2007) and accumulated evidence suggests that human exploitation has had important impacts on coastal ecosystems throughout history (Jackson et al. 2001). Nevertheless, the paradigm of the inexhaustible ocean was a powerful influence on fishery management through most of the 20th century and established a legacy that managers still struggle to transcend.

One of those legacies is "open access fisheries" in which anyone may participate by simply purchasing an inexpensive license (the elderly and the young are often excused from even this nominal degree of administration.) Through much of the 20th century marine fisheries were managed under this policy. However, as it became apparent that fish stocks were becoming depleted, governments established management agencies and began to restrict fishing. Initially, restrictions focused on inputs; types and designs of fishing gear; places and times when fishing was allowed. But as it became clear that input controls were frequently insufficient to ensure conservation, attention turned to output controls; total allowable catches, body size and/or sex restrictions on landings. In the past few decades, restricted ac-

cess policies have become popular as a means to accomplish conservation goals and improve the economic performance of fisheries. Throughout this evolution, design of management policy was assisted by an expanding toolbox of quantitative methods for stock assessment (e.g., Hilborn and Walters 1992), improved understanding of fishery economics (e.g., Clark 1990), and better understanding of the social anthropology of fishers (e.g., Pinkerton 1994a, Ostrom 1990).

Through the second half of the 20th century three paradigms of fishery policy have competed for attention: management for maximum biological yield; management for maximum economic yield; and management for maximum social benefit. Initially the policy to maximize biological yield held sway and management agencies were configured and staffed to pursue this objective. Then the policy of maximizing economic yield became dominant and agencies were somewhat reconfigured and staffed to support this policy. Policies focused on social benefits lagged somewhat as there was no generalized model that could be used to inform management. In recent years, however, a solid theoretical framework of community based common pool resource management has emerged and this is beginning to influence policy decisions. All three approaches are incorporated in modern integrated management of fisheries.

MSY to ITQ and Beyond

MSY Under Open Access

During the middle decades of the 20th century, fishery management policy was dominated by the concept of maximum sustainable yield (MSY), which is the maximum harvest in weight or numbers of fish that can be taken each year without causing progressive decline in the size of the harvestable stock. The concept of MSY derived from the developing understanding of population dynamics in ecology and had a solid foundation in ecological theory. Fishery scientists devised mathematical procedures for estimating MSY from data on catch, fishing effort, age structure and growth derived from the fishery itself or scientific surveys. These procedures remain the basis of quantitative stock assessment.

The legitimacy of MSY as a management policy for open access fisheries was based on the twin goals of maximizing employment opportunity in coastal communities and maximizing food supply from the sea. A number of problems emerged, however, in open access fisheries managed under the MSY policy:

1. Because entry into the fishery was unrestricted and relatively cheap large numbers of individuals engaged in the fishery and fisheries typically had much more fishing capacity than was needed to

harvest MSY;

2. Because of overcapacity in the fishery many fishers did not catch enough fish to make a reasonable living and fishing dependent communities tended to be poor; and

3. Because of overcapacity, MSY was frequently exceeded so that fish stocks declined and yields were compromised.

MSY Under Restricted Access

The basic economic theory of open access fisheries, which accounted for these problems, was worked out by Scott Gordon (1954) and others quite early on but did not have much influence on fishery management policy until the 1960s. By the 1960s, however, many valuable fisheries were in serious decline and governments were forced to bail out their fishers. Arguments for an "economic rationalization" of fisheries seemed to offer a way out. The first step toward this rationalization, limiting the number of licensed fishers, was taken by many countries in the 1960s and 1970s (Townsend 1990). There was considerable optimism that limited entry policies would ultimately reduce excess capacity, slow the race for fish, allow fishers to make a reasonable living, and possibly allow governments to collect some rent from the fisheries. A number of events combined to reduce the effectiveness of license limitation in achieving these goals:

1. Criteria for obtaining a license were often not very stringent and, in the lead up to implementing the policy, fishers raced to meet the criteria. As a consequence, considerable excess capacity was initially licensed in most limited entry fisheries. To bring down the number of license holders, governments were forced to undertake expensive programs to buy fishers out of the fisheries;

2. The fishers willing to be bought out tended to be the less skillful fishers so that reductions in capacity were not as great as the number of retired licenses and vessels suggested (typically about 20% of fishers catch 80% of the fish);

3. As the remaining fishers began to reap greater profits they poured additional capital into their vessels, improving comfort and safety but also increasing fishing power. Overcapacity in the form of too many fishers was replaced by overcapacity in the form of too much technology. Management agencies have introduced ad hoc policies to address this problem with variable success;

4. Limited entry tended to favor full time fishers over part time fishers. Part time fishers who sold their licenses often had few alternative sources of employment to supplement their incomes. In addition, licensed fishers have tended to relocate from small coastal communities to urban centers so that the policies have often had a negative impact on coastal communities;

5. Fishers who remained in the fishery were usually better off under limited entry than under open access. However, as more fisheries were placed under limited entry the ability of fishers to switch from one fishery to another to even out natural fluctuations in species abundance were constrained (unless they held licenses in a number of fisheries); and

6. Those who were issued a license at the inception of a limited entry fishery often reaped a windfall profit when they sold their license. This sometimes raised animosity among those who did not receive a license. More significantly, however, as the value of licenses soared, it became economically very difficult for new fishers to enter the fisheries.

Although the implementation of limited entry has not been without problems the policy has not been a failure. Fishers in limited entry fisheries generally realize a much greater economic return than under open access. Annual fishing license fees also increased dramatically in most limited entry fisheries, so that governments recovered some rents from the fishery. Government revenues from the fisheries generally remained much lower than administration and management costs, however. Townsend (1990) concluded that the most successful limited entry programs were those that were the most restrictive at the outset or that took steps to reduce the number of licensed vessels or fishermen early on. A recurrent problem has been increases in capacity through capital investment in technology, even in fisheries where management was designed to prevent such increases. Thus, limited entry has not done much to reduce the race for fish, to simplify fishery management, or to improve conservation. The conservation issue is critical as global fish stocks are in steep decline. In a controversial article, Worm et al (2005) estimated that if current trends continue all currently fished stocks will be collapsed by mid century. Stock conservation is also an ongoing problem in US fisheries (Rosenberg et al. 2006).

Townsend (1990) also noted that the success of limited entry policies depended a lot upon their acceptance by fishers. Where fishers were opposed to the policy, they had innumerable opportunity to sabotage it. Fishing communities often have informal social traditions that govern many aspects of fishing. When management policy co-opts those traditions, success is much more likely. This is a powerful argument for engaging fishers in management planning (Grafton et al. 2006).

Strengthening Property Rights, ITQs

Individual transferable quotas (ITQs) is the policy developed to resolve the problems that had emerged from the implementation of limited entry. The ITQ is a much more specific form of property right than the limited entry license in that it specifies a maximum amount of harvest for the quota holder. According to Wyman (2008) and others, the implementation of ITQ policies was greatly encouraged by the seaward extension of coastal states' jurisdiction that took place under the Law of the Sea Conven-

tion in the mid 1970s. Coastal states now have jurisdiction over most of their continental shelves, the most productive fishing areas. That means they can implement regulations that can not be undermined by foreign flag vessels. Indeed, much of the enthusiasm for the Magnuson Fishery Conservation and Management Act when it was passed in 1976 centered on the belief that foreign fishers would be kicked out of American fisheries.

ITQ policies have been implemented by a number of coastal states around the world (Beddington et al. 2007) and the trend is to increasing application of this policy (Costello et al. 2008). ITQ policies have not been widely implemented in the US, however, for a variety of reasons but primarily due to fisher opposition (Criddle and Macinko 2000, Griffith 2008). ITQ policies are expected to confer a considerable number of benefits for both fishers and fishery agencies including (See, Squires et al. 2005, Oceans of Abundance (www.edf.org/article. cfm?contentID=8791) Anderson and Holliday (2007), Leal (2005) for additional information):

1. *Reduce or end race for fish*. Because fishers own a specific fraction of the allowable catch they can organize their fishing to take that fraction at a time that best suites their needs. There is no incentive to rush to the fishing grounds and fish as hard as possible to get the fish before other fishers do.

2. *Improve economic efficiency of fishery*. Under ITQ policies, fishers no longer have an incentive to build overcapacity. They can choose vessel designs and gear that minimize their costs of fishing, thus eliminating overcapacity.

3. *Create incentive for fishers to take responsibility for conservation/management*. The more productive the fish stock, the greater each fishers absolute catch. Thus, under ITQ policies, fishers have an incentive to ensure the stock is managed to maximize the sustainable harvest.

4. *Can improve fishery selectivity and reduce by-catch*. To the extent that catching non-target species increases fishing costs, fishers will have an incentive to avoid by-catch. This will be particularly the case where non-target species are also under quota regulation and excessive by-catch can result in closure of fishing grounds. Because they have flexibility in when and where to harvest (there is no race for fish), ITQ holders can choose times and fishing locations that minimize by-catch.

5. *Increase safety and professionalism among fishers*. Fishers in ITQ fisheries typically make good incomes and can afford to equip their vessels with proper safety gear and refrigeration to maintain the quality of their catch. Because there is no race for fish, fishers can travel and fish when weather conditions are suitable rather than feeling constrained to fish regardless of sea or vessel conditions.

6. *Make conservation and recovery of depleted stocks easier/more likely*. Because ITQ fishers

have an incentive to ensure that their fish stocks are well managed they are more receptive to the goals of conservation and stock recovery. Also, ITQ fisheries tend to have fewer participants so that monitoring for compliance is easier.

7. *The fishery can become self-financing*. Because ITQ fisheries are expected to generate considerable rent from the resource the participants can be taxed to cover the cost of management. Typically, management of ITQ fisheries becomes more collaborative between management agencies and fishers. Indeed, when expected to pay the costs of management, fishers demand a big say in how the fishery is managed.

Proponents of ITQ policies argue that, because of these benefits, virtually all fisheries should be administered this way. There is considerable evidence that ITQ fisheries, in general, perform better economically, are less likely to be overfished than fisheries managed under other policies and are generally able to support the costs of management (Costello et al. 2008, Hilborn et al. 2005). However, there are also a number of recurring problems in fisheries managed under ITQ policies:

1. *High-grading and/or excessive discarding*. Although ITQ policies can encourage reductions in by-catch, in some situations they can also exacerbate the problem. Since quota holders are restricted to their individual quotas there is an incentive to include only the highest valued fish in the quota share. If fish differ in value in relation to size or flesh color, or other characteristic, there is an incentive for fishers to discard lower valued catch and fill their quota with higher valued catch. Also, if the management regime does not allow a fisher to land species outside his quota license, he may be forced to dump catch of species that, in other circumstances, he might have landed.

2. *Smaller fishers are often forced out of fishery*. As was the case with limited entry, smaller scale fishers are more likely to sell their quota to cover short-term debts and can never afford to buy it back. Thus, ITQ systems tend to favor full time, well capitalized fishers over part timers. Part time fishers can, thus, lose an important seasonal or intermittent source of income.

3. *Concentration of quota in a few hands*. A major concern among fishers has been that ITQ and other property rights systems in fisheries will lead to corporatization of the fishery in which a few wealthy corporations own most of the fishery. Most ITQ policies have been implemented with restrictions on quota concentration. However, there are many ways around such restrictions.

4. *Creates a class of "armchair" fishers*. Fisheries managed under ITQ do not necessarily demand that it is the quota holder who catches the fish. Where quotas are freely transferable, some quota holders choose to lease their quota right to another fisher rather than catching it themselves. This can help

to reduce over-capitalization as those who lease quota do not need to own and maintain a vessel. However, quota leasing can also be a step toward corporate concentration of quota.

5. *Fishers relocate to urban centers*. As was seen in restricted entry fisheries, as fishers become wealthy under ITQ policies they tend to relocate to major population centers so that coastal fishing communities suffer loss of population and income.

6. *New fishers cannot enter*. The cost of purchasing quota to enter the fishery can be prohibitive for prospective new fishers.

7. *In multispecies fisheries it can be difficult to ensure efficient harvest of all species*. Usually multispecies fisheries are closed once one or two species have reached or exceeded their quota. As a result, some ITQ holders may be prevented or severely restricted in attempting to full their quotas. This can be true regardless of management regime but the problem can be made worse when fishers are not able to fish strategically among species.

8. *Designing and implementing the system can be expensive and divisive*. The negotiations involved in designing and implementing and ITQ system can be divisive and strain relationships among fishers and between fishers and managers. For an ITQ system to be implemented, data and understanding of the fish stock must be sufficient to establish a sustainable total allowable catch. Costs of acquiring this information, if it does not exist, can be high. The rules governing who gets quota and how much they get can be particularly contentious. As was the case with limited entry, fishers will try hard to meet the criteria and get quota in the months leading up to implementation of ITQs, even if they have little history of fishing for the species. Quota sales by those who succeed can also generate windfall profits.

Several countries (New Zealand, Iceland) have gone almost exclusively to ITQ policy. Others, like Canada, have put a portion of their fisheries under ITQ policy. Costello et al. (2008) examined the likelihood of stock collapse under ITQ policy compared with other policies and showed that a much lower proportion of fisheries were collapsing under the ITQ policy. Although collapse is a rather severe consequence of overfishing, the result suggests that, in general, stock conservation is better under ITQ policies than open access of limited entry. In general, therefore, ITQ fisheries perform better ecologically and economically than open access and limited entry (Branch 2009). The other issues with ITQ listed above, however, are real and need to be considered in designing policy (Brandt 2005, Stewart and Walshe 2008, Minnegal and Dwyer 2008, Murray et al. ND).

Combining Property Rights, Community Quotas and Cooperatives

ITQs are the most popular form of property right in fisheries at the present time. However, ITQ

policies may not be a good solution for many fisheries. A number of researchers have shown that when quotas are owned by individuals, they tend to accumulate in the hands of more wealthy fishers and that successful fishers tend to relocate from small coastal communities to large urban centers. To support the viability of remote coastal communities, community based quotas may be better. The community based quota system in Alaska provides a useful model (Mansfield 2007). In this program, because the coastal community (or consortium of communities) owns the quota, any income it generates goes to sustain the community rather than particular individuals. Community based quotas may be particularly appropriate for less mobile species like shellfish but can also work with widely distributed mobile species as the Alaska program has demonstrated.

The private salmon ocean ranching firms in Alaska represent another kind of community owned quota. Members of the firm contribute to the cost of building and operating salmon hatcheries and ocean net pens where salmon fry are held and fed until they are released at a time and size that will maximize ocean survival. Fisheries on returning salmon are constrained to protect less productive wild populations and the enhancement firm has exclusive rights to returning fish that are surplus to hatchery brood stock (Pinkerton 1994b, Smoker et al. 2000). Because many of the salmon returning to the enhancement area are harvested in common pool fisheries, fishers who are not members of the enhancement firm benefit significantly from the ocean ranching program. Nevertheless, members of the firm have exclusive access to a substantial additional harvest that both supports the enhancement program and provides an additional profit.

Another type of restricted access fishery involving community ownership is cooperatives that form around sector specific TAC allocations or among groups of ITQ owners. Although legislation allowing fishers to form marketing cooperatives has been on the books for more than 70 years (the Fishermen's Collective Marketing Act of 1934), early attempts to form cooperatives ran afoul of antitrust legislation and few successful cooperatives were formed (Kitts and Edwards 2003). In 1997, however, the four catcher/processor companies in the offshore US Pacific whiting fishery successfully formed a cooperative (the Pacific Whiting Conservation Cooperative) to share the benefits of efficient harvest of their sector's TAC. Formation of the Coop was made possible by restrictions on entry of new vessels into the offshore fishery and allocation of a specific portion of the overall Pacific whiting TAC to the offshore sector by the Pacific Fishery Management Council. In effect, the offshore sector had been given a guaranteed share of the catch and it was to their collective advantage to negotiate a harvest agreement that minimized inputs and maximized product value.

Subsequently, catcher/processor vessels in the Alaska Pollock fishery successfully lobbied Con-

gress to pass legislation enabling them to form a similar cooperative. The American Fisheries Act of 1998 established the necessary conditions and fishery participants formed the Pollock Conservation Cooperative. Other groups of fishers with defined TAC shares have pursued similar arrangements. Criddle and Macinko (2000) have argued that formation of cooperatives is easier and more efficient than attempting to negotiate ITQs and, as a result, it is unlikely that any more US fisheries will adopt ITQ policies. Although the formation of cooperatives is relatively recent it does appear that they facilitate early retirement of excess fishing capacity and perform well economically.

Territorial Use Rights Fisheries

Territorial use rights have a long history in fisheries. They were the primary form of fishery administration among west coast aboriginals and are still commonplace in the coastal fisheries of developing countries. The lobster fiefs of Maine are a storied example in colonial fisheries (Acheson 1975). Formally, however, TURFs are not practiced in North American fisheries (although the zones within which Alaska enhancement firms alone are allowed to fish can be considered a form of TURF as can the inshore/offshore fishing zones in some fisheries). TURFs have been at the heart of management of Japanese coastal fisheries for centuries, however, and recently Chile has adopted TURFs as the basis of its coastal fishery management (Makino and Matsuda 2005, Cancino et al. 2007). In both Japan and Chile, the TURF is a property right bestowed on a group of local fishers by the central government (Fishery Cooperative Associations (FCAs) and associated Fishery Management Organizations (FMOs) in Japan and Management Exploitation Areas (MEAs) in Chile). The local fishers effectively own and administer the territorial fishing right, establishing their own rules of membership, fishery regulations, and enforcement in the context of broad policies set by the central government. According to Cancino et al. (2007), TURFs have certain advantages over ITQ policies in terms of harvest effectiveness:

1. TURF rules can distribute fishing effort more effectively over the territory whereas ITQ fishers tend to concentrate on and overfish the most productive areas. Both FMOs and MEAs adopt rules to reduce congestion at hot spots and take advantage of spatial heterogeneity in fishing grounds.

2. TURF policies encourage self-monitoring, enforcement and sanctions. Fishers on the grounds have the best opportunity to observe and report on rule breaking. In both the Japanese and Chilean TURFs fishers exert considerable peer pressure on colleagues to follow the rules and some have committees specifically charged with monitoring and enforcement. Some Chilean associations have adopted graduated sanctions that are applied according to the severity and circumstances of the infraction.

3. TURFs encourage better management of multispecies fisheries and ecosystems. Since ITQs are generally allocated for individual species, ITQ holders have no incentive to consider the impact of

their harvest on other species or ecosystem functions. Participants in a TURF can explicitly organize their fishing to sustain ecosystem structure and processes to maximize overall community productivity.

4. TURFs allow for the potential of full integration of natural and artificial production from fisheries. Both Japanese FMOs and Chilean MEAs engage in small scale aquaculture. Integration of capture fisheries and aquaculture is rare in other contexts.

5. TURFs allow regulations, monitoring, and sanctions to be tailored to local conditions. In most ITQ fisheries monitoring and enforcement remain the responsibility of centralized management agencies. These agencies do not have the capacity to administer spatially explicit management rules. TURFs, however, have the flexibility to develop rules specific to their needs.

Restricted Access in California Fisheries

Restricted access, in many of the forms described above, is a fishery management tool employed by California prior to and following passage of the MLMA. This section describes California's approach to restricted access.

Early application of restricted access was known as "limited entry," a way to license or permit limited numbers of participants in fisheries that historically had been open access.[91] The first limitations in California were enacted by the Legislature in the 1970s for herring, and shortly thereafter for salmon. Also known as "limited access," the application of the policy in a number of fisheries over many years was not consistent. (California DFG 2000) Efforts to achieve more consistency began before passage of the MLMA. The Commission adopted a restricted access policy in 1999 that was the product of discussions that began in 1996 in response to requests from fishery participants in a variety of sectors. The Department had convened a limited entry review committee to reconcile the various limited entry fisheries enacted by the legislature over the previous two decades. According to a 2000 Department report the committee was tasked with developing a consistent standard for evaluating restricted access proposals and responding to legislative action, such as limited entry for Dungeness crab.

A draft was completed in February and revised in March 1997, but no action was taken until August 1998. The Commission approved a draft policy for public review, which was the 1997 version with several unresolved issues including permit transfers and renewals, quotas, and vessels. Public response to that draft was incorporated in a second draft policy submitted to the Commission for its June, 1999 meeting. This version contained 22 specific policies described in nine sections with narrative rationale

[91] Some forms of limited entry do not qualify as a restricted access fishery as currently defined. Rock crabs, for example, have no form of entry, but are not a restricted access fishery because there is no capacity goal.

and explanations. It was discussed in two noticed, special public hearings, and adopted at the June 17-18 meeting. A final policy document was transmitted to the Commission, after some revisions by the Department, on August 10, 1999. (Fish & Game Commission 1999)

The broad meaning of limited access is shared between the commission policy document and the MLMA, but the tools to implement a limited access policy and the effects of such policies are subject to ambiguity and some dispute. The Fish and Game Code (Section 8100) defines limited entry fishery as a fishery in which the number of persons who may participate or the number of vessels that may be used in taking a specified species of fish is limited by statute or regulation. The MLMA defines restricted access as a fishery in which the number of persons who may participate, or the number of vessels that may be used in taking a specified species of fish, or the catch allocated to each fishery participant, is limited by statute or regulation. (Section 99).

The Commission's restricted access policy does not further define restricted access fishery, but sets out many other details. It describes and encourages the use of restricted access programs as one tool to accomplish goals of promoting sustainable fisheries, providing for orderly fisheries, promoting conservation, and maintaining long-term economic viability. Other specific policy statements call for substantial involvement by fishery participants, regular review, specific capacity goals, and permits, and set out program elements. Rights-based systems are described, discussed and permitted, but not required. The policy devotes significant detail to transferability and vessel replacement issues. The policy initially proposed several gear types as candidates for restricted access fisheries.

Since its adoption, the policy has been the topic of Commission discussions at meetings in 2005, 2007, 2008 and currently. Review and adaptation of the policy is listed as a long-term priority on the Commission's policy agenda. There is some discrepancy between the policy and the MLMA about whether restricted access programs are to be reviewed every four years or every five years. There also have been problems with inconsistent standards for inclusion in limited entry fisheries between the Commission's policy on permits (Section 5) and the statutory requirement for inclusion of licensed fishermen in limited entry programs (Code Section 8101-8104). This conflict arose in the market squid fishery FMP, for example. A review of the restricted access provisions of the Dungeness crab program in 2002 found that it was only partially consistent with the Commission's policy and failed to limit the number of traps used in the fishery, therefore not achieving any actual reduction in effort.

Concluding Comment

The spectrum of policies available to manage fisheries has expanded dramatically in the past few decades. The trend has been from open access toward more and more restrictive forms of

property rights. Presently, the emphasis is on individual property rights. But no single policy is appropriate for all fisheries. Recreational fisheries, for example, are probably best administered under an open access policy with input controls and some output controls such as size limits and bag limits. For commercial fisheries, the nature of the fishery, the species being exploited, their ecology, the fishing communities involved, should determine the appropriate policy. The MLMA seems to provide enough flexibility to permit a variety of policies if that is what Californians want.

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