

**The Master Plan:  
A Guide for the Development of  
Fishery Management Plans**  
*as directed by the  
Marine Life Management Act of 1998*



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**STATE OF CALIFORNIA  
THE RESOURCES AGENCY  
DEPARTMENT OF FISH AND GAME  
MARINE REGION**



## Executive Summary

The Marine Life Management Act (MLMA) which became law on January 1, 1999, mandates several significant changes in the way California's marine fisheries are managed and regulated. Its primary goals are to ensure the conservation, restoration and sustainable use of California's marine living resources for all the state's citizens. To that end, the MLMA requires that fishery management plans (FMPs) form the primary basis for managing the state's marine fisheries.

Due to the large number of marine fisheries in California, and the considerable time and effort involved in the preparation of FMPs, it is important to establish guidelines and set priorities. Accordingly, §7073 of the Fish and Game Code requires a Master Plan that specifies the process and resources needed to prepare, adopt, and implement FMPs for sport and commercial marine fisheries managed by the state. In effect, the Master Plan will serve as a roadmap for the development of future FMPs.

The costs associated with FMPs can be significant. The level of funding necessary to develop FMPs will depend upon many factors including the number of species, their geographic range, and the management alternatives suggested. Based on management plans currently in development, the costs to develop an FMP may range from \$1.4 million for updating an existing plan on a single species to \$6.6 million for a new FMP dealing with many species. Implementation costs are expected to represent the greatest share of an FMP's total costs. The funding required for FMPs is a fundamental issue needing resolution. Commercial fishermen, sport fishermen, and non-consumptive users will all likely provide some portion of the funding.

The Master Plan identifies over 375 marine fisheries managed by the state and describes three different approaches to prioritizing them for future FMPs. Ten groups representing 29 species were identified as in greatest need of management and conservation measures to comply with the policies of MLMA. The top three fisheries for future FMPs are sea urchins, California halibut, and nearshore sharks and rays.

Essential fishery information (EFI) is a key component in FMPs, and is integral to achieving sustainable fisheries management. The DFG continues to collect EFI using fishery-dependent and fishery-independent techniques. However, biological and socioeconomic information gaps still exist for the highest priority fisheries, and certain EFI, such as socioeconomics is almost entirely unavailable for most fisheries. The nature of missing EFI for a particular fishery can affect the costs of preparing and implementing an FMP.

The MLMA recognizes that successful marine fishery management is a collaborative process requiring ongoing communication and the participation of all those involved. The MLMA seeks to involve all interested persons in living marine resource management decisions including the development of this Master Plan, FMPs, and research protocols. The Master Plan benefited from considerable comment from members of the sport and commercial fishing industries, environmental and conservation groups, academic and scientific communities, and other interested persons. The Master Plan describes the DFG's preferred methods and activities for public involvement, and how interested persons can become involved at various stages of the FMP process.

All FMPs must stand on a foundation of good science. To ensure this, FMPs will undergo scientific peer review. Although the Master Plan is not a peer reviewed document, it will be reviewed at least every 4 years in order to keep it proactive, adaptive, and responsive to any changes affecting fisheries and FMPs.

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### **List of Acronyms**

CEQA - California Environmental Quality Act  
 CERES - California Environmental Resources Evaluation  
 CESA - California Endangered Species Act  
 CFIS - Commercial Fisheries Information System  
 DFG - Department of Fish and Game  
 EFI - Essential Fishery Information  
 EIR - Environmental Impact Report  
 FGC - Fish and Game Code  
 FMP - Fishery Management Plan  
 MLMA - Marine Life Management Act  
 MLMAEAC - Marine Life Management Act Evaluation Advisory Committee  
 MRFSS - Marine Recreational Fishery Statistical Survey  
 MSY - Maximum Sustainable Yield  
 NEPA - National Environmental Policy Act  
 NOP - Notice of Preparation  
 OAL - Office of Administrative Law  
 OY - Optimum Yield  
 PFMC - Pacific Fishery Management Council  
 PSMFC - Pacific States Marine Fisheries Commission  
 RecFIN - Recreational Fisheries Information Network  
 UC - University of California



## **Chapter 1. Introduction**

### **1.1 Background and Setting**

California's marine life is both rich and diverse. Thousands of species of plants, algae, invertebrates, fishes, seabirds, turtles, and mammals occupy a wide variety of habitats along the state's 1,100 miles of coast and associated waters. This abundant marine life is enjoyed by many people and supports numerous activities including commercial fishing, sport fishing, diving, aquaculture, biotechnology, tourism, education, and recreation. As California enters the 21<sup>st</sup> century, its growing population, diverse culture, and expanding economy will continue to place additional demands on the state's marine resources, and make management of these resources increasingly complex.

The decline of fisheries in many parts of the world brought an end to the view of oceans as limitless sources of food and materials. It is now clear that fisheries and other marine living resources need to be managed for sustainability. (Sustainability refers to the continual replacement of a resource, taking into account fluctuations in abundance and environmental variability.)

### **1.2 The Marine Life Management Act**

Assembly Bill 1241 was passed in 1998 by the California Legislature, and the Marine Life Management Act (MLMA) became law on January 1, 1999 (Appendix A). The MLMA significantly changes the way California's marine fisheries are managed and regulated. One of its primary policies is to ensure the conservation, restoration, and sustainable use of California's marine living resources for all citizens through scientifically-based decisions and processes that involve a broad constituency. Marine resources are to be managed to assure long-term economic, recreational, ecological, cultural and social benefits.

The MLMA requires that Fishery Management Plans (FMPs) form the primary basis for managing the state's marine fisheries. An FMP is a planning document based on the best available scientific knowledge and other relevant information, that contains a comprehensive review of the fishery along with clear objectives and measures to ensure its sustainability.

### **1.3 Department of Fish and Game Fishery Management Plans**

As required by the MLMA, the DFG is currently developing FMPs for white seabass and the nearshore finfish fishery. A White Seabass Management Plan was approved by the Fish and Game Commission (Commission) in 1996, but never implemented. The DFG is now updating this plan to meet MLMA requirements. The Nearshore Fishery Management Plan includes 19 finfish species: 13 rockfish (black, black and yellow, blue, brown, calico, copper, China, gopher, grass, kelp, olive, quillback, and treefish), California scorpionfish, cabezon, California sheephead, kelp greenling, rock greenling, and monkeyface prickleback.

## **1.4 The Master Plan**

Due to the large number of marine fisheries in California, and the considerable time and effort involved in the preparation of FMPs, it is important to establish guidelines and set priorities. Accordingly, §7073 FGC requires a Master Plan that specifies the process and resources needed to prepare, adopt, and implement FMPs for sport and commercial marine fisheries managed by the state (Appendix A). Thus, the Master Plan will serve as a roadmap for the development of future FMPs. Although the Master Plan relies heavily on the intent of the language in the MLMA, it is not intended to be a guide for achieving all of the goals and objectives outlined.

The Master Plan is intended to serve as a guide for the Legislature, the Commission, the DFG, and other interested persons. It contains many items specific to FMPs, but also identifies other issues that need further clarification.

The Master Plan describes the requirements and specific contents of an FMP, as well as the tasks required of technical, enforcement, and administrative staffs during the preparation, adoption, and implementation. The Master Plan provides estimated costs for three different management plans, and notes important issues that need further clarification for the success of future FMPs.

The Plan then begins identifying the next FMPs to be developed. It lists over 375 species of fish, invertebrates, plants and algae that are managed by the state. Many of these species already have existing or developing state or federal FMPs and are identified as such. The remaining species are then prioritized for future FMPs using three different approaches. Several fishes, invertebrates, and algae are identified as the fisheries most in need of conservation and management measures, and are organized into groups for the next FMPs.

The Master Plan also sets the stage for the collection of essential fishery information (EFI). It describes past and ongoing DFG monitoring and research activities, identifies future research needs, prioritizes the collection of EFI, and emphasizes the need for public involvement and collaborative research.

One of the central themes of the MLMA is the need for public involvement in fisheries management activities, and this is integrated throughout this document. The Master Plan describes processes and timelines to ensure the meaningful involvement of fishermen, conservationists, scientists, and others in the development of FMPs and research plans.

Since science is an integral part of FMPs and is a primary tool to be used in making management decisions, the Master Plan describes the scientific peer review process that will be applied to DFG documents.

Lastly, the Master Plan recognizes that FMPs constitute a new way of management for the DFG and California's marine fisheries. In addition, our marine fisheries are constantly in flux, and better research methods are identified. Newly established processes and procedures are implemented and evaluated. To this end, the Master Plan presents a process for periodic review and amendment of this document.

## **1.5 Ecosystem Considerations**

One of the objectives of the MLMA is to not only conserve the health and diversity of marine living resources, but also to do so for whole marine ecosystems. Fishery management plans must include information on the ecosystem role of the target species as well as the relationship of the fishery to that role. The MLMA recognizes that non-target species and habitats can be affected by fisheries as well, and FMPs must address and provide measures that minimize these impacts.

### **1.5.1 What is an Ecosystem?**

An ecosystem is defined as “a spatially explicit unit of the Earth that includes all of the organisms, along with all components of the abiotic environment within its boundaries” (Likens 1992). Ecosystems vary spatially, change with time, and are made up of many complex interactions among their living and nonliving components. Marine ecosystems can be particularly complex due to the vastness of the marine environment, the large number of organisms, and the intricacies of the physical, chemical, biological, and social processes involved. As a result, most marine ecosystems are poorly understood.

### **1.5.2 Ecosystem-Based Management**

The DFG, along with many other state, federal, and non-governmental agencies is moving toward an ecosystem-based approach to the management of natural resources. Traditionally, resource managers have adopted single-species or species-complex approaches to managing fisheries. But over the years, these approaches have proven insufficient or unsuccessful in many cases. Although an ecosystem-based approach to marine fisheries management is a relatively new concept, it is a fundamentally broad approach that recognizes the interdependence of multiple species and their habitats within a constantly changing oceanographic environment.

### **1.5.3 Implementing Ecosystem-Based Management**

Even though marine ecosystems are unpredictable and complex, we are not required to understand all things about all components in order to implement ecosystem-based management of fisheries. In fact, ecosystems will always contain considerable uncertainties and unmeasured variables. We do know that fishing can alter the structure and function of marine ecosystems (Pauly et al. 1998). When target species are removed, effects are seen on their prey, predators, and competitors. Habitats can also be greatly affected. These effects require that we look at exploitation and fishery management as a real and integral part of the marine ecosystem (Langton and Haedrich 1997).

Although ecosystem-based management requires the use of ecological science in natural resource management decisions, moving from concepts to practice is a formidable challenge. Since FMPs will be the primary basis for managing our marine fisheries, they must go a long way toward achieving ecosystem-based management. FMPs will specifically address ecosystem issues relevant to an individual fishery, and

as more plans are developed and implemented, their overlapping issues will provide a network of ecosystem-related information to be used in management decisions.

It is our hope that this Master Plan will serve as a useful guide for future development, adoption, and implementation of FMPs for California's marine sport and commercial fisheries. Through these individual plans, and their relationships to one another, we can achieve sustainable fisheries and a better understanding of our marine ecosystems. Successful management of our marine living resources and marine ecosystems will involve collaboration with other researchers and agencies, pooling of resources and knowledge, and meaningful public involvement.

## **Chapter 2. Preparation, Adoption, and Implementation of a Fishery Management Plan**

The Marine Life Management Act (MLMA) requires that fishery management plans (FMPs) be developed by the Department of Fish and Game (DFG) and implemented through regulations adopted by the Fish and Game Commission (Commission). Fishery management plans will serve as the primary instrument for managing California's sport and commercial marine fisheries [§7070-§7072 Fish and Game Code (FGC)]. Fishery management plans contain a comprehensive environmental and economic analysis of the fishery along with clear objectives and measures to ensure sustainability of that fishery. The DFG's development of an FMP is subject to the California Environmental Quality Act (CEQA) as part of DFG's certified regulatory program [Title 14, California Code of Regulations, §15251 (o).] As a certified agency's environmental document, FMPs are functionally equivalent to an Environmental Impact Report (EIR). An FMP prepared for a federally managed species will conform to the requirements of the Federal Magnuson-Stevens Fishery Conservation and Management Act.

### **2.1 Fishery Management Plan Requirements**

The primary requirements of FMPs pursuant to §7072 FGC are as follows:

- To the extent practical, each sport and commercial marine fishery under the jurisdiction of the state shall be managed under an FMP. Fishery management plans will be developed in priority order.
- Each FMP shall be based on the best scientific information and other relevant information that is available, or that can be obtained, without substantially delaying the preparation of the plan.
- To the extent that conservation and management measures in an FMP provide guidelines for overall harvest, FMPs shall allocate those increases or restrictions of harvest fairly among sport and commercial fishing interests participating in the fishery.

In addition to adhering to the above requirements, the DFG shall seek advice and assistance in developing FMPs from participants in the affected fishery, marine scientists, marine conservationists, and other interested parties.

### **2.2 Fishery Management Plan Contents**

Each FMP prepared by the DFG shall contain the following as specified in §7080-§7088 FGC:

- A summary of the fishery, including:
  - Species, location, number of vessels and participants, fishing effort, historical landings, and a history of conservation and management measures affecting the fishery;
  - The natural history and population dynamics of the target species, along with effects of changing oceanographic conditions

- on the target species;
  - The habitat for the fishery or species and known threats to the habitat;
  - The ecosystem role of the target species and the relationship of the fishery to that role;
  - The economic and social factors related to the fishery.
- A fishery research protocol that includes:
  - A description of past and ongoing monitoring of the fishery;
  - Essential fishery information (EFI) for the fishery and identification of additional information, resources, and time needed;
  - Procedures for monitoring the fishery and for obtaining EFI.
- Measures necessary for the conservation and management of the fishery that may include, but not be limited to:
  - Limitations on the fishery;
  - Creation or modification of a restricted access program that contributes to a more orderly and sustainable fishery;
  - A procedure to establish, review, and revise a catch quota;
  - Requirements for permits.
- Measures to minimize adverse effects on habitat caused by fishing.
- Information and analysis on the amount and type of bycatch if it is associated with the target species. Conservation and management measures must be implemented to minimize bycatch, and to minimize mortality of discards that cannot be avoided.
- Criteria for identifying when the stock is overfished and measures to address overfishing if occurring;
- A procedure for review and amendment of the plan.

Appendix B provides an example of a possible format for an FMP.

## **2.3 Fishery Management Plan Process**

FMPs are similar, yet inherently different, and can be divided into separate preparation, adoption and implementation stages. In general, FMPs will follow the process outlined in Figure 2-1. All plans will use an open and collaborative process with frequent consultations with fishery participants or their representatives, fishery scientists, and other interested parties. Public involvement is integral to the entire FMP process — from preparation and adoption to implementation (see Chapter 5).

### **2.3.1 Fishery Management Plan Preparation**

The DFG is the lead agency for all activities during the FMP preparation period. The first step in the process is the preparation of a fisheries overview, which may include a literature search, and identification of available EFI and any data gaps.

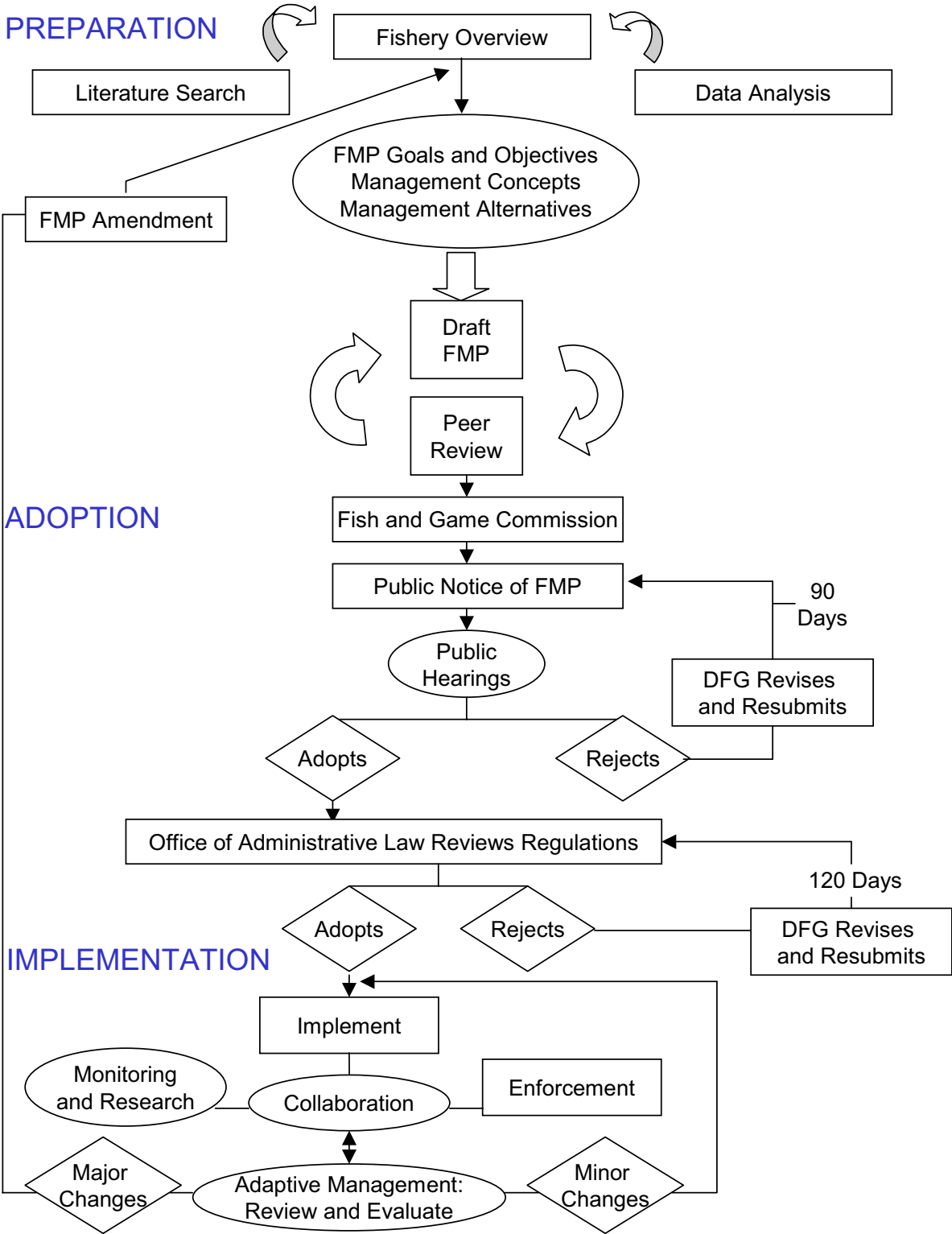


Figure 2-1. Diagram of fishery management plan (FMP) preparation, adoption, and implementation stages. DFG = Department of Fish and Game

Preliminary data analysis will occur during this time so that a profile of the target species and the fishery can be developed. The second step is the identification of the FMP goals and objectives, as well as potential obstacles to achieving them. This includes the criteria needed to assure sustainability of the fishery, based on the information collected in the previous step. If the fishery is identified as an emerging or depressed fishery, objectives will be identified for the management of that emerging fishery, or the rebuilding of the depressed fishery.

Next, an array of potential management concepts for achieving the FMP objectives will be developed. These may include, but are not limited to, the use of harvest guidelines to achieve maximum sustainable yield (MSY) or optimum yield (OY). The draft FMP will contain management alternatives with recommendations and implementing regulation language.

The final step is the preparation of the draft FMP document, cataloguing all information known and decisions made through the preparation period. Peer review of the scientific basis of the management approaches contained in the draft FMP may occur prior to, during, or just after the final step (see Chapter 6).

Public consultations through meetings, committees, or individual contacts are integral to each step.

In general terms, the following staff are needed to complete the associated tasks during preparation of an FMP and FMP amendments. It is assumed that initial preparation will require substantially different staffing levels than amendments or revisions of the FMP.

#### Technical staff:

- Assemble or update all known information about the species or species groups, the fishery, and the participants. Ascertain the quality of the data;
- Analyze data and review management approaches already in use within and beyond California;
- Prepare overviews, analyses, and information for consideration and discussion by the public;
- Convene meetings and make presentations about the issues at hand;
- Receive comments and factor them in with other information to develop management options;
- Draft the FMP or amendment and proposed research protocols;
- Assure that peer review has occurred if appropriate, and that resultant changes are incorporated before finalization of the FMP;
- Manage contracts;
- Present management options or amendments and the rationale used to support them.

#### Enforcement staff:

- Provide perspective to technical staff while they prepare the fishery overview or update;



- Interact with the preparation team during the development of management options since field officers will be required to enforce subsequent regulations or suggest changes designed to meet management objectives;
- Assist at Commission and public meetings.

Administrative staff:

- Assist with meeting logistics;
- Provide clerical and mail support;
- Take and transcribe notes;
- Acquire supplies and equipment;
- Manage contracts.

### **2.3.2 Fishery Management Plan Adoption**

Once an FMP has been prepared through the process discussed above, the draft document along with proposed regulations must be submitted to the Commission for adoption. The DFG will also provide the FMP peer review report to the Commission.

An FMP and associated proposed regulations must be available to the public for review 30 days prior to a hearing by the Commission. All proposed plans, hearing schedules, and agendas must be posted on the DFG's Internet web site pursuant to §7077 FGC. Once the Commission has received the FMP, the following Commission process begins [§7078(a)-7078(f) FGC]:

- The Commission produces a public notice that they will be considering an FMP for adoption.
- The Commission then schedules at least two public hearings prior to adoption. The first of these meetings must be within 60 days following receipt of the plan by the Commission.
- The Commission may adopt the plan at the second public hearing, at the Commission's meeting following the second public meeting, or at any duly noticed subsequent meeting.
- If an FMP is rejected by the Commission, the DFG must make changes and resubmit the FMP within 90 days.
- The Commission shall adopt any regulations necessary to implement an FMP no more than 60 days following adoption of the FMP.
- The regulations must be approved by the Office of Administrative Law (OAL) before they become enforceable.

Under authority of the Administrative Procedures Act, the OAL reviews all proposed state regulations and approves a regulation only when the rulemaking agency has adequately considered public comments and the regulation is easily understood, necessary, authorized, and consistent with law. This process takes a minimum of 30 working days.

During the FMP adoption period, the Commission is the lead for all activities. Public comment made during Commission meetings will become part of the official public records in the rulemaking file for the adoption of regulations to implement the FMP management approach. As stated throughout the Master Plan, public involvement and input are integral to effective management decision-making.

The Commission makes all the arrangements for public notification of meetings, arranges the meetings, and publishes regulatory documents. The DFG provides the background information in the draft FMP and makes changes as directed by the Commission. The DFG is also required to complete a substantial portion of the regulatory paperwork, and respond to public comments received through the adoption process.

Technical staff:

- Attend the Commission meetings to present the draft FMP as well as answer questions from the Commission and public attending the meeting;
- Respond to comments submitted in writing to the Commission or made verbally at Commission meetings;
- Complete the regulatory documents for the adoption of implementing regulations.

Enforcement staff:

- Attend the Commission meetings to answer enforcement questions and review regulations to ensure enforceability.

Administrative staff:

- Support may be needed for technical and enforcement staff involved in the Commission process.

### **2.3.3 Fishery Management Plan Implementation**

Management provisions of the adopted FMP become official after the implementing regulations are filed with the Secretary of State. This filing begins a process with a longer timeframe, more complexity and less specificity. The DFG again assumes responsibility for assuring the implementation process is conducted appropriately.

If the adopted FMP is simple and contains all necessary management provisions, then regulations will be enforced, monitoring and research programs will begin, and the review or adaptive management process will be started. Additional interactions between the DFG and public may occur while regulations are enforced, and monitoring and research programs take place. These FMPs are flexible documents and can be amended once information is gathered and analyzed. If amendments are recommended, the FMP process may return to the preparation stage.

Enforcement of associated regulations is the first action taken under an FMP. These regulations may be simple or complex, regional or statewide, or seasonal or year-round. Technical staff will establish monitoring and research programs that may

include the public, or collaboration with researchers in other agencies or academia. Data collection begins, especially to fill the most important data gaps. Contracts for research or monitoring programs may also be written.

Although formal public involvement activities will probably lessen, the DFG must inform the public about the implementation activities and results on a continuing basis through printed media, the Internet, advisory committee meetings, and personal contacts. If new or better information of management significance is available before a scheduled formal review of the individual FMP, or results of a management strategy prove to be inappropriate, adaptive management will be applied.

Fishery management plan implementation is a much less structured process than preparation and adoption. As such, it entails regulation enforcement, research and monitoring programs, and opportunities to revise the selected management regimen. Time, staffing, and resources needed to fully implement an FMP are difficult to determine at this time, since each step in the process is based on the provisions for each contained within individual FMPs. The types of activities and appropriate staff can be as follows:

Technical staff:

- Conduct identified monitoring and research programs;
- Collaborate with the public or researchers on assessment, monitoring, or development of projects to meet the objectives of the individual FMP;
- Analyze data collected during implementation;
- Provide information to interested persons during implementation;
- Manage contracts.

Enforcement staff:

- Ensure regulation compliance through enforcement and education activities;
- Collaborate with technical staff to maximize research platforms;
- Interact with the technical staff during management effectiveness review;
- Act as an in-the-field conduit for information to and from the DFG;
- Suggest management or regulation changes designed to meet management objectives during the review process;
- Attend and assist at Commission and public meetings.

Administrative staff:

- Assist with certain data input and editing efforts;
- Manage contracts;
- Acquire equipment and supplies.

## **2.4 Potential Costs of a Fishery Management Plan**

Once the Commission adopts the Master Plan pursuant to §7073 FGC, the DFG will begin to prepare, adopt, and implement FMPs for the highest priority fisheries identified in the Master Plan. Each FMP will vary in the amount of funds and time needed for preparation and implementation. These costs will depend on whether the FMP contains a single species or a group of species in a fishery, the size of the geographical area the fishery covers, the quantity and quality of information that exists, the availability of knowledgeable staff, the degree of urgency (e.g., emergency measures), and the amount of staff needed to enforce regulations adopted with the FMP.

Choices will also need to be made regarding how existing DFG funds and staff will be devoted to the preparation and implementation of an FMP if there are limited funds and no new funds scheduled to be allocated. For example, if no new funding is available, the DFG would need to structure the size of an FMP process and devote resources based on factors such as the fishery's value, the level of recreational vs. commercial conflicts, the ecological significance of the fishery, and many others. If a fishery is of small economic value to the state and does not affect a key species in the ecosystem, the DFG may budget an FMP process that has fewer public hearings, spends less money on contracts or staff time for analyzing existing or collecting new data, and generally attempts to generate a relatively simple plan. The costs of developing FMPs mandated by the MLMA needs to be balanced among commercial, recreational and non-consumptive users.

The DFG has no previous history managing fisheries with the FMP process outlined in §7050-7090 FGC. Therefore, detailed costs for the preparation, adoption, and implementation of FMPs are not available. However, one can get an idea of the range of costs associated with an FMP by looking at the following DFG management plans:

1. Pacific Herring. The DFG manages the Pacific herring commercial fisheries (single species) that occur in Humboldt, Tomales, and San Francisco Bays through a CEQA process which is similar to the FMP process. Initially, the cost of preparing the Pacific herring CEQA document was approximately \$95,000 in 1991. The preparation cost of the original document is based on a single staff person taking on all aspects of the assignment. It was a data-rich situation that required minimal research. Since that time, the DFG's annual commitment is approximately \$1.5 M, of which approximately \$850,000 is spent on permanent staffing needs and \$630,000 for research, operating, and temporary staffing needs. The DFG's herring management approach has been established for about twenty years and has considerable public involvement. It has been widely recognized in publications, by the fishing industry, by other fishery managers, and in the MLMA as a successfully managed fishery.

2. White Seabass. A White Seabass Management Plan was developed and adopted by the Commission in March of 1996 at an estimated cost of \$65,000; however, it was never implemented. The White Seabass FMP is for a single species that includes both sport and commercial take in southern California. The DFG has

updated that initial plan to comply with provisions contained in the MLMA. The **estimated** cost to update, adopt, and implement the White Seabass Plan is approximately \$1.4 M.

3. Nearshore Fishery. On the other end of the spectrum is the Nearshore Fishery Management Plan currently under development and due to be adopted by the Commission by January 1, 2002. This is a multi-species FMP, containing 13 rockfish species and six non-rockfish species. It is a fishery that includes both sport and commercial participants statewide, requires considerable monitoring and research to obtain large amounts of missing EFI, and needs a phased-in regulatory approach due to the complexity of the fishery and the species involved. Considerable effort has been made to develop a number of management strategies, and the level of public involvement has been substantial. It is also the first FMP that the DFG has done from the ground up. Due to the complex issues surrounding the Nearshore FMP, the overall **estimated** cost is \$6.6 M.

The **estimated** costs for preparation, adoption, and implementation of the above mentioned FMPs are enumerated in Table 2-1. For all three FMPs, implementation costs are expected to represent the greatest share of total costs. As stated previously, public involvement is an important element in all FMPs, and the cost can be as high as 5% of the total. In addition, if a fishery is identified as depressed or emerging, the complexity of the process to prepare, adopt, and implement will increase and potentially require more resources.

Table 2-1. Estimated costs for three different fishery management plans (FMPs) at different developmental stages.			
Fishery Management Plan	*Pacific herring	White seabass	Nearshore
Preparation**	375 K	155 K	3.1 M
Technical***	315 K	140 K	2.4 M
Administrative	60 K	15 K	0.7 M
Implementation	1.12 M	1.25 M	3.5 M
Technical	660 K	1.06 M	1.7 M
Enforcement	375 K	60 K	1.1 M
Administrative	90 K	125 K	0.7 M

\*The Pacific herring fishery has a CEQA document that currently acts as an FMP. It is amended every year in order to incorporate changes in the harvest guidelines set each year based on biomass estimates. The preparation cost of the original CEQA document done in 1991 is estimated to be \$95,000.

\*\*Preparation includes the costs of the Commission's adoption of the FMP.

\*\*\*Technical includes the cost of enforcement's participation in the preparation process.

### Enforcement considerations

The Marine Region law enforcement function was established in 1997 and is currently staffed by 57 peace officers and four engineers. They have the responsibility

to enforce all federal and state laws and regulations along approximately 1,100 miles of California coastline and out to sea for 200 miles; a total of 220,000 square miles. Throughout all patrol areas, fishing takes place seven days a week and can occur any time, day or night.

Two essential components of any effective management approach are compliance with and enforcement of regulations. Each FMP will potentially have unique regulatory needs and challenges. Enforcement personnel are faced with structuring and scheduling enforcement activities to address these complex regulations. Without successful compliance with the adopted regulations outlined in each FMP, achieving the management alternatives will be potentially impossible. Enforcement personnel are therefore a critical part of successful FMP implementation.

Marine enforcement staff operate seven large and four mid-size vessels, five large rigid hull inflatables, and 20 small patrol boats for at sea and coastal shoreline patrols. The larger vessels are at sea one to five days at a time and with the current staff, the number of days the boats can patrol is limited. Enforcement activities include:

- Monitoring commercial and sport fisheries (including fishing vessels, shore facilities, and all fishery related infrastructures throughout the state);
- Monitoring of illegal commercialization of public fishery resources; conducting market inspections; monitoring and auditing commercial landings taxes;
- Responding to pollution events; making court appearances; inspecting fish products at airports; performing lengthy investigations and surveillance;
- Maintaining patrol boats, vehicles and specialized equipment;
- Conducting administrative duties; and
- Providing public outreach and education.

Under the restriction of a 40-hour work week and the limited number of marine wardens, it is clear that the state's resources are left unprotected a disproportionate amount of time. This is especially true in the larger urban areas such as the San Francisco Bay Area and southern California. This shortfall in staff and equipment will only increase in the future as MLMA responsibilities increase. All the costs of marine law enforcement activities are ongoing and require a steady source of revenue.

Currently, 14 law enforcement positions are directly charged with assisting in the preparation and adoption of FMPs and ensuring compliance with laws and regulations established under the authority of the MLMA. Compliance must be the primary goal of marine enforcement because without compliance the effectiveness of management measures will be undermined. Considering that there will be many FMPs developed in the coming years, it is clear that enforcement responsibilities will increase substantially, resulting in a need for additional staff and equipment in order to achieve compliance and ultimately sustainable fisheries.

## **2.5 Issues Relevant to the Development of Fishery Management Plans**

It has become clear during the development of this initial Master Plan that several issues need extra consideration or clarification; and full implementation of the MLMA will take several years. Policies or guidelines on issues such as allocation, bycatch, optimal yield, rebuilding depressed fisheries, ecosystem management, habitat considerations, and non-consumptive users are crucial to the success of an FMP. An open public dialogue will serve to educate and provide clear guidance to decision-makers, and the public alike, concerning the complexities of the issues before them. The Master Plan is designed to be a proactive and adaptive document which will be reviewed on a regular basis.

The following issues explain why clarification is needed and how the development of FMPs will benefit from guidance provided by various definitions or application guidelines.

### **2.5.1 Allocation**

For a variety of reasons, many FMPs may need to allocate resources among various interest groups. Fishery management plans may do so either directly or indirectly. For example, available catches may be allocated directly to commercial and sport fishermen through separate quotas. On the other hand, some types of management measures, such as the prohibition of a type of fishing gear may have an indirect effect of allocating fish by decreasing the efficiency of one group of fishermen over another. Catch quotas, seasons, area closures, bag limits, and other common regulations typically affect fishery groups in varying degrees. Such regulatory decisions are likely to be among the most difficult the Commission will make, for they involve complex biological, social, and/or economic objectives.

The MLMA provides some guidance on allocating fishery resources. Section 7072(c) of the Fish and Game Code states that FMPs “shall allocate those increases or restrictions fairly among recreational and commercial sectors participating in the fishery”. In addition, §7056(f) FGC states that FMPs have the following objective: “Management of a species that is the target of both sport or commercial fisheries or of a fishery that employs different gears is closely coordinated”.

Allocation decisions are often controversial and may benefit from dispute resolution. Direct allocation through catch quotas and other measures invariably causes disputes about “fairness”, present vs. historical participation, dependence on the fishery, relative economic value of the catch, effects on local communities, and so on. Such discussions often become contentious as the public, managers, and decision-makers struggle to weight these values. The MLMA states “... and appropriate mechanisms are in place to resolve disputes such as access, allocation, and gear conflicts” [§7055(k) FGC]. A framework, developed in advance in a less contentious atmosphere, could greatly benefit the Commission and public alike by delineating factors to consider when making allocations, such as:

- Present versus historical participation;
- Economics of the fishery, including the costs of fishing;
- Local community impacts;

- Product quality and flow to the consumer;
- Gear conflicts;
- Non-consumptive “use” or values;
- Increasing fishing efficiency;
- Recreational versus commercial sectors.

See Appendix N for information on the dispute resolution process.

### **2.5.2 Bycatch**

The MLMA considers estimates of bycatch and discards to be EFI. Fish and Game Code §90.5 defines bycatch as, “fish or other marine life that are taken in a fishery but which are not the target of the fishery. Bycatch includes discards.” The MLMA further defines what FMPs should contain relative to bycatch, including amount and type of bycatch, ecosystem impacts, and measures to minimize bycatch (§7085 FGC). Bycatch occurs in most sport and commercial fisheries, but the amount varies considerably based on the type of gear used, fishing techniques, fish behavior, and so on. Marketable or desirable fish are kept by sport and commercial fishermen. Fish that are undersized, out of season, or undesirable are discarded by both sport and commercial fishermen, and may be alive or appear alive when discarded.

Of primary concern is how data on bycatch and discards will be collected and considered in the development of FMPs. The amount of bycatch and discards can only be determined accurately by direct observation at sea. Voluntary observer programs have been ineffective due to a high refusal rate to carry observers. It may be necessary to establish a management recommendation on how bycatch information will be collected and used – for example, requiring fishermen to take observers when needed in order to gather EFI and allow the testing of methods to reduce or minimize bycatch.

### **2.5.3 Optimum Yield**

Optimum Yield (OY) is the harvest objective for sport and commercial fisheries when the fishery is managed on the basis of maximum sustainable yield (MSY) [§7056(a) FGC]. Section 97 FGC provides a definition: “ Optimum yield, with regard to a marine fishery, means the amount of fish taken in a fishery that does all of the following: (a) Provides the greatest overall benefit to the people of California, particularly with respect to food production and recreational opportunities, and takes into account the protection of marine ecosystems; (b) Is the maximum sustainable yield (MSY) of the fishery, as reduced by relevant economic, social, or ecological factors; (c) In the case of an overfished fishery, provides for rebuilding to a level consistent with producing maximum sustainable yield in a fishery.” The MLMA does not require that MSY and OY be used as a harvest control to maintain sustainability. There are other management tools other than MSY and OY that could be applied. Each FMP will need to determine the best management alternatives based on the complexity of the FMP (e.g., the number of species or species groups contained in the FMP; geographical



range of the species; commercial and/or sport use; the amount of data available; the economic effects of the management alternatives, etc.).

Optimum yield for a species is based on estimation of MSY. Due to limited or uncertain data, as well as environmental uncertainty, calculation of MSY requires making a series of assumptions. Scientists must then derive estimates, or proxies, of the true MSY which vary in accuracy as data are refined. Dealing with this uncertainty while ensuring that stocks are harvested at a sustainable level may require adoption of a hierarchical approach to harvest levels. This means that the less information that is known about a stock and its appropriate harvest level, then the more conservative the harvest strategy must be.

When new or emerging fisheries develop, EFI is often not available. This may also be true when some aspect of a developed fishery suddenly changes. Different harvest levels may be needed as a result. Each harvest level could be based on the availability of established types of EFI for determination of MSY— from data-rich fisheries to data-poor or unassessed stocks. In the absence of harvest strategies, measures such as size limits, seasons, and gear restrictions may not prevent overfishing.

Possible harvest strategies include: adjusting fishing mortality in relationship to stock size, basing harvest levels on a percentage of historic catch, or exercising more caution when uncertainty or risk is high. California waters contain many marine stocks for which limited demographic data are available and which likely must use harvest strategies in lieu of MSY proxies.

Another harvest strategy to be considered is that of protecting a weak or depressed species in a multi-species fishery. Rockfishes (genus *Sebastes*) represent an example of an important California multi-species fishery with several weak species captured jointly with other, more robust species. A potential management approach might be to close a fishery when the OY of a weak species is attained, or alternatively to exceed that species' OY in the interests of achieving the overall OY of the multi-species complex.

The MLMA emphasizes sustainability and defines OY such that it cannot exceed MSY under any circumstance. "The precautionary approach" should be summarized and put into language that the Commission and public can readily understand when determining OY.

#### **2.5.4 Rebuilding Depressed Fisheries**

The goal of the MLMA is sustainable fishery management for all sport and commercial fisheries under its jurisdiction. The Act lists several objectives that must be met to achieve this goal. One objective, §7056(c) FGC, requires rebuilding depressed fisheries to the highest sustainable yield consistent with environmental and habitat conditions. In the context of overfishing, [§7086(c)1] FGC also calls for rebuilding stocks in less than 10 years, except in cases where the biology of the population or other environmental conditions dictate otherwise. This is a complex issue, encompassing stock size, harvest strategies or practices, environmental factors, and habitat.

If stock declines are attributed to long-term environmental change or permanent loss of habitat, then all forms of fishery controls, including a complete prohibition on take, may not lead to stock recovery. The MLMA does not address this situation but assumes that all fish stocks will recover.

One potential approach would be to develop a Commission policy statement that defines the relationship between current stock size and historic stock size as reference points, with appropriate management measures for each reference point. This would offer clear guidance to implement FMPs for depressed stocks. In addition, long term recovery plans for a stock that has declined due to environmental change or habitat loss could be included.

### **2.5.5 Ecosystem Management and Habitat Considerations**

As stated in Chapter 1, the DFG is moving towards an ecosystem-based approach to the management of natural resources. Ecosystem-based management is difficult due to the complexity and vastness of the marine environment and the lack of knowledge and understanding of the interactions among the multiple species within an ecosystem. Nevertheless, the DFG is committed to this form of management and realizes the importance of establishing ecosystem guidelines for inclusion in FMPs. Establishing the guidelines for ecosystem management is a long-term process and will need to be done by collaborating with marine and ecological scientists and other interested persons. As these guidelines are developed, they will be incorporated into the Master Plan and FMPs.

In addition to ecosystem management guidelines, the maintenance, restoration, and enhancement where appropriate of marine habitats is mandated by the MLMA [§7056 (b) FGC], and will be a crucial part of an FMP. The DFG understands that these components of habitat protection must be clarified for the purpose of consistent application across FMPs. Like ecosystem management guidelines, these components need to be discussed and agreed upon by DFG and Commission staff, marine scientists, other management agencies, and the public. Once clarified or defined, the Master Plan will be amended. Until then, each FMP will address ecosystem and habitat issues relevant to that particular fishery.

### **2.5.6 Non-Consumptive Users**

Traditionally, great commercial and recreational value has been placed on marine resources and habitats. Non-consumptive users place a value on those resources that is difficult to measure. The value of knowing that marine resources will be preserved for future generations cannot be measured using traditional assessments. The ability to assess the impacts on non-consumptive users as a result of a fishery or an FMP needs to be addressed in future FMPs. Further clarification and guidance on the issue is necessary. Once again, as clarification is made, it will be incorporated into the Master Plan and FMPs.

## **2.6 Proposed Approach for Developing Clarifying Guidance**

This framework is intended to be sufficiently flexible to cover a broad range of issues, with particular emphasis on extensive public consultation. The DFG

recommends that these key features be incorporated in creating guidance efforts:

- Establish clear goals and objectives for a policy, if one is to be developed;
- Use the most effective and appropriate forms of public involvement as outlined in the Master Plan;
- Inform and involve a full spectrum of targeted members of the public;
- Assign an ad hoc committee to address the above mentioned needs and develop potential policy options for the Commission;
- Employ a “best practices” approach, drawing upon the experiences of other fisheries and resource agencies worldwide;
- Schedule discussion and public comment at a minimum of two regularly-scheduled Commission meetings prior to any guidance or policy adoption.

## Chapter 3. Prioritization of Fisheries

Due to the large number of California's marine fisheries, and the time and effort needed to prepare fishery management plans (FMPs), it becomes imperative to set priorities. Although the goal is to eventually develop FMPs for all California's marine fisheries, the Marine Life Management Act (MLMA) clearly states that the Master Plan will provide a prioritized list for preparation of FMPs. Fishery management plans are to be prioritized based on a fishery's need for changes in conservation and management measures in order to comply with state policies and requirements established by the MLMA [§7073 (b)2 FGC].

A species' absence from a prioritized list does not signify it is not a candidate for conservation measures; it just precludes it from being the subject of a Department of Fish and Game (DFG) FMP at present. A fishery that is not listed for prioritization or ranks low may be identified as a high priority in the future (see Chapter 7). An emerging fishery, for example, may be elevated to top priority and supercede existing prioritized FMPs.

### 3.1 Shortened List of Fisheries

A draft list of California's marine fisheries was submitted for review to marine fishery experts outside the DFG including representatives from the sport and commercial fishing industry, scientific community, and conservation groups. It was noted that due to the comprehensive and somewhat disparate nature of the data sources (Appendix C), some individual species and species groupings were included on the list that were not relevant. Species that reside primarily outside state waters or occur in fresh water habitats were eliminated. Additional species were suggested by breaking down a few of the species groupings into more specific components. This resulted in a final list of more than 375 marine fishes, invertebrates, plants and algae managed by the state (Appendix D). Appendices E and F list fisheries for which the Commission or Legislature has specific management authority.

Before prioritization, we shortened this list by selecting those species that are: 1) the subject of a significant directed marine fishery at present, were in the past, or may be in the foreseeable future; 2) not already included in an existing management plan (federal or state), or in one currently being developed; and 3) open to harvest or take.

This reduced the list to 109 fisheries including 59 finfishes, 48 invertebrates, and 2 algae (Appendix G). Many of the species were eliminated because they are included in Pacific Fishery Management Council (PFMC) management plans (Appendix D); are currently the subjects of FMPs in development (nearshore finfishes, white seabass, and abalone); or due to an absence of a directed fishery, coupled with a lack of commercial or sport interest in the taking of these species.

The Master Plan recognizes the importance of the market squid fishery, but did not include it in the prioritization process due to concurrent legislative activities. The California legislature emphasized the importance of market squid and required the DFG to focus on this fishery and submit a report on its status along with recommendations for management and conservation measures. This report was submitted in May 2001. The Master Plan also recognizes that pending legislation would give authority for

management of squid permanently to the Commission and require the development of an FMP by the end of 2002. This would cause squid to be considered as one of the top priorities for an FMP.

### **3.2 Development of Criteria**

Prioritizing California's marine fisheries for FMPs is a complex task. There are numerous intertwined issues, as well as much information (or lack of information) to consider. The DFG decided that a standardized approach was necessary. The guidelines for this process were that it should be objective, quantitative, equitable, reproducible, justified – and above all – credible.

As a first step, we evaluated current approaches to fisheries prioritization being used or developed by consulting groups, government agencies, the American Fisheries Society, and within the DFG. Although the fisheries being addressed often differed, the approaches generally involved evaluating lists of similar criteria that fall into the following categories:

Biological: Some species have characteristics that make them more vulnerable to or less able to rebound from exploitation.

Environmental: Some species have distributions and abundances that are greatly affected by changes in oceanographic conditions.

Fishery: Many species undergo varying degrees and methods of exploitation.

Socioeconomic: Some species have a higher value to sport or commercial fisheries.

Management: Some species have effective management regulations already in place.

We took components from several of these categories, modified them to better fit California marine fisheries, and developed a preliminary approach to prioritizing.

The draft prioritization approach was sent to marine fisheries experts in academia and the federal government for review. We also solicited input from the Marine Life Management Act Evaluation Advisory Committee (MLMAEAC), which is a group of constituents representing sport and commercial fishing, environmental and conservation groups, and the scientific community.

### **3.3 Prioritization Approaches**

The comments and suggestions we received from the outside review resulted in three separate prioritization approaches. These approaches were intended to provide a rough cut of the highest priority fisheries. Approaches A and B were developed for finfishes, and differ slightly. Approach A emphasizes two main factors: a species' exploitation history and specific life history parameters. It identifies species of greatest concern without ranking them. Approach B, on the other hand, ranks species based on scores assigned to them from a wide variety of questions addressing aspects of their biology, habitat and environmental requirements, landings, management, and

economics. The main difference between the two approaches is the relatively greater emphasis on landings and landing trends in approach A. Approach C was developed for the prioritization of invertebrates, and uses life span as a primary factor.

These fisheries prioritization approaches are not static. Instead, they are evolving processes that incorporate changes as more information is gathered and input is received. Future versions of the Master Plan will refine these approaches, or develop new methods, to aid in the prioritization of fisheries for FMPs.

### **3.3.1 Approach A (Finfish)**

This approach examined the exploitation history of each finfish species along with several life history parameters (Appendix H). Analysis of exploitation histories involved an evaluation of the amount and trends of sport and commercial landings over the past 20 years, taking into consideration effort, market conditions, regulations, oceanographic conditions, and other factors. We reviewed internal and external documentation, and consulted experts with unique knowledge of certain fisheries. The productivity of a species was inferred by considering several life history parameters: growth rate, fecundity, age at maturation, and life expectancy. The intent was to identify species with lower productivity, which would have greater difficulty rebounding from exploitation. The combination of exploitation histories and a low inherent productivity would identify those species of greatest concern and most in need of management attention.

### **3.3.2 Approach B (Finfish)**

This approach was intended to identify species most vulnerable to overexploitation based on a wide variety of factors. This approach scored and totaled 18 questions addressing biological, habitat, environmental, fishery, management, and economic issues for each finfish species (Appendix I). Species were then ranked according to their total score.

### **3.3.3 Approach C (Invertebrate)**

It was apparent that the prioritization approaches used for finfishes would not be directly applicable to invertebrates. Life history characteristics are very different or poorly understood for many invertebrates. In addition, there is little information on their sport take, and some species exploited in the past are now uncommon along the California coast.

Since a species' life span is an indicator of its response to environmental variation, it was selected as the single measure of how a species might respond to exploitation. In general, long life span indicates the relative difficulty for a species to "leave" successful offspring from each reproductive episode. Thus, more reproductive episodes (i.e. years) are needed in order for an individual to replace itself. Many invertebrates, for example, release tens of thousands of eggs and sperm into the water column during each spawning. However, distances between individuals and vagaries of currents can hinder fertilization. Furthermore, even if fertilization is successful, larvae and post settlement recruits experience a very high mortality rate and thus few survive

to become adults. The additional burden of exploitation would be expected to cause problems for long-term success of the species. All else being equal, long-lived species need more regulation.

The first part of this prioritization approach grouped invertebrates into either short ( $\leq 5$  years), moderate (6-20 years), or long ( $> 20$  years) life span categories. The invertebrates in the long life span group were then further prioritized based on current exploitation.

### 3.3.4 Approach D (Algae)

Because few algae remained after the list of fisheries was shortened (Appendix G), they were not prioritized further.

## 3.4 Results of Prioritization Approaches

### 3.4.1 Finfishes

Approach A identified 10 species of greatest concern, in no order of priority (Table 3-1). These finfish species generally have either high landings with significant decreasing trends over the years, very low productivity, or both.

Table 3-1. Species of greatest concern based on approach A (finfish).	
Common Name	Scientific Name
Pile perch	<i>Rhacochilus vacca</i>
Redtail surfperch	<i>Amphistichus rhodoterus</i>
Shiner perch	<i>Cymatogaster aggregata</i>
Walleye surfperch	<i>Hyperprosopon argenteum</i>
White seaperch	<i>Phanerodon furcatus</i>
Barred sand bass	<i>Paralabrax nebulifer</i>
Kelp bass	<i>Paralabrax clathratus</i>
Brown smoothhound	<i>Mustelus henlei</i>
Gray smoothhound	<i>Mustelus californicus</i>
Shovelnose guitarfish	<i>Rhinobatos productus</i>

Approach B identified, in order of priority, California halibut, brown smoothhound, and white seaperch as top species for future FMPs (Table 3-2). Other species of surfperches (black perch, barred surfperch, pile perch, rainbow seaperch, and redbtail surfperch) and sharks and rays (gray smoothhound and bat ray) also ranked high in this approach.

Table 3-2. Top ranked species based on approach B (finfish).	
Common Name	Scientific Name
Callifornia halibut	<i>Paralichthys californicus</i>
Brown smoothhound	<i>Mustelus henlei</i>
White seaperch	<i>Phanerodon furcatus</i>
White sturgeon	<i>Acipenser transmontanus</i>
Black perch	<i>Embiotoca jacksoni</i>
Barred surfperch	<i>Amphistichus argenteus</i>
Jacksnelt	<i>Atherinopsis californiensis</i>
Night smelt	<i>Spirinchus starksi</i>
Pile perch	<i>Rhacochilus vacca</i>
Bat ray	<i>Myliobatis californica</i>
Gray smoothhound	<i>Mustelus californicus</i>
Rainbow seaperch	<i>Hypsurus caryi</i>
Redtail surfperch	<i>Amphistichus rhodoterus</i>

It is not surprising that both approaches identified several surfperches and nearshore sharks as high priorities for FMPs. Surfperches and nearshore sharks possess certain life history characteristics such as low fecundity (long gestation periods and bearing live young) and slow growth, that make it difficult to rebound from exploitation. In addition, several surfperches and sharks utilize bays and estuaries as nurseries which make them particularly vulnerable to overfishing and habitat degradation. Several surfperches have undergone significant declines in catch, catch-per-unit effort, size, and abundance in fishery-dependent and fishery-independent surveys. In addition, there are relatively few regulations in place for surfperches and nearshore sharks. Both groups are a high priority for FMPs.

Barred sand bass and kelp bass were also identified as species in need of an FMP. Both of these finfishes are major components of the sport fishery in southern California. There is some concern for these resources since landings of these species, kelp bass in particular, have steadily declined. In addition, barred sand bass are often targeted in spawning aggregations, and kelp bass are non-migratory residents of rocky reefs subject to heavy fishing pressure. Barred sand bass and kelp bass are also relatively slow growing and long-lived which may hinder their ability to rebound from exploitation.

California halibut was identified as a top priority for an FMP by Approach B. This was primarily due to certain life history characteristics and the substantial, yet relatively stable, landings that occur for both sport and commercial fishing. California halibut are



long-lived and are dependent upon bay and estuarine habitats as nursery areas. These habitats are particularly susceptible to damage, and most of them have been lost or considerably altered from their original state.

### 3.4.2 Invertebrates

Thirteen invertebrates were identified as species of greatest concern, based on their long life spans (Table 3-3). Red sea urchins are by far the longest lived; large individuals may exceed an age of 100 years. Although the life span of California spiny lobsters is not known, adults are believed to be long-lived as well. Of the long-lived species, both red sea urchin and spiny lobster are the most exploited fisheries, and high priorities for an FMP.

Table 3-3. Species of greatest concern based on approach C (invertebrate).	
Common Name	Scientific Name
Red sea urchin	<i>Strongylocentrotus franciscanus</i>
Purple sea urchin	<i>Strongylocentrotus purpuratus</i>
California spiny lobster	<i>Panulirus interruptus</i>
Sea cucumber	<i>Parastichopus</i> spp. ( <i>P. californicus</i> , <i>P. parvimensis</i> )
Wavy top shell	<i>Astraea undosa</i>
Kellet's whelk	<i>Kelletia kelletii</i>
Top shell	<i>Tegula</i> spp. ( <i>T. funebris</i> , <i>T. eiseni</i> , <i>T. gallina</i> , <i>T. aureotincta</i> )
Giant (owl) limpet	<i>Lottia gigantea</i>
Rock scallop	<i>Hinnites giganteus</i>
Gaper or horse clam	<i>Tresus nuttallii</i>
Geoduck	<i>Panopea generosa</i>
Pismo clam	<i>Tivela stultorum</i>
California mussel	<i>Mytilus californianus</i>

There are species in the early stages of exploitation that need special consideration because their life history attributes are less well known. Purple sea urchins probably live for at least 50 years. Size structure of sea cucumber, wavy top shell, and Kellet's whelk populations all show very few small individuals, which suggests low recruitment rates and long life. All of these species are high priorities for FMPs.

There remain, however, a number of species that are not part of an established fishery or a developing commercial fishery, but are collected for food. Of these species, top shells (*Tegula* spp.) and giant (owl) limpets are also long-lived. Although prohibited

from commercial take, giant (owl) limpets appear to be particularly affected by exploitation. These intertidal invertebrates are also a high priority for an FMP.

### **3.4.3 Algae**

The major algal species harvested are giant kelp and to a lesser extent, bull kelp. These species are a high priority for an FMP even though an environmental document addressing them has recently been adopted. An FMP for giant kelp and bull kelp will contain information not in the environmental document such as data needs and research protocols, costs of implementation and research, harvest control rules with guidelines indicating when overharvesting has occurred, recovery plans, and a review process.

Although not on the shortened list of fisheries to be considered for FMPs, there are a number of algal species that currently represent a small harvest but have potential for further development. These are *Postelsia palmaeformis*, *Laminaria* spp., *Porphyra* spp., *Gracilaria* spp. and *Fucus* spp.

### **3.5 Assignment of Fisheries to Fishery Management Plans**

Identifying species of greatest need for changes in conservation and management measures is only part of the goal. The MLMA requires that these individual species be assigned to FMPs. Fishery management plans may contain one or many species. If a fishery targets a single species and impacts no others, then a single species FMP may be best. Conversely, if a particular fishery commonly takes many species, even though it is targeting a single species, then a multiple species FMP may be more appropriate.

The three prioritization approaches identified several species that are taken in the same fishery or have similar life histories. Several of these species can be grouped into the same FMP. Therefore, we propose ten groups of species as the top priorities for future FMPs (Table 3-4).

### **3.6 Top Three Fishery Management Plans**

Since the MLMA requires that research protocols be developed for the top three fisheries identified in the Master Plan, we needed to further refine the list of the highest priority fisheries. This was difficult since there was no single approach to prioritize finfishes, invertebrates, and algae together due to differences in their life histories, fishery characteristics, and our knowledge regarding these areas. The three prioritization approaches were used to identify the groups of species most in need of an FMP, but were not intended to produce a strict ordination of top fisheries. It was felt that some degree of subjectivity would ultimately be involved in determining the order of the top fisheries. For example, several important criteria such as the ecosystem role of the target species, amount of bycatch in a fishery, and habitat impacts were difficult to quantify and incorporate into the prioritization approaches. These issues need to be considered in the final selection of top FMPs.

Table 3-4. Top fishery management plans and species groups identified from prioritization approaches.	
Fishery Management Plan	Species
Surfperches	White seaperch, redbtail surfperch, pile perch, shiner perch, walleye surfperch, black perch, barred surfperch, rainbow surfperch, striped seaperch, and rubberlip seaperch
Nearshore Sharks and Rays	Brown smoothhound, gray smoothhound, Pacific angel shark, shovelnose guitarfish, and bat ray
Sea Basses	Barred sand bass and kelp bass
Halibut	California halibut
Sea Urchins	Red sea urchin and purple sea urchin
Lobster	California spiny lobster
Sea Cucumbers	Giant red sea cucumber and warty sea cucumber
Subtidal Snails	Kellet's whelk and wavy top shell
Intertidal Invertebrates	<i>Tegula</i> spp. and giant (owl) limpet
Kelp	Giant kelp and bull kelp

Based on our analysis, it was clear that at least ten species or species groups are in need of management plans. After reviewing public input, we decided upon sea urchins, California halibut, and nearshore sharks and rays as the top three fisheries for the following reasons:

#### Sea urchins

Sea urchins are locally abundant, subtidal invertebrates that play an important ecological role in kelp forest communities. Sea urchins graze on kelp, provide habitat and shelter for other species, are important prey, and compete with other species, such as abalone, for food and space. In addition, red sea urchins support one of the most economically valuable commercial fisheries in California. The fishery began in 1971 with statewide landings peaking in 1988. However, fishery-dependent and fishery-independent data have indicated dramatic declines in catches and reductions of harvestable stocks since then. Current management policies have been ineffective in curbing these declines.

Evidence from both DFG and academic researchers indicates that red sea urchin stocks in northern California are overexploited in at least three of the four major port areas. Age and growth data indicate that our present management, based on minimum size limits, is not protecting the portion of the spawning stock most important for long-term population growth in the northern fishery.

Southern California's red sea urchin stocks also show evidence of depletion. The catch at the northern Channel Islands has steadily fallen from about 16 million pounds in 1991 to just over 3 million pounds in 2000. The northern Channel Islands have provided

the majority of the statewide sea urchin catch since the fishery began in 1971. Although catch declines are more difficult to interpret in southern California for a variety of reasons, potential sea urchin fishery effort appears to be far in excess of the available harvestable stock. In order to address this problem and the overexploitation of the northern California resource, a sea urchin FMP is needed. A draft sea urchin FMP was developed in 1994 but was not implemented, due partly to the lack of a guiding mandate such as the MLMA.

### California halibut

California halibut are found statewide, are highly prized by sport fishermen, and support a viable commercial fishery. The halibut population appears healthy based on stable sport and commercial catches. However, the DFG faces several issues related to management of the halibut fishery that could be addressed by an FMP.

One of the main issues concerning the halibut fishery is a user-group conflict between sport and commercial fisheries. Currently both are open year round and are often in direct competition. In addition, there are gear and area conflicts as halibut are taken by hook and line, gillnets, and trawls.

Another issue is bycatch. Federal observers have documented bycatch of marine mammals and seabirds in the halibut gillnet fishery that is cause for concern. Halibut are also taken by trawling, and bycatch consists of groundfish and other bottom dwelling species. Research into gillnet modifications, seasonal closures, and area closures may develop fishing methods that reduce the bycatch to lower levels. Research could also be applied to develop alternative fishing gear that is effective in taking halibut, but without the bycatch problem.

Juvenile halibut are known to utilize bays, estuaries, and other nearshore areas as nursery areas. Further research is needed to identify nursery habitat and quantify juvenile production throughout the state. Habitat protection is one of the most important issues facing management of many marine species. The above issues are well-suited for an FMP.

### Nearshore sharks and rays

Nearshore sharks and rays share life history parameters that make them very susceptible to overfishing, including: slow growth, long life, low reproductive rates, and low natural mortality rates. They also utilize bays and estuaries as nursery areas, where they are susceptible to habitat loss and degradation. In addition, they are taken by a variety of gear and often not kept, resulting in poor catch data.

In general, the record of management for shark fisheries world-wide, has been a poor one. The rapid development of fisheries, combined with their low reproductive capacity, and a general reliance on fishery-dependent data as a source of information on life history parameters, has led to declines in nearly every developed shark fishery prior to the adoption of management regulations. In California, such declines prior to effective management have occurred in fisheries for the Pacific angel shark, thresher shark, spiny dogfish and soupfin shark.

Nearshore sharks and rays are taken by sport and commercial fishermen throughout California, except for the shovelnose guitarfish, which is rare north of

Monterey Bay. Commercial landings of Pacific angel shark peaked in the mid-1980s at over 1 million pounds, then began to decline. Minimum size limits were adopted in 1990, and gillnets, the primary commercial gear utilized in the Pacific angel shark fishery, were banned in state waters in 1994. In 1999, only 53,000 pounds of Pacific angel shark were landed.

Brown and grey smoothhound landings were only 10,000 pounds in 1999, but these sharks are possibly taken and discarded in trawl and other fisheries because of their low value. Bat rays are not widely regarded as a desirable food fish, but they are also taken by sport and commercial fishermen, then discarded.

There has been concern for the health of leopard shark and spiny dogfish populations. Leopard sharks are primarily found in bays, estuaries, and shallow nearshore waters where they are easily taken by sport fishermen. Although not targeted by sport or commercial fishermen, the spiny dogfish is probably significant bycatch in some fisheries. Both of these species are listed in the PFMC Pacific Coast Groundfish Plan but are not actively managed. The DFG is considering the addition of leopard shark and spiny dogfish to the nearshore sharks and rays FMP, which would require that PFMC transfer authority for management of these species to the state.

## Chapter 4. Data Collection: Past and Present Activities and Future Needs

### 4.1 Sustainability and Essential Fishery Information

Multiple uses, increased harvests, and lack of information have increased concern that many of California's diverse marine living resources are being exploited in an unsustainable manner. Sustainability is defined in the Marine Life Management Act (MLMA) as: "(a) continuous replacement of resources, taking into account fluctuations in abundance and environmental variability; (b) securing the fullest possible range of present and long-term economic, social, biological and ecological benefits, maintaining biological diversity, and in the case of fisheries management based on maximum sustainable yield, taking in a fishery that does not exceed optimum yield" [§99.5(a)(b)FGC].

The MLMA identifies a collective body of biological, ecological, physical, and socioeconomic information known as "essential fishery information" (EFI) which is to be used in the development of fishery management plans (FMPs). Each FMP is to summarize the best scientific and other relevant information available, and to collect necessary additional information if this does not significantly delay FMP preparation [§7072(b) FGC]. Fishery management plans will designate sustainable levels of harvest and include appropriate management strategies to achieve those levels. This will allow the Department of Fish and Game (DFG) to be proactive and adaptive in its management of California's marine fisheries. The DFG will develop FMPs, as funding allows, to achieve the goal of sustainable resources.

The MLMA requires that the Master Plan identify both past and current monitoring and research activities related to the state's fisheries, as well as future activities focused on the highest priority fisheries [§7073(b)(3) FGC]. The DFG, to the extent feasible, must collect essential fishery information for all marine fisheries managed by the state [§7060(a)(b)].

### 4.2 Definition of Essential Fishery Information and Relationship to Management

Essential fishery information is information about the biology and harvest of a fish species that is required for sustainable fisheries management (§93 FGC). This may include, but is not limited to, information on age and growth, reproduction, habitat requirements, ocean conditions, ecosystem relationships, and trends in the fishery. The DFG collaborated with scientists from other fisheries agencies and academia to identify broad, inclusive biological and socioeconomic EFI groupings for managing fisheries. They are:

#### Biological EFI

Age and growth  
Stock distribution  
Ecological interactions  
Indices of abundance  
Movement patterns  
Recruitment  
Reproduction  
Total mortality

#### Socioeconomic EFI

Employment  
Expenditures  
Resource demand  
Revenue  
User/industry demographics

These broad groupings are not mutually exclusive, and some components may fall under more than one category. The relevance of biological and socioeconomic EFI to fishery managers is discussed in the following chapter sections.

#### **4.2.1 Biological Essential Fishery Information**

##### Age and growth

Age and growth studies typically measure how long a species lives, the age at which it reproduces, and how fast individuals grow. This information is very important to determine a population's ability to replenish itself, at what rate it might be harvested, and when individuals will reach a harvestable size. Changes in the age structure and growth rate of a population also serve as indicators of that population's health. Fish age often cannot be determined externally, so individuals must be harvested for age information.

##### Stock distribution

A stock is a population unit that is selected for management purposes. It may be defined based on its ecology, genetics, and/or geographic separation. Discrete stocks of a given species may have very different growth rates, reproductive schedules and capacity, and even ecological relationships. Stock distribution refers to where a stock is found, and is important in addressing jurisdictional issues.

##### Ecological interactions

Studies of ecological interactions assess the relationship of the species with other animal and plant species and its physical environment. For example, the harvest of an organism has an effect on its predators and on the prey organisms upon which it feeds. In addition, fishing activity may have unintended effects on fish habitat or on other species inhabiting the area. Ecosystem-based studies consider how oceanographic parameters, habitat, trophic (food and energy) dynamics, community structure, competition, or fishing mortality affect the health and abundance of organisms.

Oceanographic features include many biological (e.g. primary production, nutrient levels) or physical variables (e.g. current, temperature, salinity patterns) that can provide valuable insights into the abundance, distribution, and condition of a particular species or stock. Their predictive value makes long-term trends in oceanographic data, coupled with other biological information parameters, especially important in fisheries management.

Pristine habitat is integral to maintaining the productivity and diversity of marine ecosystems. Habitat investigations are useful to fisheries managers because they can identify the importance of specific physical parameters to the species of interest, and to associated biological assemblages.

##### Indices of abundance

By its very nature and size, the ocean prevents highly accurate animal population counts. Managers and scientists rely instead on estimates and indices of abundance. An index of abundance is an indirect measure of the size of a population, and is often

obtained by counting a portion of the population in the same way each year, or by comparing counts between areas using similar techniques. This information is used by managers to calculate estimates of the total population size that are then used to determine appropriate harvest levels.

### Movement patterns

Information on distribution patterns and movement of fish is important to resource managers because of the insights gained on a stock's vulnerability to harvest. Certain species may aggregate in specific areas for spawning, or travel in predictable patterns, or move to certain locales that make them especially vulnerable. Insights into the movement patterns of fish are vital to the development of management strategies based on regional catch quotas or marine protected areas.

### Recruitment

Recruitment refers to a measure of the number of fish that survive to a particular life stage, and is often used to predict future population size. Some examples include: the number of offspring that reach the juvenile stage (larval recruitment), the number of individuals that survive (i.e., recruit) to the next year (e.g., age 2 recruits), the number of fish that reach sexual maturity (i.e., recruit to the spawning population), or in the case of a fishery, the number of fish that recruit to the catchable component of the population. Young-of-the-year (individuals less than one year old) are frequently counted for many fish species and used as an index of larval recruitment success.

Many highly-valued species depend on successful recruitment events for replenishment. Recruitment success can be highly variable because it depends on the proper combination of many factors. As a result, sustainable harvest of the fishery may depend on only a few strong cohorts (born the same year) to provide harvestable stocks until the next successful recruitment event. Resource managers must consider this variable recruitment success when setting harvest levels by allowing sufficient portions of stocks to "escape" harvest and provide spawning biomass for future recruitment successes.

### Reproduction

Reproduction encompasses information such as the number of eggs a female produces, the average age an individual becomes sexually mature, and whether a female bears live young or broadcasts eggs in the water. This type of information helps managers determine the ability of a population to replenish itself, and at what level it might be harvested. This knowledge allows them to set appropriate open seasons, areas, size limits, escape mechanisms for traps, and net mesh-size restrictions based on spawning considerations.

### Total mortality

Natural and fishing mortality rates comprise the sum of all individuals removed from a population over a fixed period of time (often over one year). Fishing mortality is the rate at which animals are removed from the population by fishing, and can be calculated from landings information if the population size can be estimated. Natural



mortality refers to all other forms of removal of fish from the population such as predation, old age, or disease. This information is used to predict how many animals remain to reproduce and replenish the population. Mortality figures are used by managers to calculate the number or weight (biomass) which may be safely harvested from a population or stock on a sustainable basis.

#### **4.2.2 Socioeconomic Essential Fishery Information**

One of the objectives of fishery management under the MLMA is to minimize adverse impacts on small-scale fisheries, coastal communities, and local economies [§7056(j) FGC]. The economic stability and social diversity of coastal communities may be affected by changes to marine resource use patterns including non-consumptive pursuits, sport fishing, commercial fishing, and fish marketing/processing activities. Economic repercussions arise from regulatory changes that directly alter the public's use and enjoyment of marine organisms, or from indirect effects on resource-use activities, such as shifts in financial markets, consumer demand, inflation, or tax changes that influence business investment or activities. These effects may ultimately contribute to changes in local business output (production), employment, population, and demand for public services.

It is imperative that fisheries managers have a clear understanding of the current economic condition of the community and fishery under regulation, and of the likely socioeconomic consequences of regulatory changes to the fishery. This includes direct impacts to resource users, such as reduction in landings revenue due to lower catch quotas and shorter fishing seasons, as well as indirect or "downstream" economic impacts to local employment or associated industries. Socioeconomic EFI can be grouped into five general categories: Employment, Expenditures, Resource demand, Revenue, and User/industry demographics.

##### Employment

Changes in user activities related to non-consumptive uses, as well as commercial and recreational pursuits trickle through local economies and may cause changes to local economic output (e.g., production or product demand) and local employment. That is, each job that is lost in a community directly and indirectly influences other related jobs in the community. Resource managers use local employment information to help predict the ultimate outcome of regulatory changes to overall employment in local communities.

##### Expenditures

There are two general expenditure categories of importance to resource managers: direct expenditures on resource-related activities, and indirect expenditures associated with those activities. Resource managers and others tend to focus on the relative value of landed catch and not on the realm of expenditures associated with the end product (e.g., market seafood or sport fisherman's catch). A broader perspective regarding expenditures related to resource use is warranted and important because local economies or communities are dependent on both direct and ancillary expenditures.

Information on direct expenditures for fishing such as bait and fuel can be derived from the ongoing Marine Recreational Fisheries Statistics Survey (MRFSS) or DFG databases. However, indirect expenditures associated with commercial fishing operating costs, expenses of non-consumptive users, or travel and lodging expenses for a sportfishing trip must be captured through field interviews of users. Examples of indirect expenditures might include vessel taxes, medical insurance or worker's compensation – all necessary to fishing. This information is used to estimate the likely changes to user expenditures and local economic output arising from changes in resource availability or regulations.

#### Resource demand

Resource demand is the relationship between the quantity and quality of a good or service, and demand by the user at various market prices or costs. For instance, a sport fisherman may be willing to pay a considerable sum to expect to catch ten fish in a single trip. But, the same fisherman may not value any additional fish at the same incremental cost as paid for the first ten. As another example, a recreational diver may be willing to pay more to visit an area where the marine resources are in pristine condition (more species, greater size diversity). Resource managers must be aware of these demand relationships for user groups in order to make efficient allocations of limited resources and optimal use of public resources.

#### Revenue

This category includes revenue from the sale of local goods or services within the community, as well as those goods or services which are exported out of the community. Those exports represent new money entering the local economy from outside. An influx of money from outside the community is crucial to each local economy since it offsets the monetary outflow for goods and services purchased from outside that community. Revenue information allows resource managers to assess how changes in resources or regulations may affect industry-sector revenues and ultimately, the local community's economic output and vitality.

#### User/industry demographics

Local fishing community and user-group information, such as population size, average income levels, age distribution, and industry composition, are used to gauge the potential impact of regulatory changes on local economies and individuals. Much of this information is obtained through surveys conducted by state or federal government agencies; however, more detailed information may entail targeted surveys of the resource users or other groups of interest.

### **4.3 Fishery Data Collection Techniques**

Two major categories of data collection exist in the field of fisheries science, fishery-dependent and fishery-independent, which differ in their underlying assumptions, expense, strengths, and weaknesses. Our intent is to provide the reader with a summary of the primary techniques utilized by the DFG to collect EFI, the benefits of such techniques, and the value in pursuing multiple methods. The DFG's

collection and monitoring efforts have been thoroughly summarized in the CERES database (see References).

A general summary of the methods of collecting both biological and socioeconomic EFI is presented in Table 4-1. The table illustrates the potential for numerous types of EFI to be collected by a single sampling method or study. The quality of EFI collected is dependent on a well-designed sampling protocol and the collection of data over a time period sufficient to assess annual variation in the resource. Historically, EFI quality has varied with species and/or fishery of concern and collection method. Comprehensive data collection programs should contain both fishery-dependent and fishery-independent components.

Methods	EFI									
	Age and growth	Stock distribution	Ecological interactions	Indices of abundance	Movement patterns	Recruitment	Reproduction	Socioeconomics	Total mortality	
Creel	P	P	S	P	S	P	P	P	P	
Dockside/market	P	P	S	P	S	P	P	P	P	
On-board	S	P	S	S	S	P	P	P	P	
Landing receipts		S	S	P				P	P	
Logbooks		S	S	P				P	P	
Fishing	P	P	P	P	P	P			S	
Egg abundance		P	P	P	S	P	P		P	
Underwater	S	P	P	P	P	P	P			
Hydroacoustic surveys		P	P	P	P	S	P		P	
Laboratory	P		S			S	P		P	
Genetic		P			S					

P - Denotes methods that are primary sources of EFI

S - Denotes methods that are secondary sources of EFI

#### 4.3.1 Fishery-Dependent Techniques

Fishery-dependent data is information collected from direct observation of a fishery. The DFG has historically employed five categories of monitoring to collect EFI: creel (pier/skiff) surveys, dockside/market sampling, on-board observer programs, landing receipts, and logbooks. These activities have continued for many years in both commercial and recreational sectors of California's fisheries, and provide the DFG with vital insights on the status of both the fishery and the exploited species.

Fishery-dependent data collection provides many types of EFI. Some of this information is useful when collected over short periods of time, but its greatest value in

understanding fisheries and harvested resources is in analyses of long-term trends. Resource managers make inferences about population trends using landings data, although its unique limitations can make interpretation of trends difficult. Fishery landings comprise only a portion of the population, and gear selectivity, skill of fishermen, and allowable harvest levels all determine what portion is caught. As a result, population estimates can only be indirectly calculated. It is difficult to obtain standardized measures of fishing effort, and species identification can be imprecise or inaccurate.

While these methods are generally less expensive than fishery-independent methods, they provide only part of the information necessary to make management decisions. They are most useful when they are part of a comprehensive management program that employs both fishery-dependent and fishery-independent studies in a complementary fashion.

#### Creel surveys

These surveys are conducted by DFG or contract staff who interview sport fishermen at boat-launching ramps or at points where they are fishing from land (e.g., beaches, piers, and rocky coastline). Samplers typically gather information on: number of each species caught, number of each species kept, size and sex of kept fish, number of fish returned to the water, type of gear used, number of fishermen in the party, and total hours fished. Certain creel surveys may also collect socioeconomic data such as distance traveled from home or from port, length of stay in the area, and expenditures. The accuracy and precision of these surveys depend largely on a good working relationship between DFG staff and the fishermen being surveyed. Information collected on catch composition, catch-per-unit-of-effort, size limits, and fishing mortality are used to determine how the recreational sector of a fishery affects a resource.

#### Dockside/market sampling

Dockside or fish market sampling is used to collect commercial landings data after the catch has been off-loaded and, in the case of multiple-species landings, separated into market categories. These data provide important information on total weight, species composition, size, sex, age, and maturity of the species being landed. It is important to note, however, that this type of sampling provides imprecise estimates of fishing effort, and little or no information on bycatch or discards. Fishery landing statistics collected from this sampling allow fishing mortality rates to be calculated (excluding any discard mortality).

#### On-board sampling

Scientific observers accompany commercial and sport fishermen on fishing trips to collect biological and socioeconomic data at sea. Observers collect information on the location fished, total catches (not just landed), and the species, size, sex, and maturity of fish caught. In some fisheries they also collect (or have collected in the past) data on bycatch, discards, and interactions with birds and marine mammals. This information also can be used to verify logbook and creel survey data. On-board sampling also has the potential to address socioeconomic gaps in EFI. On-board

observers collect EFI that cannot be obtained by other means (e.g., bycatch, precise fishing locations of each unit of fishing effort, etc.).

#### Landing receipts

The DFG's first major attempt to gather EFI began in 1916 with the use of landing receipts, or "fish tickets," as they are commonly known. Commercial buyers are required to complete landing receipts when the catch is off-loaded onshore to track the amount of fish landed by weight or number, along with the tax due on those landings. These forms contain information on the species, general location fished, weight of the catch, and price paid for the catch. Many fish species are often grouped into multi-species market categories, based on similar market value, rather than separated into species-specific categories. Although limited in scope and accuracy, they are often the only information available on a particular fishery. The DFG has used direct sampling of market categories to improve species-specific landings information of many fisheries for over forty years.

#### Logbooks

Logbooks were developed to augment information obtained from landing receipts and require that fishermen record information such as catch, location fished, and time spent fishing for each time their fishing gear is deployed. The log is then sent to the DFG. Logbooks seek to access the professional knowledge and observations of fishermen to improve fishery management. The utility of the information that they provide is dependent on its accuracy, timeliness, and return rate. Appendix J lists fisheries that currently require logbooks.

### **4.3.2 Fishery-Independent Techniques**

Fishery-independent data is information collected from sources other than directly from the fishery. In other words, scientists collect data from direct observation, or studies, of the species and ecosystem of interest. While fishery-independent methods may capture rather diverse data types, they often focus on: population size, life history information, habitat requirements, distribution and movement, and fishing gear characteristics and effectiveness. Research has also been conducted on new techniques to evaluate management strategies and fishing methods, as well as to develop new *in situ* population studies.

The DFG routinely uses fishery-independent methods when needs arise and resources are available. Many projects are conducted in collaboration with other fisheries agencies and academic scientists to pool expertise and minimize costs. Like fishery-dependent information that they complement, these data collection activities possess their own unique limitations and assumptions. Fishery-independent research collects standardized information, often on all life stages, not just what is marketable or utilized by the fishery. Often greater technology and more sophisticated equipment are required than for typical fishery-dependent data collection. Managers require comprehensive data of both types to make well-informed management decisions. The following are many of the fishery-independent methods the DFG uses to collect EFI:

### Fishing surveys

Rather than rely on a commercial or recreational fishery to provide the DFG with samples, biologists often collect their own using a variety of gear. Since fisheries often use gear that selects certain sizes or a sex of fish or invertebrates, their catches usually do not represent the entire population. By using gear that catches a representative sample of the entire population, such as trawls for some fisheries, the DFG avoids such limitations of fishery-dependent samples. The DFG may also use this method to experiment with gear types that may be recommended for use in commercial or sport fisheries.

### Tagging

Tagging animals provides EFI such as their movement, age, growth, and population size. Fish or invertebrates are captured alive, size and catch location recorded, tagged externally (typically), and released. If they are recaptured at a later date, information can be obtained on how far they traveled, how much they grew, and how old they are since being released. Tagging studies are most frequently conducted with the advice and participation of fishermen, who are most likely to recapture tagged animals and return the tag, and/or the animal, to the DFG. Information on distribution patterns and movement of fish is valuable to resource managers because it allows insight into the areas and times that stocks are most vulnerable to harvest or environmental effects.

### Egg abundance surveys

Surveys to estimate the abundance of eggs spawned by a particular species of fish or invertebrate are also used to estimate the size of a population, especially the reproductive portion of a population. This method also provides information on the amount of reproduction that has occurred, its locations, and spawning habitat preferences.

### Underwater (*in situ*) surveys

The ability to deploy divers or equipment underwater to make direct observations of animals and habitats is indispensable to the DFG. These methods allow a variety of EFI to be collected which cannot be collected in any other way such as: detailed habitat preferences, many ecological interactions, movement patterns, and non-lethal size/abundance information. The most widely-used method to gather data underwater is scuba. Scuba-based projects are equipment-intensive, and require a relatively large staff to ensure the requisite sampling effort. Intensive scuba surveys are strictly limited by depth (to approximately 60 feet) and bottom time, and are also constrained by weather and sea conditions.

Submarines and remotely operated vehicles (ROVs) are also capable of direct, *in situ* observation of the environment and living resources. Unlike divers, however, their operation is not as severely constrained by depth, ocean conditions, or operating time. In addition, these units are capable of carrying a wide array of sensory and recording

instrumentation such as: CTD<sup>1</sup>, habitat mapping, video, and navigational equipment. These are powerful investigatory tools for fishery-independent research, and have been used successfully by the DFG.

#### Hydroacoustic surveys

Hydroacoustic technology is familiar to most fishermen because it is the same technology used by depth finders and sonar to locate schooling fish or the ocean bottom. This method can be used to measure the size, distribution, and movement of fish schools, and to map and characterize the associated bottom or habitat type. It is most useful for species that exhibit schooling behavior. “Ground-truthing,” or validating, hydroacoustic surveys is accomplished by using nets to catch, identify, and quantify the species being surveyed. Divers are also used to identify and quantify habitat.

#### Laboratory studies

Laboratory studies provide EFI that cannot be collected in the field. They are sometimes experimental in nature, and may require collaboration with non-DFG scientists for the necessary expertise. They include topics such as: age determination and validation, genetics, behavior, food and environmental requirements, reproduction and growth.

#### Genetic investigations

Recently, scientists have refined genetic assessment techniques to sample populations to differentiate discrete fish or invertebrate stocks. Separate stocks of a given species may have very different life histories and this type of EFI may be used by resource managers in regional management strategies.

### **4.4 Future Essential Fishery Information Needs for Highest Priority Fisheries**

All FMPs will have different EFI requirements and data needs which will affect their costs. In the context of the Master Plan, it is not possible to determine EFI requirements for all future FMPs. However, it is possible to briefly discuss EFI relative to each proposed FMP. In order to do this effectively, subject-area experts were sent a questionnaire inquiring about the status of knowledge for all EFI for a species or group of species. The questionnaire results were then used to subjectively assess EFI categories as either data-rich (R), data-moderate (M), or data-poor (P), in order to identify future data needs for the proposed FMPs (Table 4-2). These categories are defined as: data-rich – able to proceed with FMP development with a high degree of confidence; data-moderate – able to proceed with FMP development with some confidence; and data-poor – unable to proceed with FMP development with any confidence. The following is a brief discussion of EFI needs and the most efficient means of collecting missing data.

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<sup>1</sup>Conductivity, temperature, depth

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 ( <i>Tegula spp.</i> )	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



### Sea urchins

Age and growth, reproduction, and movement patterns are well documented for both red and purple sea urchins. Other categories of EFI are considered data-moderate with the exception of stock distribution and socioeconomics, which are classified as data-poor.

Further research is needed on wasting disease, which is fatal. Research is also needed to determine longevity and to study the interrelationship of purple and red sea urchins, because purple sea urchin populations tend to greatly expand following harvest of red sea urchins. Sea urchin research is well suited for a DFG program, with certain research components, such as genetic studies, better suited to outside experts.

### California halibut

Age and growth, reproductive characteristics, food habits, distribution, movement patterns, and ecological relationships of California halibut are well known. More research is required on the remaining EFI categories because past research has been limited to southern or central California waters, with little EFI from Mexico or northern California. In addition, most of the known research on halibut was completed before 1990, and no socioeconomic analysis of this fishery has been undertaken.

Abundance surveys and recruitment estimates have focused on larval halibut and on juvenile halibut off southern and central California. The only published estimate of population size was obtained in the late 1980s.

Unpublished data are available on halibut abundance from a 1994 DFG trawl survey conducted off southern and central California.

Fishery-independent trawling is the most efficient method of obtaining missing EFI for this species. Information on nearly all EFI categories, except socioeconomics, can be obtained directly by trawling. Trawling can also provide samples for other research, such as genetics, movement patterns, and age and growth studies.

### Nearshore sharks and rays

Essential fishery information for the nearshore sharks and rays, when considered as a species group, is data-poor. The exceptions are age and growth information and reproductive characteristics, which are moderately known for all species. Validation of ageing techniques and further work on spatial and temporal aspects of reproduction are needed to improve these categories of information for management. There are also moderate exceptions to the data-poor categorization of movement patterns for brown smoothhound, Pacific angel shark, and bat ray; although most studies are limited both spatially and temporally. Most of the information on the southern California Pacific angel shark fishery was accumulated in the 1980s.

Considerable fishery-dependent monitoring and fishery-independent assessment activities need to be implemented, and existing efforts bolstered, to ensure the sustainability of nearshore sharks and rays. Fishery-dependent recreational creel surveys, improved commercial landings records, onboard observers (to gather information on effort and discards), and tagging programs could improve knowledge of stock distribution, movement patterns, and total mortality.

Fishery-independent assessments need to be undertaken on genetic stock structure, indices of abundance, ecological interactions, movements and recruitment. In some cases, these programs could work in cooperation with commercial and sport fisheries. Socioeconomic information needed for management can be developed from a variety of fishery-dependent queries and analyses.

### Surfperches

Most of the EFI for surfperches, when considered as a species group, is data-poor. However, information on reproductive characteristics, ecological interactions, and movement patterns may be considered data-moderate. Shiner perch, striped seaperch, barred surfperch, black perch, redbtail surfperch and walleye perch have relatively more EFI available on a species-specific basis.

Much work needs to be done to fill EFI data gaps in order to ensure a sustainable surfperch FMP. Current fishery-dependent monitoring can contribute to age and growth, stock distribution, indices of abundance, movement patterns and total mortality EFI categories, if improved and expanded in both the sport and commercial sectors of the fishery (e.g., species and location-specific landings information, and biological sampling).

Fishery-independent assessment work is necessary on genetic stock structure, ecological interactions, indices of abundance, recruitment and movement patterns, and total mortality EFI categories. Depending on the species, such programs could make use of *in situ* research techniques (e.g., scuba, remotely-operated vessels or ROVs), as well as mid-water trawl and seine capture techniques. In addition, joint studies with commercial and sport fishermen, such as tagging programs, have considerable promise. Management-related socioeconomic information can be acquired from a variety of fishery-dependent queries and analyses.

### Sea basses

For both kelp and barred sand basses, age and growth, stock distribution, and reproduction are well known. Data on recruitment and socioeconomic EFI is considered poor, but all other EFI categories are considered data-moderate.

The regional nature of this fishery is conducive to a DFG research program utilizing collaboration with other agencies, academia, and sport fishermen. Fishery-independent work is needed to collect better information on abundance, recruitment, and total mortality. Both species are well suited for tagging studies and are easily observed during scuba surveys.

### Spiny lobster

Age, growth, and reproductive characteristics of spiny lobster are well known. Existing data for the other EFI categories are not current and are therefore considered moderate to poor. Information is needed on inter-relationships with other species, and effects of oceanographic regimes and human-caused disturbances on their populations. Like the sea basses, lobster research is also well suited to a DFG program using a collaborative approach since it is also a regional fishery. Essential fishery information on stock distribution and recruitment is needed. This may require collaboration with

scientists from Mexico since a large portion of the lobster's range occurs off of Baja California.

### Sea cucumbers

Essential fishery information for giant red and warty sea cucumbers is generally data-poor. However, there is a moderate amount of data on age and growth, indices of abundance, and reproductive characteristics for the giant red sea cucumber. There is also a moderate amount of data on age and growth and ecological interactions for the warty sea cucumber.

Further research on interspecific relationships, effects of oceanographic regimes, and effects of human-caused disturbances on their populations is required. Population monitoring is recommended for both species via fishery-independent studies using underwater techniques and trawling surveys.

### Subtidal snails

All categories of EFI are poorly known for wavy turban snails and Kellet's whelk. The harvest of wavy turban snails and Kellet's whelk has yet to be sufficiently quantified. Population estimates and basic life history information would be best obtained through cooperative research studies with universities. Fishery-independent work using a variety of underwater techniques would be the best method to obtain much of their needed EFI.

### Intertidal invertebrates

Essential fishery information for top snails (*Tegula* spp.) is poorly understood. *Tegula funebris* is the only species for which indices of abundance, age and growth, recruitment, and reproductive characteristics are available.

Studies of giant owl limpets at many sites off central and southern California have increased our knowledge base to the data-moderate level on indices of abundance, age and growth, movement patterns, and ecological interactions. However, information is absent or poor for total mortality, recruitment, and stock distribution.

The harvest of *Tegula* spp. and owl limpets needs to be quantified and monitored by the DFG. Information on the effects of human perturbations and oceanographic conditions on the abundance and health of their populations is needed. Mark and recapture is the most efficient method of obtaining age and growth data. All of these studies are well suited for cooperative research programs with universities.

### Kelp

Essential fishery information for giant kelp and bull kelp are well known. Aerial surveys are the most efficient method of determining annual health, distribution, and abundance of both giant kelp and bull kelp. Scuba surveys are well-suited for estimating growth rates and recruitment, "ground-truthing" other abundance estimation techniques, and studying ecological relationships. Movement pattern data is only applicable to drift kelp. Harvest-related mortality may not apply to giant kelp because only the canopy is removed. However, when bull kelp is harvested, the entire plant is removed. Both species are susceptible to heavy mortality during storms or high surf conditions.

#### **4.5 Prioritizing Essential Fishery Information**

While all of the previously mentioned fishery information is important for sustainable management, the DFG recognizes that it has quite limited fiscal and staff resources for the collection of EFI for individual FMPs. The following factors influence where, and in what priority, those resources will be directed for collecting EFI: cost, available technology, appropriate expertise, jurisdictional limitations, prior availability and quality of baseline information, and the relative importance of specific EFI for managing a particular fishery.

Many monitoring and assessment techniques (e.g., creel, market, or dockside monitoring) can collect EFI from many categories simultaneously (Table 4-1), whereas the logistics of some techniques (e.g., landing receipts, laboratory studies) may allow collection of a fewer number of EFI parameters. Many EFI parameters require long-term investigation to be most valuable (e.g., comparing catch rates to oceanographic parameters and growth rates). The most efficient method of collecting EFI begins by balancing specific informational needs with the resources available to collect that information (including methodology, expertise and budget).

As an example of how EFI can be prioritized, the DFG's Nearshore FMP ranked biological EFI needed for sustainable fisheries management of 19 species. Eight EFI categories were ranked as follows:

1. Indices of abundance
2. Total mortality
3. Age and growth
4. Recruitment
5. Ecological interactions
6. Reproduction
7. Stock distribution
8. Movement patterns

In this case, the ranking methodology was developed specifically for fisheries that directly exploit nearshore finfish. It was determined that the first three EFI categories (Indices of abundance, Total mortality, and Age and growth) provided core information, regardless of which management tool was applied to this fishery (e.g., harvest control rules, regional management, restricted access, or marine protected areas), and that an emphasis should be placed on collecting these EFI.

#### **4.6 Public Involvement in Collecting Essential Fishery Information**

The MLMA states that the public shall be involved in the design and conduct of research. It is important that the scientific "deductive" method of information gathering be augmented by the direct observations and experience of others with specialized knowledge of the resource. The public at large, and more specifically members of the fishing community, have a collective knowledge of fisheries which should be used by resource managers. Similarly, members of non-consumptive "user-groups" offer a unique perspective, and their knowledge can also be used to fill data gaps.

The DFG fosters and encourages public involvement in fisheries monitoring and research. This is best accomplished within a framework that ensures the collaboration of divers, fishermen, and others in research design, the objective collection and analysis of data, and the cooperation of all in carrying out these activities (see Chapter 5).

Department of Fish and Game/public cooperative projects can have many benefits. They may: (a) enhance monitoring and research efforts; (b) foster communication and cooperation; (c) consolidate costs; (d) enhance resource stewardship; and (e) build trust and understanding during the development of long-term conservation goals. Some examples of activities that could incorporate members of the public (fishermen, processors, trade associations, non-consumptive users, etc.) in their design and execution are:

- Conduct educational workshops on fish identification, biology, or regulations;
- Assist in the development of commercial and sport fishing gear that reduces discards or habitat damage;
- Share vessels with other agency research programs;
- Utilize sport and commercial fishermen to develop observer programs;
- Support collaboration with other agencies and universities;
- Encourage projects and ideas suggested by the public;
- Encourage volunteer programs to collect data from sport and commercial fisheries;
- Use volunteer scuba divers to conduct habitat and fish abundance surveys.

Uncertainty in assessing the dynamics of fisheries will likely remain. However, cooperative EFI investigations invoke confidence by members of the public that the best information available, scientific and otherwise, is being used in marine resource management. This, in turn, encourages consultation and cooperation in the FMP development process. Furthermore, better understanding of EFI parameters through public involvement can diminish uncertainty, and help agencies progress toward adaptive and proactive management essential to achieving sustainable fisheries.

## **Chapter 5. Public Involvement in Fisheries Management**

The Marine Life Management Act (MLMA) recognizes that successful marine fishery management is a collaborative process requiring ongoing communication and participation [§7059(a) FGC], so the MLMA seeks to involve all interested parties in marine living resource management decisions [§7050(b)(7) FGC]. More specifically, the MLMA calls for the Department of Fish and Game (DFG) to seek advice and assistance from the public – fishery participants, marine scientists, marine conservationists, and other interested persons – in a variety of fisheries management activities, including the development of fishery management plans (FMPs) and research plans (§7056, §7059, §7060, §7073, §7074, and §7076 FGC). Public involvement is also often called constituent involvement or stakeholder involvement.

The DFG is committed to developing an effective public involvement program and believes that the resulting exchange of information is essential for FMPs to be successful. Meaningful involvement requires being part of the process from the early stage of deciding which fisheries need management plans through the preparation, adoption, implementation, and amendment of those plans (Appendix K). The DFG believes that broad participation in these processes improves the effectiveness and the ability to implement FMPs by:

- Exploring issues, concerns, and management measures from a variety of perspectives;
- Providing an increased understanding of how resources and associated fisheries should be managed from both fishery participant and non-participant perspectives through consensus building and collaborative research;
- Sharing the responsibility for managing sustainable fisheries with all interested persons.

This chapter is intended as a guide to help achieve the goal of meaningful public involvement in the FMP process, and to provide information on the resources needed for full and effective implementation. It suggests the most appropriate approaches to inform, involve, and collaborate with the public.

It is our intent to continue refining the process of public involvement by learning from experience, and future versions of the Master Plan will contain refinements in the methods, activities, costs, and timelines.

### **5.1 Objectives of Public Involvement**

To achieve meaningful, constructive, and effective participation, the DFG believes that it is essential to focus on the following objectives:

- Provide diverse opportunities for constructive participation early in the process of developing and implementing an FMP;
- Provide the necessary resources and personnel to successfully develop and implement a public involvement plan for each FMP. Choose appropriate techniques given the complexity of the fishery and the varying

levels of public concern and interest, ecological concerns, and legal and jurisdictional issues;

- Provide wide distribution and dissemination of plain language, user friendly, reliable and timely information about FMP preparation processes and related marine resource issues using a variety of communication methods;
- Ensure that public groups are treated fairly in the development and selection of FMP objectives, allocations, and management measures;
- Encourage collaborative fisheries research with fishery participants, marine scientists, and other interested parties;
- Provide a consensus building process that seeks positive and innovative solutions to conflict;
- Develop a dispute resolution process, with established guidelines, that involves all interested parties;
- Provide the opportunity for periodic and regular review, evaluation and amendment of processes and plans.

## **5.2 Public Involvement In Fishery Management Plans**

Each FMP will have a public involvement element to address the approaches most appropriate for a particular fishery. Each plan will identify the public involvement goals, potential activities, and timelines. Public involvement is essential in at least three important areas of every FMP: 1) development of FMP objectives; 2) development and selection of management alternatives to achieve FMP objectives; and 3) development and implementation of a research plan.

### **5.2.1 Fishery Management Plan Objectives**

All FMPs contain objectives which will lead to end products. Public involvement is necessary to identify what end products are desired by fishery participants and other interested parties, such as bigger fish, more fish, improved fishing opportunities, better public access, and greater conservation of resources.

Public meetings and an advisory committee may be utilized to help establish FMP objectives and desired end products. Public meetings will focus on informing the public and receiving comments and recommendations. At public meetings the DFG will present available background information on the fishery (fishery overview), which may include life histories of the species, landings histories, and past regulations, and discuss the potential and limitations of the subject species. An advisory committee may focus on collaboratively developing recommendations and/or building a consensus on the desired outcomes of an FMP.

### **5.2.2 Management Concepts**

Once FMP objectives have been established, an array of potential management concepts for achieving the objectives will be developed. Management concepts may include restricted access (Appendix L), area closures, the use of harvest control rules to

achieve maximum sustainable yield (MSY) or optimum yield (OY), and so on. Public meetings will focus on informing the public and receiving their comments and recommendations. An advisory committee may focus on building a consensus on the preferred management concepts.

### **5.2.3 Management Alternatives and Proposed Regulations**

Once FMP objectives and management concepts have been established, management alternatives are needed. Fishery management plans usually contain several management alternatives and proposed regulations with analyses of their risks and benefits. Since management alternatives and proposed regulations can have great impacts on fishery participants and other interested parties, public involvement in the development and selection of a preferred management alternative and the accompanying proposed regulations is crucial. Public meetings and an advisory committee may be utilized to bring about effective public involvement.

### **5.2.4 Research Protocols**

Each FMP will include a research protocol chapter which will include a research plan. A research plan will describe how the DFG will resolve existing gaps in essential fishery information (EFI) such as abundance, age and growth, total mortality, and recruitment of the species. The DFG is encouraged to participate in collaborative research with others having expertise in marine fishery science, economics, conservation, or a particular fishery. Collaborative fisheries research involves research conducted with the collaboration and cooperation of fishery participants, marine scientists, and other interested persons.

A key to successful collaboration involves using existing expertise in colleges, universities, private institutions and other agencies in all stages of research design, implementation, and evaluation. Successful collaboration also involves fishermen in research design, and in the objective collection and analysis of data. Collaborative research recognizes and values the fishing industry's experience, knowledge and observations. It begins by engaging in the exchange of information and ideas to develop mutual understanding, trust, and innovative approaches to research and management. Additional definitions and descriptions of resources and processes utilized in public involvement activities may be found in Appendix M. (See section 4.6 for more information on research.)

### **5.2.5 Review Criteria and Levels of Public Involvement**

When the DFG begins the process of developing an FMP it will assess the appropriate level of public involvement necessary based upon "review criteria". Review criteria consist of: (a) the level of public concern and interest for involvement; (b) ecological concerns; (c) legal and jurisdictional issues; and (d) resources available to the DFG. This review process will allow the DFG to determine the level of public activities warranted and to optimize available funding, staff, and time. At any point during FMP processes, it may become evident that the next level of public involvement is necessary.



The levels of public involvement range from a Standard Commitment Level to Level III, and are associated with specific methods and activities (Table 5-1). The appropriate level of public involvement will be reassessed throughout the FMP process using the review criteria. Each succeeding level involves greater public participation and includes the methods and activities from the previous level.

<b>Table 5-1. Levels of public involvement and associated methods and activities.</b>	
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

### **5.3 Methods and Activities for Public Involvement**

#### **5.3.1 Standard Commitment Level**

The Standard Commitment Level for involving the public in the FMP preparation process will include notifying the public of the DFG's intent to develop an FMP, how the public can become involved and comment, and where and when FMP documents will be available.

#### Notice of announcement

A notice of announcement explains the DFG's FMP preparation process and identifies the opportunities for public involvement. The announcement should be made as early in the process as possible. It should include an address and a telephone number for a contact person to request additional information and allow the public to express interest in opening and continuing dialogue with the DFG. A notice of announcement should take whatever form is most useful for an FMP. Options include direct mail, news releases, radio and television public service announcements, Internet, web site, fact sheets, and newsletters.

#### Public notification

Public notices may be used to inform the public of specific events throughout the FMP preparation process. These events may include public meetings, workshops, public review and comment periods, and the release of important documents. Public notices can be mailed to individuals on a contact list, announced on radio and television, or published in media chosen to reach targeted public.

#### Fact sheet

A fact sheet is a brief report summarizing current or proposed activities of an FMP process, and presents technical information in a clear and understandable format.

The purpose is to help inform the public of the status of FMP processes and ensure they understand the issues. In addition to developing generic fact sheets and brochures, fishery-specific fact sheets should also be developed when a significant number of the public appear to be interested or concerned about an FMP. This fact sheet should be sent to persons on the contact list and distributed by any other suitable means.

#### Important documents

Important documents may include preliminary drafts and the final FMP. The DFG will make these documents available to the public. Other relevant documents may also be made available as appropriate. Documents may be provided in Marine Region field offices, on the web site, and by request.

#### Informal request for comments

A request for comments is an informal process with a designated time period where comments from the public on a proposed course of action are accepted by the DFG. When requesting comments, the following are considered: (a) provide a reasonable amount of time for comments to be made; (b) include the purpose and objectives for the comments and any draft documents related to the issue; and (c) ensure that all responders are aware that their comments may be summarized and provided to the public.

#### Formal public review and comment

Formal public review and comment is a formal period, required by law, when the public can review and comment on a draft FMP or proposed implementation regulations developed by the DFG. Documents should be made available to the public for review at least 30 days prior to a hearing on an FMP by the Commission. The public requesting to be notified of the availability of an FMP will be notified in sufficient time to allow them the opportunity to review and submit comments at or prior to a public hearing.

#### Questionnaire and comment forms

Questionnaire and comment forms may be developed to obtain the public's opinions and concerns about the progress of FMPs. Questionnaires may include questions about many topics related to FMPs. Comment forms provide a forum for the public to express ideas and provide input. Both questionnaire and comment forms may be provided at a variety of venues including distribution to individuals on a contact list, providing them at public meetings, in newsletters, on the web site, and in DFG Marine Region offices.

#### Newsletter

A newsletter can inform the public on a variety of issues. It may provide updates on FMP proposals under consideration and updates on a project's status. It will announce public meeting dates and provide contact information for personnel working on a particular FMP. The DFG has developed the quarterly newsletter, *Marine*

*Management Newsletter*, which features articles on the development of FMPs and related public involvement activities.

### Contact list

A contact list is an important communication tool which allows an organization to reach broad or targeted audiences with its messages. The better the contact list, the better the public outreach and delivery of information. A well-developed contact list will reach participants that want to be actively involved as well as those who wish to be involved simply by staying informed. The process of developing a contact list begins early in the public involvement effort, and there are many ways to collect names. Other agencies' or organizations' existing contact lists may be used as a starting point. A contact list should be able to provide the public with information in the method they prefer, i.e., via U.S. postal service, facsimile, or electronic mail (e-mail). A contact list may be organized geographically so that different questions could be posed and comments solicited based on potential regional management approaches.

The DFG will develop, maintain, and update a multi-faceted contact list that includes a broad base of the public, such as fishery participants, attendees at public meetings, agencies, organizations, public aquariums, elected officials, relevant media outlets and other organizations' newsletters, and interested individuals. The contact list will be used to send the public announcements of meetings or special events, reports, documents and other relevant information about a fishery, newsletters, information on specific issues and activities, FMPs, and questionnaire and comment forms as appropriate. In addition, it may be used to identify members of the constituency who may be considered for an advisory committee.

### Web site

A web site can provide announcements of public meetings and hearings, current information on proposals under consideration, important documents including FMPs, summaries of meetings and other related information about a fishery, and the MLMA. It allows those unable to travel to meetings or Commission hearings a method to remain informed and involved. The MLMA website is [www.dfg.ca.gov/mrd/mlma](http://www.dfg.ca.gov/mrd/mlma). In addition, the public may add their name to the contact list at this site.

## **5.3.2 Level I**

### Meetings and workshops - generally

Meetings and workshops provide opportunities for focused dialogue with the public. The goal is to encourage an exchange of views and open exploration of issues, alternatives, and consequences. Meetings must be preceded by timely distribution of information. The dialogues should occur sufficiently in advance of decision-making to make certain that the public's opinions are considered and to permit response to the public's views prior to DFG or Commission actions. Meetings and workshops should be held at times and places that encourage attendance and participation. Whenever possible, they should be held during non-work hours, such as evenings and weekends, and at locations accessible by public transportation. Some guidelines to follow are: (a) notice should be provided not less than 14 days prior to the meeting; (b) the purpose,

objectives, agenda, date and venue of meetings should be widely distributed; (c) the use of a facilitator should be considered; (d) agendas should clearly indicate when oral and/or written statements from the public may be made; and (e) a summary record of discussions at public meetings and workshops will be provided when requested.

(a) Public meeting

A public meeting provides the public an opportunity to become informed, ask questions, and make comments and recommendations. The purpose is to inform the public about ongoing activities, to discuss issues, and to receive input. Subject experts should be present to provide information and answer specific questions. The public making comments should try to be as concise as possible to avoid repeating comments made by others. The time available for each person to make comments will depend on the number of people who wish to speak at the meeting and the time constraints.

(b) Workshop

A workshop is a form of public meeting that may include presentations and exhibits but ends with discussion, comments, and recommendations. The DFG may hold statewide and/or regional workshops. A statewide workshop may provide a forum for dialogue among DFG staff and the public. After some of the statewide fishery issues have been discussed, it may be useful to hold regional workshops.

(c) Small group meeting

The purpose of a small group meeting is to inform invited public of FMP activities, discuss specific issues, receive comments and recommendations, answer questions, and clear up any misconceptions or misunderstandings. Small group meetings also help to develop the DFG's sensitivity to public concerns, get 'first-hand' information from interested public, and establish rapport and a good working relationship with the public.

**5.3.3 Level II**

Advisory committee

An advisory committee is a group of the public (representing diverse public interests) and subject matter experts assembled to provide suggestions, advice, feedback, and recommendations to the DFG and/or the Commission. Advisory committees may help to provide more broadly supported input, a fair and effective process, and establish a rapport and good working relationship with the public. Other common names include Task Force and Citizen Advisory Board.

Consensus building

Consensus building refers to a range of processes used to foster dialogue, clarify areas of agreement and disagreement, and resolve controversial issues. Consensus building is a voluntary process in which the participants seek a mutually acceptable resolution to a defined issue or problem. The basic steps to consensus building include the following:

1. Involve all parties that can implement or block a decision.
2. Obtain participants' agreement on the process structure and goals.
3. Obtain participants' agreement on the definition of the problem.
4. Identify and communicate participants' interests by sharing information.
5. Participants identify potential solutions, develop evaluation criteria and obtain agreement.
6. Reconcile different perspectives when possible.
7. Communicate with broader interests throughout the process.
8. Implement decisions that address real concerns and perspectives.

People involved in making decisions regarding marine resource management issues know that conflicts naturally exist. Individuals and groups have different perspectives and different needs. When handled constructively through consensus building, differences can develop into positive and innovative solutions with broad support and effective implementation.

#### Panel

A panel is a group of experts assembled to debate or provide comments and recommendations on specific issues. After panel presentations there may be a period of discussion between the panel members and the audience. Outcomes may include summary recommendations.

#### Public hearing

A public hearing is a formal hearing organized by the DFG and/or the Commission and is open to all the public. The purpose is to provide an opportunity for formal comment and testimony. All testimony received becomes part of the public record. The DFG and/or the Commission will hold at least two public hearings prior to the adoption or rejection of an FMP. The first hearing must be held within 60 days of the Commission receiving a Draft FMP.

### **5.3.4 Level III**

#### Dispute resolution

Dispute resolution is a method to improve communication among parties in order to better identify options that satisfy different interests and values. The goal of dispute resolution is a negotiated agreement that may be binding on all participants. Because fishery management issues are very complex, the MLMA encourages the DFG and the Commission to work with dispute resolution specialists and to develop dispute resolution processes appropriate to each element in the fishery management process (Appendix N).

### **5.4 Opportunities for Involvement**

There are numerous opportunities for public involvement and comments during FMP and regulation processes (Fig. 5-1).

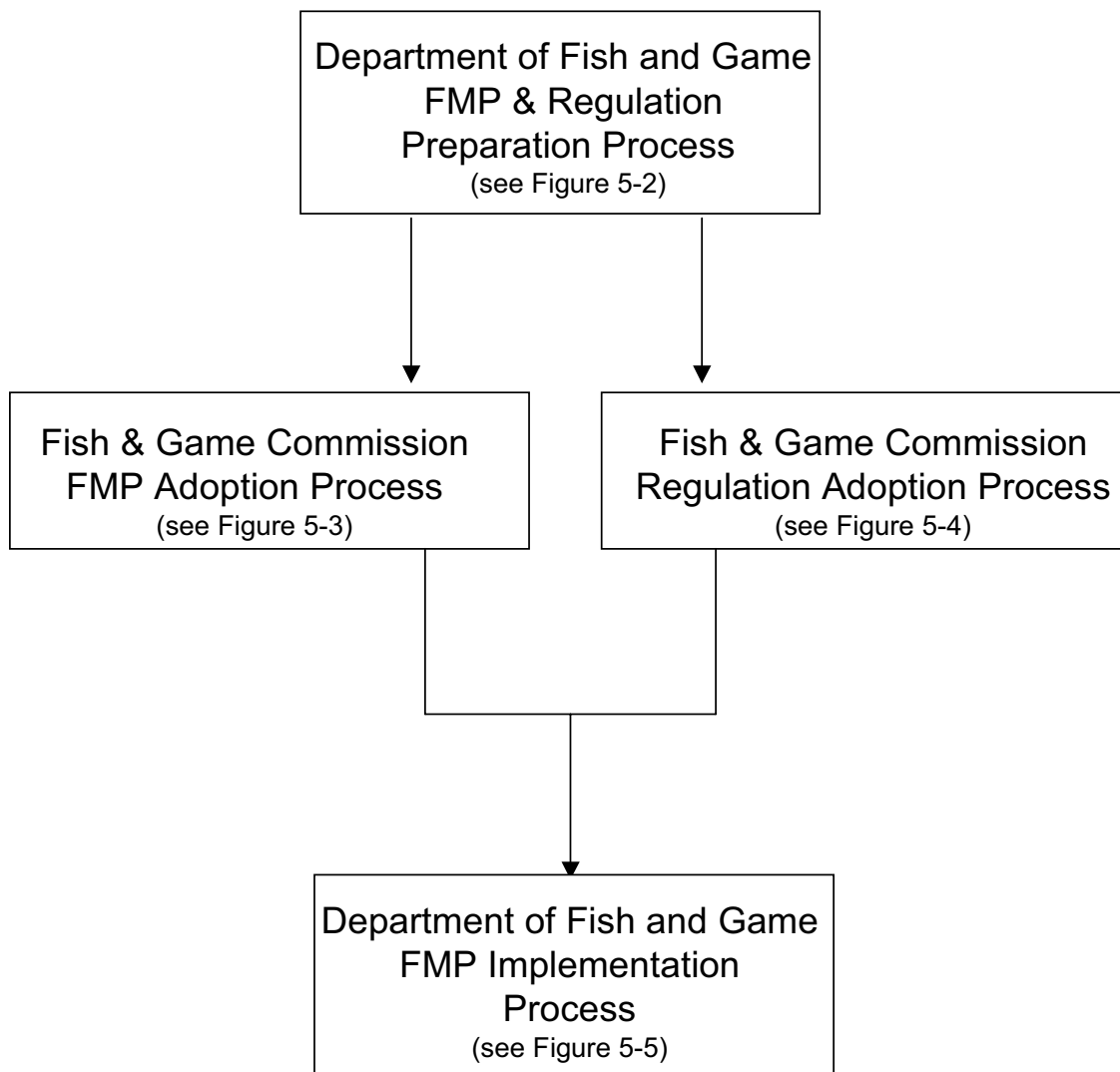


Figure 5-1. Overview of fishery management plan (FMP) and regulation processes. See Figures 5-3 through 5-5 for illustrations of opportunities for public involvement in each of these processes.

#### **5.4.1 Fishery Management Plan and Regulations Preparation Process**

The DFG is the lead for all activities during the preparation of an FMP and regulations. There are numerous opportunities for comments to be made to the DFG, with public involvement ranging from Standard Commitment Level to Level III (Fig. 5-2). An FMP and associated regulations must be made available to the public at least 30 days before a hearing by the Commission.

The DFG is committed to ensuring that all interested members of the public are able to participate in the preparation of FMPs by scheduling meetings in a variety of locations, on various days of the week, and during convenient times of the day. All meetings, special events, and important documents associated with an FMP are posted on the DFG's Marine Region web site at [www.dfg.ca.gov/mrd/index.html](http://www.dfg.ca.gov/mrd/index.html). The DFG also places public notices in local newspapers, and makes public announcements on local television and radio stations.

An FMP is considered to be a functional equivalent of a California Environmental Quality Act (CEQA) document. The CEQA process requires that the DFG prepare a Notice of Preparation (NOP) for review by state agencies when they first begin the process of developing an FMP. The NOP commenting period is 45 days. During this time, other state agencies may make written comments to the DFG about what should be included in an FMP. (See section 2.3.1. for more information on the FMP preparation process.)

#### **5.4.2 Fishery Management Plan Adoption Process**

When the DFG submits a Draft FMP to the Commission, a formal comment period is initiated. During this period, the Commission is the lead for all activities. There are numerous opportunities for comments to be made to the Commission by the public (Fig. 5-3). The Commission will receive written and verbal comments at a minimum of two public hearings. (See section 2.3.2 for more information on the FMP adoption process.)

#### **5.4.3 Fishery Management Plan Regulations Adoption Process**

When the DFG submits a Draft FMP to the Commission, it also submits Initial Regulatory Documents (Fig. 5-4). These include proposed regulations, an initial statement of reasons, a public notice, and a rulemaking file. The public notice is sent to people on the DFG's and Commission's active mailing lists. It is also published in the California Regulatory Notice Register, which is available through the Office of Administrative Law (OAL) in Sacramento. The table of contents of each issue is also available at their web site ([www.oal.ca.gov](http://www.oal.ca.gov)). The rulemaking file must be made available for public review. This file may be obtained from the Commission or others mentioned in the public notice.

The basic regulatory process takes about 140 days. The Commission may not adopt proposed regulations until 45 days after the public notice. During this comment period, the public may submit written comments to the DFG or Commission. The Commission generally must hold one public hearing before adopting regulations (Weber and Heneman, 2000).

# Department of Fish and Game FMP & Regulation Preparation Process

Public involvement:

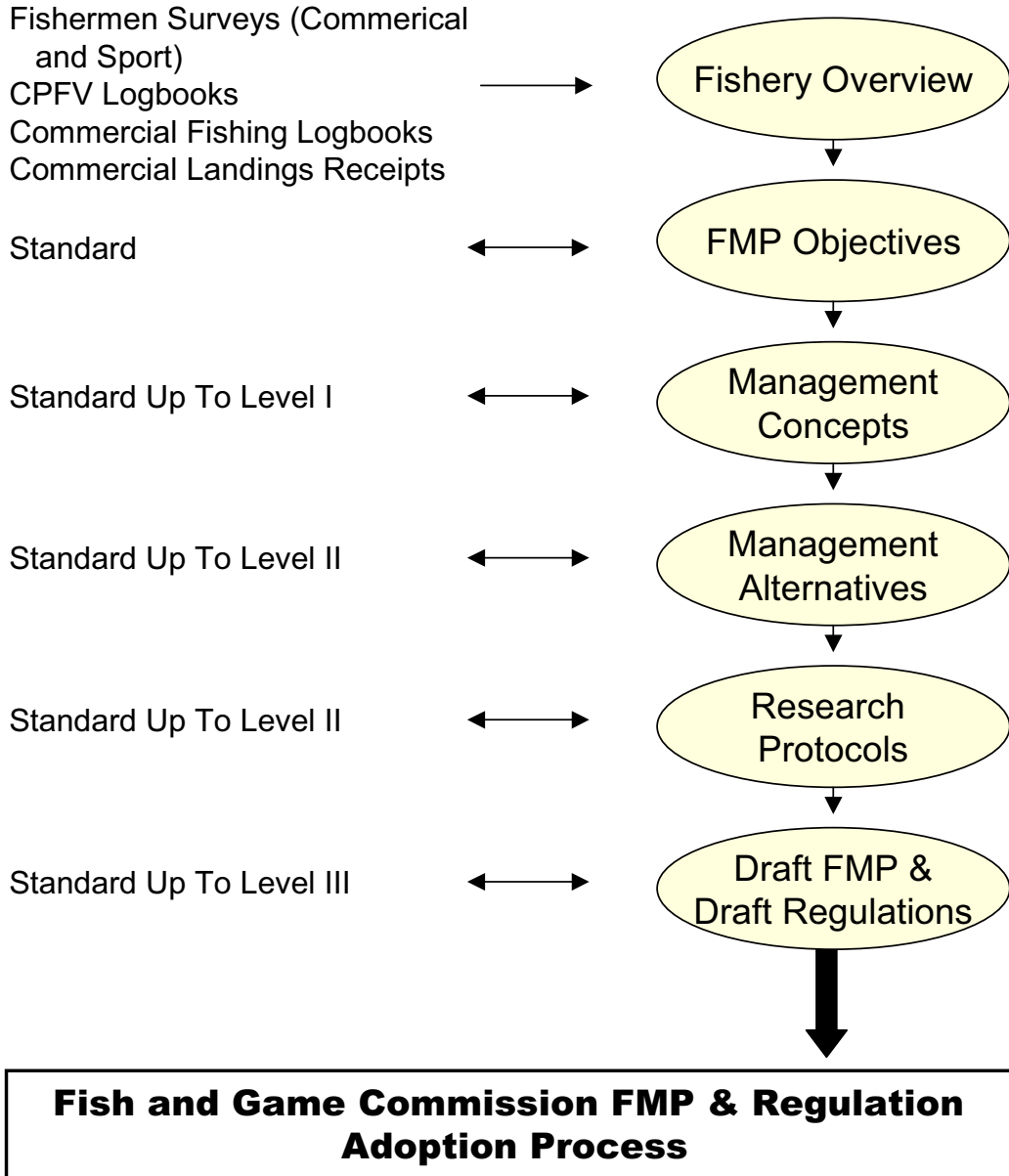


Figure 5-2. Illustration of opportunities for public involvement during the fishery management plan (FMP) and regulation preparation process. See Table 5-1 for definitions of the different levels of public involvement. Written comments may be submitted at any time.

Opportunities for public involvement



## Fish & Game Commission FMP Adoption Process

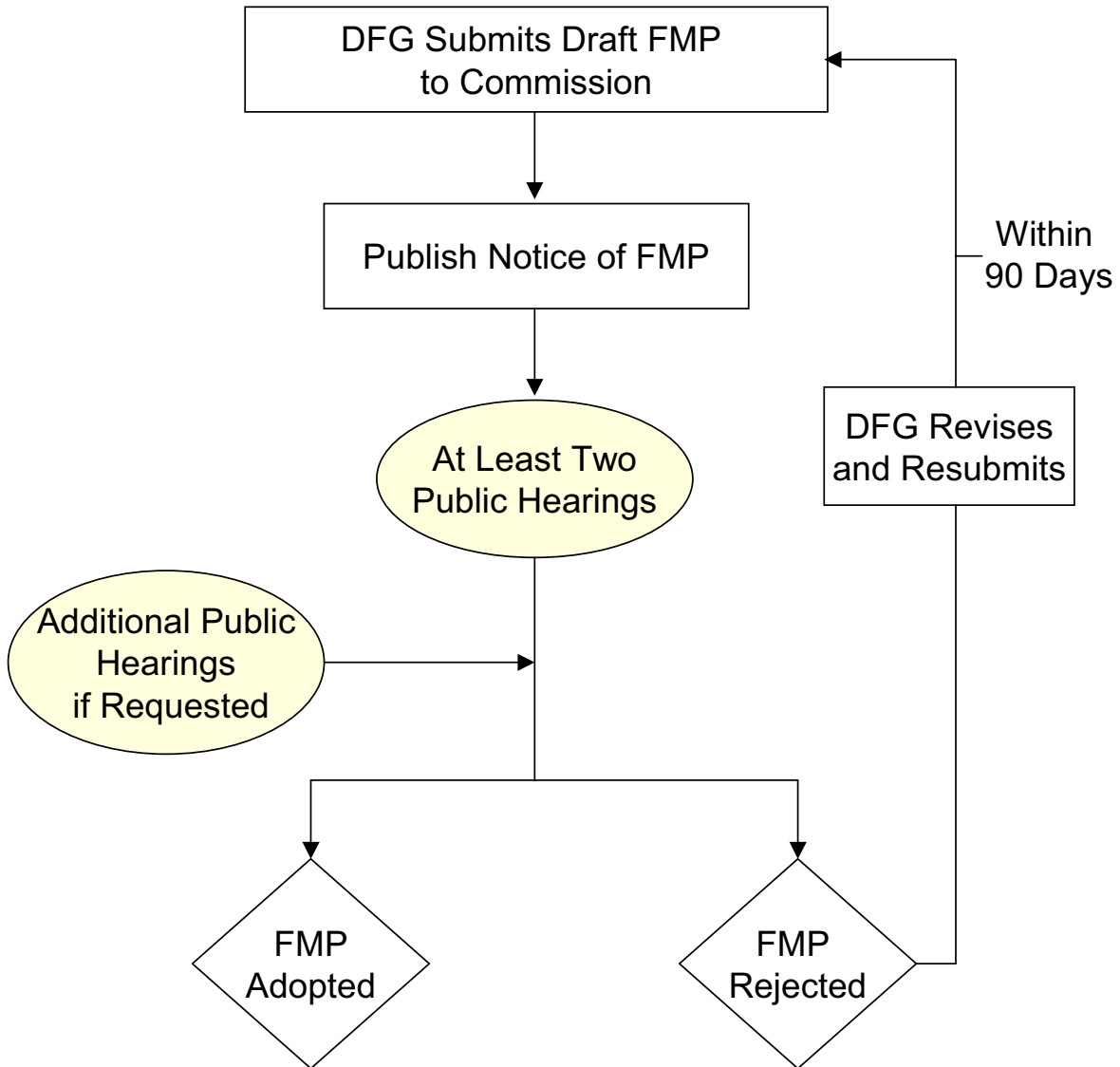


Figure 5-3. Illustration of opportunities for public involvement during the Fish and Game Commission fishery management plan (FMP) adoption process. Written comments may be submitted at any time, up to adoption by the Commission. DFG = Department of Fish and Game

Opportunities for public involvement

## Fish & Game Commission Regulation Adoption Process

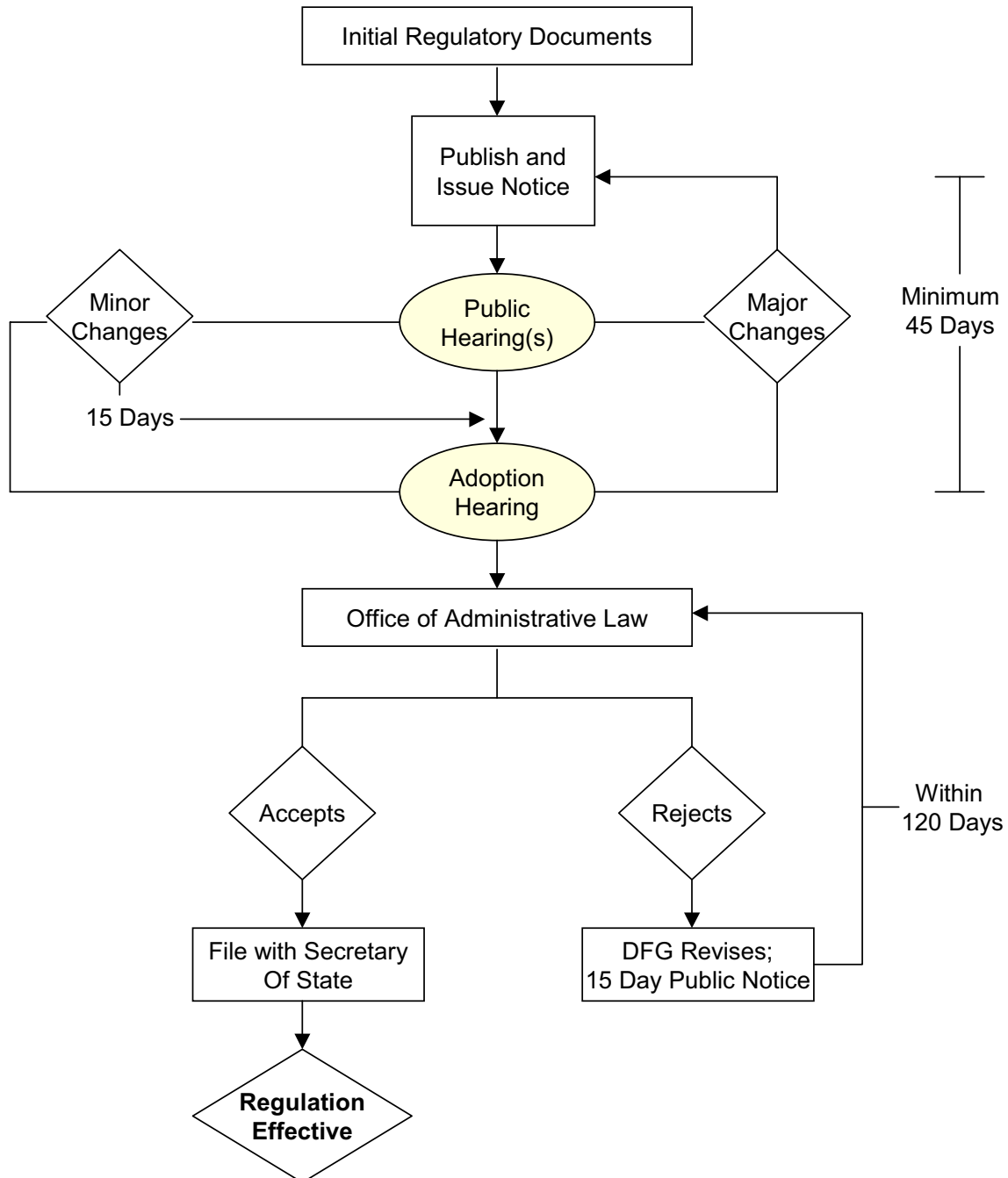


Figure 5-4. Illustration of opportunities for public involvement during the Fish and Game Commission regulation adoption process. Written comments may be submitted at any time, up to adoption by the Commission.  
DFG = Department of Fish and Game

If public comment or other information leads the Commission to make changes in the proposed regulations, there is another 15-day comment period on the revised regulations. However, If the Commission makes substantive changes to the proposed regulations, it must issue a new public notice and allow another 45 days for comment.

Once the comment period is closed, the DFG and Commission must submit the final rulemaking file to OAL, which has 30 days to review the file. If approved, the regulations are sent to the Secretary of State, published, and become effective within 30 days. If the OAL disapproves the regulations, the DFG must revise and resubmit the document to OAL within 120 days. Any revision must also allow for a 15-day comment period.

#### **5.4.4 Fishery Management Plan Implementation Process**

The DFG is the lead for all activities during the implementation process. Public involvement generally occurs during the collaborative efforts of monitoring and research, and in the review and evaluation of the implementation process (Fig. 5-5). The complexity of an FMP will determine the level of public involvement needed for implementation. The DFG will keep the public informed throughout the process through printed media, Internet, advisory committee meetings, and personal contacts. (See section 2.3.3 for more information on the FMP implementation process.)

#### **5.5 Commenting Guidelines**

The public may provide both verbal and written comments at public meetings during the FMP and regulations preparation process. These comments will not be recorded verbatim, but will be summarized. All comments are part of the public record, and will be made available to meeting participants and the public upon request. They may also be available on the DFG's web site.

Verbal comments at meetings may be made by simply signing up and providing the name, address, and telephone number of the commenter. Verbal comments may also be made over the telephone and in person to DFG personnel.

Written comments may be sent to the DFG by U.S. postal service, facsimile, electronic mail (e-mail), and hand delivery. Contact information for each FMP will be available on the DFG's Marine Region web site at [www.dfg.ca.gov/mrd/index.html](http://www.dfg.ca.gov/mrd/index.html). In addition, comments may be directed to:

California Department of Fish and Game  
Marine Region Headquarters  
20 Lower Ragsdale Drive, Suite 100  
Monterey, CA 93940  
Telephone (831) 649-2870  
Facsimile (831) 649-2894.

Written comments should be submitted with the author's complete name, mailing address, and telephone number. By providing this information, DFG personnel may contact the person to discuss or clarify concerns and comments.

## Department of Fish and Game FMP Implementation Process

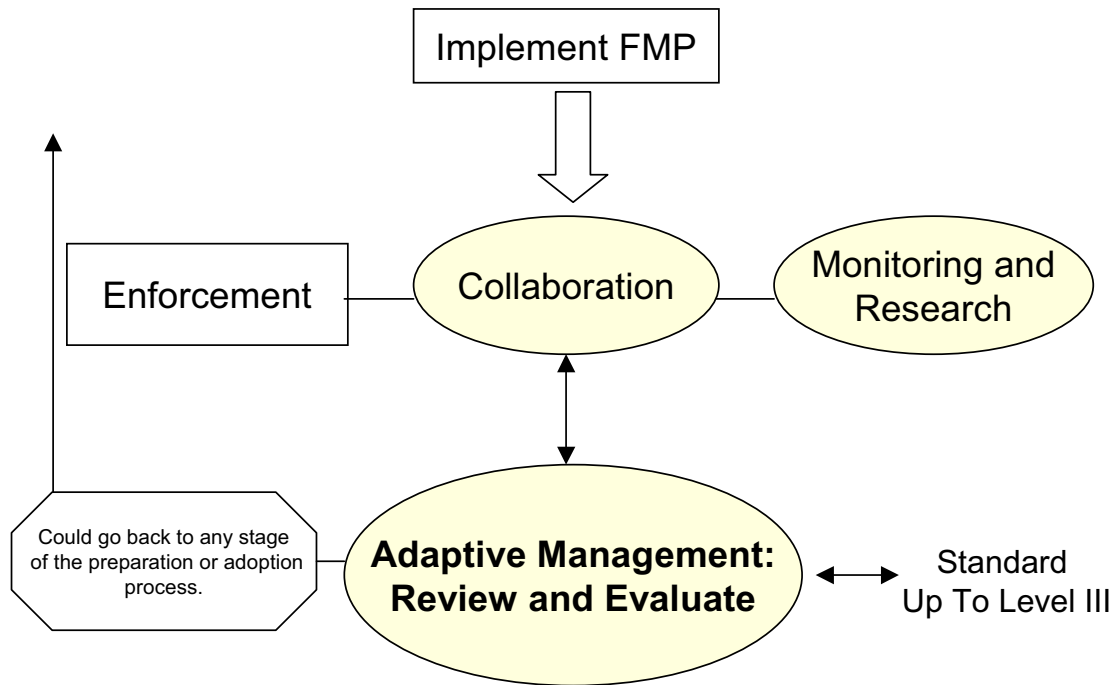


Figure 5-5. Illustration of opportunities for public involvement during the fishery management plan (FMP) implementation process. Written comments may be submitted at any time.

Opportunities for public involvement

The public may also provide comments during the FMP and regulations adoption processes. Groups or individuals wishing to speak at a Commission meeting about a topic already on the agenda can simply sign up at the meeting by providing their name, address, and telephone number. Ideally, organized groups should identify one spokesperson. Speakers should try to be as concise as possible to avoid repeating comments made by others. The time available for each person to make comments will depend on the number of people who wish to speak at the meeting.

Written comments received at least 30 days before a Commission meeting will be distributed to each commissioner and appropriate staff before the meeting.

Comments may be mailed to:

California Fish and Game Commission  
1416 9th Street, Room 1320  
Sacramento, CA 95814  
Telephone (916) 653-4899  
Facsimile (916) 653-5040.

Comments may also be e-mailed with the commenter's name and address directly to: [skoell@dfg.ca.gov](mailto:skoell@dfg.ca.gov). Please be aware that due to the high volume of questions and requests the Commission receives, they unfortunately are not able to answer every message personally, but will take all thoughtful and constructive comments into consideration.

## **Chapter 6. Scientific Peer Review**

The Marine Life Management Act (MLMA) goals identify science as a primary tool to be used in making management decisions. Therefore, to ensure that those decisions stand on sound scientific conclusions, a formal scientific peer review process is necessary.

### **6.1 Definitions**

It is important that key terms be defined in order to understand the scientific peer review process. Peer review is referred to in §7062, §7074, §7075, and §7076 Fish and Game Code (FGC) (Appendix A). In the MLMA, peer review is defined as an examination of the scientific soundness of Department of Fish and Game (DFG) reports, plans, and documents by an external group of colleagues or coequals. Peer reviewers are defined as individuals with technical expertise and knowledge specific to the document being reviewed. Peer reviewers will not be employees or officers of the DFG or the Fish and Game Commission (Commission), and will not have participated substantially in the development of the document to be reviewed. The word “scientific” is derived from the term science, and science is defined as (a) the knowledge of facts gained and verified by exact observation, organized experiment, and ordered thinking; and (b) an orderly presentation of facts and reasons concerning some subject or group of subjects.

### **6.2 Peer Reviewed Documents**

Documents prepared by DFG staff under authority of the MLMA shall be submitted to peer review. These include fishery management plans (FMPs), FMP amendments, interim research or management protocols, and marine resource and fishery research plans.

### **6.3 Peer Review Organizations**

The DFG may enter into an agreement with one or more outside entities that are significantly involved with research, understand marine fisheries, and are not advocacy organizations. The specified entities include the Sea Grant program of any state, the University of California (UC), the California State University, the Pacific States Marine Fisheries Commission (PSMFC), or any other entity approved by the Commission.

### **6.4 Implementation of a Peer Review Process**

The DFG is contracting with UC for a period of three fiscal years (2000-2003) to conduct peer review of the scientific merits of marine management documents. The UC will be responsible for acquiring the services of appropriately qualified scientific community members when needed, and for delivering a written report to the DFG within 30 days of the peer review process for any document.

#### **6.4.1 Fishery Management Plan Peer Review**

Prior to submitting an FMP or FMP amendment to the Commission – including any proposed regulations necessary for implementation – DFG staff shall submit these documents for peer review. Department of Fish and Game staff will provide the peer review panel with any comments received from fishery participants or other interested persons.

#### **6.4.2 Interim Research Protocols**

The DFG will prepare interim fishery research protocols for the three highest priority fisheries adopted in the Master Plan. An interim fishery research protocol will be used by the DFG until an FMP is implemented for the fishery. Interim research protocols will be peer reviewed.

#### **6.4.3 Exemption from Peer Review Process**

The Commission, with advice from the DFG, shall adopt criteria to determine whether any MLMA document may be exempt from peer review. Exemption criteria should be developed jointly by the UC contractor and the DFG based on the experience gained from preparing and reviewing submitted documents prior to January 1, 2002.

After criteria for peer review exemption have been adopted by the Commission, any document that the DFG determines does not need to be peer reviewed, must be submitted to the Commission with reasons that support this exemption. If the Commission does not adopt exemption criteria, all MLMA related documents must be peer reviewed.

#### **6.5 Submission of Peer Reviewed Documents to the Commission**

DFG staff may accept the peer review findings, in whole or in part, and revise the document accordingly. If the DFG disagrees with any aspect of the peer review findings, it will explain the basis for disagreement. The DFG will submit a peer review report to the Commission with any peer reviewed document that will be adopted or approved by the Commission.

## Chapter 7. Master Plan Review

The Marine Life Management Act (MLMA) establishes several objectives that assure fishery management systems are proactive, adaptive, and responsive to changing environmental conditions, market or socioeconomic factors, and the concerns of fishery participants and the public. In order to meet these objectives, there must be a process for regular review and revision of the Master Plan.

### 7.1 Purpose

The purpose for reviewing the Master Plan is to provide an opportunity for amendments or revisions that address unplanned needs, unexpected issues, changes in underlying circumstances and public concerns. Persons desiring changes to the Master Plan may address any part of the plan, but should focus on improving the fishery management system and on achieving the goal of fishery sustainability.

### 7.2 Scheduled Review Process

In order to provide for public involvement during the scheduled review process, the Department of Fish and Game (DFG) will invite suggestions and changes for Master Plan amendment or revision by holding meetings, workshops, or formal hearings, by using advisory bodies or taking written comment. After reviewing public suggestions and comments, the DFG will submit the revised Master Plan or amendment to the Fish and Game Commission (Commission) for adoption. The Master Plan amendment or revision will be available in written form at appropriate DFG and Marine Region offices, and on the DFG's web site at least 45 days prior to Commission adoption. The Commission must hold at least one public hearing before adoption.

The DFG will be reporting annually to the Commission on the status of at least one-fourth of the fisheries managed by the state. Thus, all the fisheries will be reviewed every four years. This serves as an appropriate timeframe for scheduled Master Plan review. The entire Master Plan will be reviewed no later than four years from the adoption date.

### 7.3 Amendment or Revision

The Master Plan amendment or revision process should be flexible to accommodate situations outlined in 7.2. Amendment or revision can be initiated by the DFG or members of the public. Requests by the public must be made in writing to the Commission clearly stating the reasons why the Master Plan should be changed. The Commission will decide whether the change is valid and *significant*, and direct the DFG to begin the amendment or revision process or whether the change is valid and *minor*, and direct the DFG to make an editorial change to the Master Plan.

A *significant* change for the purposes of Master Plan amendment or revision is defined as any of the following:

1. A need for re-prioritization of the fisheries being considered for fishery management plans (FMPs).



2. An addition or deletion to the process for meaningful public involvement.
3. Changes to definitions contained in the Master Plan.
4. Anything the Commission determines is a *significant* change.

Any changes other than those listed above will be considered minor.

There are some issues, such as prioritization of fisheries, that may need to be reviewed more frequently than every four years. The DFG Director may recommend to the Commission that fisheries be re-prioritized based upon recent changes or developments in a particular fishery, data and recommendations from the annual status of fisheries report (§7065, 7066 FGC), and other information.

The public may also petition the Commission to consider fisheries for re-prioritization through a written statement. Such petitions shall, at a minimum, include sufficient information that a change in prioritization may be warranted. Petitions shall include information regarding landing trends, life history attributes of the species, socioeconomics of the fishery, and other relevant factors. The petition must identify how current management of the fishery is inconsistent with MLMA, and show there is a great need for changes in conservation and management measures of the fishery in order to comply with MLMA. The Commission shall determine if there is sufficient information and adequate justification to warrant further review of the petition by the DFG. If so, then the Commission will send the petition to the DFG for analysis.

The DFG will examine the reasons for re-prioritizing fisheries and determine if it will significantly change the prioritization results of the Master Plan. The DFG will then apply the approaches described in Chapter 3 to re-prioritize fisheries, if needed. A revised prioritized list of fisheries will then be submitted to the Commission as an amendment to the Master Plan. If an amendment is rejected in whole, or in part, it will be sent back to the DFG for revision and re-submission. Written statements requesting re-prioritization of fisheries will be reviewed annually every March, or at other times if deemed necessary by the Commission.

## **Appendix A. California Fish and Game Code Pertaining to the Marine Life Management Act**

### **PART 1.7. CONSERVATION AND MANAGEMENT OF MARINE LIVING RESOURCES**

#### **CHAPTER 1. GENERAL POLICIES**

##### **§7050.**

(a) The Legislature finds and declares that the Pacific Ocean and its rich marine living resources are of great environmental, economic, aesthetic, recreational, educational, scientific, nutritional, social, and historic importance to the people of California.

(b) It is the policy of the state to ensure the conservation, sustainable use, and, where feasible, restoration of California' s marine living resources for the benefit of all the citizens of the state. The objective of this policy shall be to accomplish all of the following:

(1) Conserve the health and diversity of marine ecosystems and marine living resources.

(2) Allow and encourage only those activities and uses of marine living resources that are sustainable.

(3) Recognize the importance of the aesthetic, educational, scientific, and recreational uses that do not involve the taking of California's marine living resources.

(4) Recognize the importance to the economy and the culture of California of sustainable sport and commercial fisheries and the development of commercial aquaculture consistent with the marine living resource conservation policies of this part.

(5) Support and promote scientific research on marine ecosystems and their components to develop better information on which to base marine living resource management decisions.

(6) Manage marine living resources on the basis of the best available scientific information and other relevant information that the commission or department possesses or receives.

(7) Involve all interested parties, including, but not limited to, individuals from the sport and commercial fishing industries, aquaculture industries, coastal and ocean tourism and recreation industries, marine conservation organizations, local governments, marine scientists, and the public in marine living resource management decisions.

(8) Promote the dissemination of accurate information concerning the condition of, or management of, marine resources and fisheries by seeking out the best available information and making it available to the public through the marine resources management process.

(9) Coordinate and cooperate with adjacent states, as well as with Mexico and Canada, and encourage regional approaches to management of activities and uses that affect marine living resources. Particular attention shall be paid to coordinated approaches to the management of shared fisheries.

**§7051.** (a) A regulation adopted pursuant to this part shall apply only to ocean waters and bays. Notwithstanding any other provision of this part, nothing contained in this part grants the department or any other agency of the state any regulatory authority not in existence on January 1, 1999, in any river upstream of the mouth of such river, in the Sacramento-San Joaquin Delta or in any other estuary.

(b) The policies in this part shall apply only to fishery management plans and regulations adopted by the commission on or after January 1, 1999. No power is delegated to the commission or the department by this part to regulate fisheries other than the nearshore fishery, the white sea bass fishery, emerging fisheries, and fisheries for which the commission or department had regulatory authority prior to January 1, 1999.

#### **CHAPTER 2. MARINE FISHERIES GENERALLY**

**§7055.** The Legislature finds and declares that it is the policy of the state that:

(a) California's marine sport and commercial fisheries, and the resources upon which they depend, are important to the people of the state and, to the extent practicable, shall be managed in accordance with the policies and other requirements of this part in order to assure the long-term

economic, recreational, ecological, cultural, and social benefits of those fisheries and the marine habitats on which they depend.

(b) Programs for the conservation and management of the marine fishery resources of California shall be established and administered to prevent overfishing, to rebuild depressed stocks, to ensure conservation, to facilitate long-term protection and, where feasible, restoration of marine fishery habitats, and to achieve the sustainable use of the state's fishery resources.

(c) Where a species is the object of sportfishing, a sufficient resource shall be maintained to support a reasonable sport use, taking into consideration the necessity of regulating individual sport fishery bag limits to the quantity that is sufficient to provide a satisfying sport.

(d) The growth of commercial fisheries, including distant-water fisheries, shall be encouraged.

**§7056.** In order to achieve the primary fishery management goal of sustainability, every sport and commercial marine fishery under the jurisdiction of the state shall be managed under a system whose objectives include all of the following:

(a) The fishery is conducted sustainably so that long-term health of the resource is not sacrificed in favor of short-term benefits. In the case of a fishery managed on the basis of maximum sustainable yield, management shall have optimum yield as its objective.

(b) The health of marine fishery habitat is maintained and, to the extent feasible, habitat is restored, and where appropriate, habitat is enhanced.

(c) Depressed fisheries are rebuilt to the highest sustainable yields consistent with environmental and habitat conditions.

(d) The fishery limits bycatch to acceptable types and amounts, as determined for each fishery.

(e) The fishery management system allows fishery participants to propose methods to prevent or reduce excess effort in marine fisheries.

(f) Management of a species that is the target of both sport and commercial fisheries or of a fishery that employs different gears is closely coordinated.

(g) Fishery management decisions are adaptive and are based on the best available scientific information and other relevant information that the commission or department possesses or receives, and the commission and department have available to them essential fishery information on which to base their decisions.

(h) The management decision making process is open and seeks the advice and assistance of interested parties so as to consider relevant information, including local knowledge.

(i) The fishery management system observes the long-term interests of people dependent on fishing for food, livelihood, or recreation.

(j) The adverse impacts of fishery management on small-scale fisheries, coastal communities, and local economies are minimized.

(k) Collaborative and cooperative approaches to management, involving fishery participants, marine scientists, and other interested parties are strongly encouraged, and appropriate mechanisms are in place to resolve disputes such as access, allocation, and gear conflicts.

(l) The management system is proactive and responds quickly to changing environmental conditions and market or other socioeconomic factors and to the concerns of fishery participants.

(m) The management system is periodically reviewed for effectiveness in achieving sustainability goals and for fairness and reasonableness in its interaction with people affected by management.

**§7058.** Any fishery management regulation adopted pursuant to this part shall, to the extent practicable, conform to the policies of Sections 7055 and 7056.

**§7059.** (a) The Legislature finds and declares all of the following:

(1) 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.

(2) In order to maximize the marine science expertise applied to the complex issues of fishery management, the commission and the department are encouraged to continue to, and to find creative new ways to, contract with or otherwise effectively involve Sea Grant staff, marine scientists, economists, collaborative fact finding process and dispute resolution specialists, and others with the necessary expertise at colleges, universities, private institutions, and other agencies.

(3) The benefits of the collaborative process required by this section apply to most fishery management activities including, but not limited to, the development and implementation of research plans, fishery management plans, and plan amendments, and the preparation of fishery status reports such as those required by Section 7065.

(4) Because California is a large state with a long coast, and because travel is time consuming and costly, the involvement of interested parties shall be facilitated, to the extent practicable, by conducting meetings and discussions in the areas of the coast and in ports where those most affected are concentrated.

(b) In order to fulfill the intent of subdivision (a), the commission and the department shall do all of the following:

(1) Periodically review fishery management operations with a view to improving communication, collaboration, and dispute resolution, seeking advice from interested parties as part of the review.

(2) Develop a process for the involvement of interested parties and for fact finding and dispute resolution processes appropriate to each element in the fishery management process. Models to consider include, but are not limited to, the take reduction teams authorized under the Marine Mammal Protection Act (16 U.S.C.A. Sec. 1361 et seq.) and the processes that led to improved management in the California herring, sea urchin, prawn, angel shark, and white seabass fisheries.

(3) Consider the appropriateness of various forms of fisheries comanagement, which involves close cooperation between the department and fishery participants, when developing fishery management plans.

(4) When involving fishery participants in the management process, give particular consideration to the gear used, involvement of sport or commercial sectors or both sectors, and the areas of the coast where the fishery is conducted in order to ensure adequate involvement.

### CHAPTER 3. FISHERIES SCIENCE

**§7060.** (a) The Legislature finds and declares that for the purposes of sustainable fishery management and this part, essential fishery information is necessary for federally and state-managed marine fisheries important to the people of this state to provide sustainable economic and recreational benefits to the people of California. The Legislature further finds and declares that acquiring essential fishery information can best be accomplished through the ongoing cooperation and collaboration of participants in fisheries.

(b) The department, to the extent feasible, shall conduct and support research to obtain essential fishery information for all marine fisheries managed by the state.

(c) The department, to the maximum extent practicable and consistent with Section 7059, shall encourage the participation of fishermen in fisheries research within a framework that ensures the objective collection and analysis of data, the collaboration of fishermen in research design, and the cooperation of fishermen in carrying out research.

(d) The department may apply for grants to conduct research and may enter into contracts or issue competitive grants to public or private research institutions to conduct research.

**§7062.** (a) The department shall establish a program for external peer review of the scientific basis of marine living resources management documents. The department, in its discretion and unless otherwise required by this part, may submit to peer review, documents that include, but are not limited to, fishery management plans and plan amendments, marine resource and fishery research plans.

(b) The department may enter into an agreement with one or more outside entities that are significantly involved with researching and understanding marine fisheries and are not advocacy

organizations. These entities may include, but not be limited to, the Sea Grant program of any state, the University of California, the California State University, the Pacific States Marine Fisheries Commission, or any other entity approved by the commission to select and administer peer review panels, as needed. The peer review panels shall be composed of individuals with technical expertise specific to the document to be reviewed. The entity with which the department enters into an agreement for a peer review shall be responsible for the scientific integrity of the peer review process. Each peer reviewer may be compensated as needed to ensure competent peer review. Peer reviewers shall not be employees or officers of the department or the commission and shall not have participated in the development of the document to be reviewed.

(c) The external peer review entity, within the time frame and budget agreed upon by the department and the external scientific peer review entity, shall provide the department with the written report of the peer review panel that contains an evaluation of the scientific basis of the document. If the report finds that the department has failed to demonstrate that a scientific portion of the document is based on sound scientific knowledge, methods, and practices, the report shall state that finding, and the reasons for the finding. The department may accept the finding, in whole or in part, and may revise the scientific portions of the document accordingly. If the department disagrees with any aspect of the finding of the external scientific peer review, it shall explain, and include as part of the record, its basis for arriving at such a determination in the analysis prepared for the adoption of the final document, including the reasons why it has determined that the scientific portions of the document are based on sound scientific knowledge, methods, or practice. The department shall submit the external scientific peer review report to the commission with any peer reviewed document that is to be adopted or approved by the commission.

(d) The requirements of this section do not apply to any emergency regulation adopted pursuant to subdivision (b) of Section 11346.1 of the Government Code.

(e) Nothing in this section shall be interpreted, in any way, to limit the authority of the commission or department to adopt a plan or regulation.

#### CHAPTER 4. COMMISSION AND DEPARTMENT

**§7065.** (a) The director shall report annually in writing to the commission on the status of sport and commercial marine fisheries managed by the state. The date of the report shall be chosen by the commission with the advice of the department. Each annual report shall cover at least one-fourth of the marine fisheries managed by the state so that every fishery will be reported on at least once every four years. The department shall, consistent with Section 7059, involve expertise from outside the department in compiling information for the report, which may include, but not be limited to, Sea Grant staff, other marine scientists, fishery participants, and other interested parties.

(b) For each fishery reported on in an annual report, the report shall include information on landings, fishing effort, areas where the fishery occurs, and other factors affecting the fishery as determined by the department and the commission.

(c) Notwithstanding subdivision (a), the first annual report shall be presented to the commission on or before September 1, 2001, and shall cover all the marine fisheries managed by the state. To the extent that the requirements of this section and Section 7073 are duplicative, the first annual report may be combined with the plan required pursuant to Section 7073.

**§7066.** (a) The Legislature finds and declares that a number of human-caused and natural factors can affect the health of marine fishery resources and result in marine fisheries that do not meet the policies and other requirements of this part.

(b) To the extent feasible, the director's report to the commission pursuant to Section 7065 shall identify any marine fishery that does not meet the sustainability policies of this part. In the case of a fishery identified as being depressed, the report shall indicate the causes of the depressed condition of the fishery, describe steps being taken to rebuild the fishery, and, to the extent practicable, recommend additional steps to rebuild the fishery.

(c) The director's report to the commission pursuant to Section 7065, consistent with subdivision (n) of Section 7056, shall evaluate the management system and may recommend modifications of that system to the commission.

## CHAPTER 5. FISHERY MANAGEMENT PLANS--GENERAL POLICIES

**§7070.** The Legislature finds and declares that the critical need to conserve, utilize, and manage the state's marine fish resources and to meet the policies and other requirements stated in this part require that the state's fisheries be managed by means of fishery management plans.

**§7071.** (a) Sections 7070 to 7088, inclusive, do not apply to the white seabass fishery.

(b) Part 1.5 (commencing with Section 7000) does not apply to any fishery other than to the white seabass fishery.

(c) Any fishery management plan adopted on or before January 1, 1999, pursuant to Part 1.5 (commencing with Section 7000) shall remain in effect until amended pursuant to Part 1.5 or this part. Notwithstanding paragraph (2) of subdivision (b) of Section 7073, any fishery management plan adopted pursuant to Part 1.5 (commencing with Section 7000) and in existence on January 1, 1999, shall be amended to comply with this part on or before January 1, 2002.

**§7072.** (a) Fishery management plans shall form the primary basis for managing California's sport and commercial marine fisheries.

(b) Fishery management plans shall be based on the best scientific information that is available, on other relevant information that the department possesses, or on such scientific information or other relevant information that can be obtained without substantially delaying the preparation of the plan, based on the schedule developed pursuant to paragraph (5) of subdivision (b) of Section 7073.

(c) To the extent that conservation and management measures in a fishery management plan either increase or restrict the overall harvest in a fishery, fishery management plans shall allocate those increases or restrictions fairly among recreational and commercial sectors participating in the fishery.

(d) The commission shall adopt a fishery management plan for the nearshore fishery on or before January 1, 2002, if funds are appropriated for that purpose in the annual budget act or pursuant to any other law.

**§7073.** (a) On or before September 1, 2001, the department shall submit to the commission for its approval, 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. Consistent with Section 7059, the master plan shall be prepared with the advice, assistance, and involvement of participants in the various fisheries and their representatives, marine conservationists, marine scientists, and other interested persons.

(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.

(c) The commission shall adopt or reject the master plan or master plan amendment, in whole or in part, after a public hearing. If the commission rejects a part of the master plan or master plan

amendment, the commission shall return that part to the department for revision and re-submission pursuant to the revision and resubmission procedures for fishery management plans as described in subdivision (a) of Section 7075.

**§7074.** (a) The department shall prepare interim fishery research protocols for at least the three highest priority fisheries identified pursuant to paragraph (4) of subdivision (b) of Section 7073. An interim fishery protocol shall be used by the department until a fishery management plan is implemented for that fishery.

(b) Consistent with Section 7059, each protocol shall be prepared with the advice, assistance, and involvement of participants in the various fisheries and their representatives, marine conservationists, marine scientists, and other interested persons.

(c) Interim protocols shall be submitted to peer review as described in Section 7062 unless the department, pursuant to subdivision (e), determines that peer review of the interim protocol is not justified. For the purpose of peer review, interim protocols may be combined in the following circumstances:

(1) For related fisheries.

(2) For two or more interim protocols that the commission determines will require the same peer review expertise.

(d) The commission, with the advice of the department, shall adopt criteria to be applied in determining whether an interim protocol may be exempted from peer review.

#### CHAPTER 6. FISHERY MANAGEMENT PLAN PREPARATION, APPROVAL, AND REGULATIONS

**§7075.** (a) The department shall prepare fishery management plans and plan amendments, including any proposed regulations necessary to implement plans or plan amendments, to be submitted to the commission for adoption or rejection. Prior to submitting a plan or plan amendment, including any proposed regulations necessary for implementation, to the commission, the department shall submit the plan to peer review pursuant to Section 7062, unless the department determines that peer review of the plan or plan amendment may be exempted pursuant to subdivision (c). If the department makes that determination, it shall submit its reasons for that determination to the commission with the plan. If the commission rejects a plan or plan amendment, including proposed regulations necessary for implementation, the commission shall return the plan or plan amendment to the department for revision and resubmission together with a written statement of reasons for the rejection. The department shall revise and resubmit the plan or plan amendment to the commission within 90 days of the rejection. The revised plan or plan amendment shall be subject to the review and adoption requirements of this chapter.

(b) The department may contract with qualified individuals or organizations to assist in the preparation of fishery management plans or plan amendments.

(c) The commission, with the advice of the department and consistent with Section 7059, shall adopt criteria to be applied in determining whether a plan or plan amendment may be exempted from peer review.

(d) Fishery participants and their representatives, fishery scientists, or other interested parties may propose plan provisions or plan amendments to the department or commission. The commission shall review any proposal submitted to the commission and may recommend to the department that the department develop a fishery management plan or plan amendment to incorporate the proposal.

**§7076.** (a) To the extent practicable, and consistent with Section 7059, the department shall seek advice and assistance in developing a fishery management plan from participants in the affected fishery, marine scientists, and other interested parties. The department shall also seek the advice and assistance of other persons or entities that it deems appropriate, which may include, but is not limited to, Sea Grant, the National Marine Fisheries Service, the Pacific States Marine Fisheries Commission, the Pacific Fishery Management Council, and any advisory committee of the department.

b) In the case of a fishery management plan or a plan amendment that is submitted to peer review, the department shall provide the peer review panel with any written comments on the plan or plan amendment that the department has received from fishery participants and other interested parties.

**§7077.** A fishery management plan or plan amendment, or proposed regulations necessary for implementation of a plan or plan amendment, developed by the department shall be available to the public for review at least 30 days prior to a hearing on the management plan or plan amendment by the commission. Persons requesting to be notified of the availability of the plan shall be notified in sufficient time to allow them to review and submit comments at or prior to a hearing. Proposed plans and plan amendments and hearing schedules and agendas shall be posted on the department's Internet website.

**§7078.** (a) The commission shall hold at least two public hearings on a fishery management plan or plan amendment prior to the commission's adoption or rejection of the plan.

(b) The plan or plan amendment shall be heard not later than 60 days following receipt of the plan or plan amendment by the commission. The commission may adopt the plan or plan amendment at the second public hearing, at the commission's meeting following the second public hearing, or at any duly noticed subsequent meeting, subject to subdivision (c).

(c) When scheduling the location of a hearing or meeting relating to a fishery management plan or plan amendment, the commission shall consider factors, including, among other factors, the area of the state, if any, where participants in the fishery are concentrated.

(d) Notwithstanding Section 7550.5 of the Government Code, prior to the adoption of a fishery management plan or plan amendment that would make inoperative a statute, the commission shall provide a copy of the plan or plan amendment to the Legislature for review by the Joint Committee on Fisheries and Aquaculture or, if there is no such committee, to the appropriate policy committee in each house of the Legislature.

(e) The commission shall adopt any regulations necessary to implement a fishery plan or plan amendment no more than 60 days following adoption of the plan or plan amendment. All implementing regulations adopted under this subdivision shall be adopted as a regulation pursuant to the rule making provisions of the Administrative Procedure Act, Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code. The commission's adoption of regulations to implement a fishery management plan or plan amendment shall not trigger an additional review process under the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code).

(f) Regulations adopted by the commission to implement a plan or plan amendment shall specify any statute or regulation of the commission that is to become inoperative as to the particular fishery. The list shall designate each statute or regulation by individual section number, rather than by reference to articles or chapters.

## CHAPTER 7. CONTENTS OF FISHERY MANAGEMENT PLANS

**§7080.** Consistent with subdivision (b) of Section 7072, each fishery management plan prepared by the department shall summarize readily available information about the fishery including, but not limited to, all of the following:

(a) The species of fish and their location, number of vessels and participants involved, fishing effort, historical landings in the sport and commercial sectors, and a history of conservation and management measures affecting the fishery.

(b) The natural history and population dynamics of the target species and the effects of changing oceanic conditions on the target species.

(c) The habitat for the fishery and known threats to the habitat.

(d) The ecosystem role of the target species and the relationship of the fishery to the ecosystem role of the target species.

(e) Economic and social factors related to the fishery.



**§7081.** Consistent with subdivision (b) of Section 7072, each fishery management plan or plan amendment prepared by the department shall include a fishery research protocol that does all of the following:

(a) Describe past and ongoing monitoring of the fishery.

(b) Identify essential fishery information for the fishery, including, but not limited to, age and growth, minimum size at maturity, spawning season, age structure of the population, and, if essential fishery information is lacking, identify the additional information needed and the resources and time necessary to acquire the information.

(c) Indicate the steps the department shall take to monitor the fishery and to obtain essential fishery information, including the data collection and research methodologies, on an ongoing basis.

**§7082.** Each fishery management plan or plan amendment prepared by the department shall contain the measures necessary and appropriate for the conservation and management of the fishery according to the policies and other requirements in this part. The measures may include, but are not limited to, all of the following:

(a) Limitations on the fishery based on area, time, amount of catch, species, size, sex, type or amount of gear, or other factors.

(b) Creation or modification of a restricted access fishery that contributes to a more orderly and sustainable fishery.

(c) A procedure to establish and to periodically review and revise a catch quota in any fishery for which there is a catch quota.

(d) Requirement for a personal, gear, or vessel permit and reasonable fees.

**§7083.** (a) Each fishery management plan prepared by the department shall incorporate the existing conservation and management measures provided in this code that are determined by the department to result in a sustainable fishery. (b) If additional conservation and management measures are included in the plan, the department shall, consistent with subdivision (b) of Section 7072, summarize anticipated effects of those measures on relevant fish populations and habitats, on fishery participants, and on coastal communities and businesses that rely on the fishery.

**§7084.** (a) Consistent with subdivision (b) of Section 7072, each fishery management plan or plan amendment prepared by the department for a fishery that the department has determined has adverse effects on marine fishery habitat shall include measures that, to the extent practicable, minimize adverse effects on habitat caused by fishing. (b) Subdivision (a) does not apply to activities regulated by Chapter 6 (commencing with Section 6650) of Part 1.

**§7085.** Consistent with subdivision (b) of Section 7072, each fishery management plan or plan amendment prepared by the department, in fisheries in which bycatch occurs, shall include all of the following:

(a) Information on the amount and type of bycatch.

(b) Analysis of the amount and type of bycatch based on the following criteria:

(1) Legality of the bycatch under any relevant law.

(2) Degree of threat to the sustainability of the bycatch species.

(3) Impacts on fisheries that target the bycatch species.

(4) Ecosystem impacts.

(c) In the case of unacceptable amounts or types of bycatch, conservation and management measures that, in the following priority, do the following:

(1) Minimize bycatch.

(2) Minimize mortality of discards that cannot be avoided.

**§7086.** (a) Consistent with subdivision (b) of Section 7072, each fishery management plan or plan amendment prepared by the department shall specify criteria for identifying when the fishery is overfished.

(b) In the case of a fishery management plan for a fishery that has been determined to be overfished or in which overfishing is occurring, the fishery management plan shall contain measures to prevent, end, or otherwise appropriately address overfishing and to rebuild the fishery.

(c) Any fishery management plan, plan amendment, or regulation prepared pursuant to subdivision (b), shall do both of the following:

(1) Specify a time period for preventing or ending or otherwise appropriately addressing overfishing and rebuilding the fishery that shall be as short as possible, and shall not exceed 10 years except in cases where the biology of the population of fish or other environmental conditions dictate otherwise.

(2) Allocate both overfishing restrictions and recovery benefits fairly and equitably among sectors of the fishery.

**§7087.** (a) Each fishery management plan prepared by the department shall include a procedure for review and amendment of the plan, as necessary.

(b) Each fishery management plan or plan amendment prepared by the department shall specify the types of regulations that the department may adopt without a plan amendment.

**§7088.** Each fishery management plan and plan amendment shall include a list of any statutes and regulations that shall become inoperative, as to the particular fishery covered by the fishery management plan or plan amendment, upon the commission's adoption of implementing regulations for that fishery management plan or plan amendment.

#### CHAPTER 8. NEW OR DEVELOPING FISHERIES

**§7090.** (a) The Legislature finds and declares that a proactive approach to management of emerging fisheries will foster a healthy marine environment and will benefit both commercial and sport fisheries and other marine-dependent activities. It is therefore the intent of the Legislature that the commission, upon recommendation of the department, shall have the authority to encourage, manage, and regulate emerging fisheries consistent with the policies of this part.

(b) "Emerging fishery," in regard to a marine fishery, means both of the following:

(1) A fishery that the director has determined is an emerging fishery, based on criteria that are approved by the commission and are related to a trend of increased landings or participants in the fishery and the degree of existing regulation of the fishery.

(2) A fishery that is not an established fishery. "Established fishery," in regard to a marine fishery, means, prior to January 1, 1999, one or more of the following:

(A) A restricted access fishery has been established in this code or in regulations adopted by the commission.

(B) A fishery, for which a federal fishery management plan exists, and in which the catch is limited within a designated time period.

(C) A fishery for which a population estimate and catch quota is established annually.

(D) A fishery for which regulations for the fishery are considered at least biennially by the commission.

(E) A fishery for which this code or regulations adopted by the commission prescribes at least two management measures developed for the purpose of sustaining the fishery. Management measures include minimum or maximum size limits, seasons, time, gear, area restriction, and prohibition on sale or possession of fish.

(c) The department shall closely monitor landings and other factors it deems relevant in each emerging fishery and shall notify the commission of the existence of an emerging fishery.

(d) The commission, upon the recommendation of the department, may do either, or both, of the following:

(1) Adopt regulations that limit taking in the fishery by means that may include, but not be limited to, restricting landings, time, area, gear, or access. These regulations may remain in effect until a fishery management plan is adopted or for 12 months, whichever is shorter.

(2) Direct the department to prepare a fishery management plan for the fishery and regulations necessary to implement the plan.

(e) A fishery management plan for an emerging fishery shall comply with the requirements for preparing and adopting fishery management plans contained in this part. In addition to those requirements, to allow for adequate evaluation of the fishery and the acquisition of essential fishery information, the fishery management plan shall provide an evaluation period, which shall not exceed three years unless extended by the commission. During the evaluation period, the plan shall do both of the following:

(1) In order to prevent excess fishing effort during the evaluation period, limit taking in the fishery by means that may include, but not be limited to, restricting landings, time, area, gear, or access to a level that the department determines is necessary for evaluation of the fishery.

(2) Contain a research plan that includes objectives for evaluating the fishery, a description of the methods and data collection techniques for evaluating the fishery, and a timetable for completing the evaluation.

(f) The commission is authorized to impose a fee on an emerging fishery in order to pay the costs of implementing this chapter. Such fees may include, but not be limited to, ocean fishing stamps and permit fees. Such fees may not be levied in excess of the necessary costs to implement and administer this chapter. The commission may reduce fees annually if it determines that sufficient revenues exist to cover costs incurred by the department in administering this chapter. The commission and the department, with the advice of fishery participants and other interested parties, shall consider alternative ways to fund the evaluation of emerging fisheries.

(g) An emerging fishery is subject to this section unless the department incorporates the fishery into a fishery management plan developed under Sections 7070 to 7088, inclusive.

(h) In the event that this section is found to conflict with Section 8606, 8614, or 8615, this section shall prevail.

## **Appendix B. Sample Format of a Fishery Management Plan**

- Title Page
- Executive Summary
- Table of Contents
- List of Figures
- List of Tables
- List of Appendices

- 1 Environmental Setting
  - 1.1 Purpose and Need for Action
    - 1.1.1 Location and General Characteristics of the Project Area
    - 1.1.2 Problem Statement
- 2 Description of Stocks
  - 2.1 Species A
    - 2.1.1 Distribution, Stock Structure, and Migration
    - 2.1.2 Age and Growth
    - 2.1.3 Reproduction, Fecundity and Seasonality
    - 2.1.4 Natural Mortality
    - 2.1.5 Disease
    - 2.1.6 Predator/Prey Relationships
    - 2.1.7 Competition
    - 2.1.8 Critical Habitat
    - 2.1.9 Status of the Stocks
  - 2.2 Species B - (Repeat Above)
- 3 History and Socioeconomics of the Fishery
  - 3.1 Areas and Species Involved
  - 3.2 History of Exploitation
    - 3.2.1 Description of User Groups and Resource Use
    - 3.2.2 Fishing Effort and Landings
    - 3.2.3 Analysis of Impacts
    - 3.2.4 Estimation and Allocation of Maximum Sustainable Yield and Optimum Yield
  - 3.3 Social and Economic Characteristics of the Fishery
    - 3.3.1 Sport Sector
    - 3.3.2 Commercial Sector
    - 3.3.3 Non-Consumptive Use
    - 3.3.4 Consistency with Statewide and Regional Plans
- 4 History of Conservation and Management Measures
  - 4.1 Regulatory History
  - 4.2 Non-Regulatory Conservation of Stocks
- 5 Current Problems to be Addressed by FMP
  - 5.2 Goals and Objectives
    - 5.2.1 Goals and Objectives Defined under the Marine Life Management Act
    - 5.2.2 Specific Goals and Objectives of the Plan
  - 5.3 Public Involvement Process Used in Development of the Plan and Public Review Process
    - 5.3.1 Public Consultation for Definition of Plan Objectives
    - 5.3.2 Public Consultation for Selection of Preferred Management Alternative
  - 5.4 Authority and Responsibility
    - 5.4.1 Summary of the Marine Life Management Act
      - 5.4.1.1 Process of Plan Review

- 5.4.1.2 Process for Plan Amendment
  - 5.4.2 Fish and Game Commission
    - 5.4.2.1 Responsibilities
    - 5.4.2.2 Sport Fisheries
    - 5.4.2.3 Commercial Fisheries
  - 5.4.3 Rulemaking Process under the Administrative Procedures Act
  - 5.4.4 California Environmental Quality Act
    - 5.4.4.1 Functional Equivalent
    - 5.4.4.2 Use of the Environmental Document
  - 5.4.5 Federal Law
- 6 Management Alternatives
  - 6.1 Definition of a Fishery Management Plan (FMP) Framework
    - 6.1.1 FMP Amendment
    - 6.1.2 Types of Framework Actions
      - 6.1.2.1 Full Rulemaking Actions
      - 6.1.2.2 Notice Actions
      - 6.1.2.3 Prescribed Actions
  - 6.2 General List of Management Measures
  - 6.3 Definition of Maximum Sustainable Yield and Optimum Yield
  - 6.4 Alternatives Considered
    - 6.4.1 Alternative A - No Change
    - 6.4.2 Alternative B
    - 6.4.3 Alternative C
    - 6.4.3 Alternative D - Preferred Alternative
  - 6.5 Annual Review of Management Measures
  - 6.6 Social and Economic Considerations
  - 6.7 Standing Committees
  - 6.8 Reporting and Record-Keeping Requirements
- 7 Research Protocols
  - 7.1 Research Plan for a Sustainable Fishery
  - 7.2 Essential Fishery Information (EFI)
  - 7.3 Summary of Past and Current Fishery-Dependent Monitoring and Fishery-Independent Assessment
  - 7.4 Adequacy of Current Fishery-Dependent Monitoring and Fishery-Independent Assessment Activities to Obtain EFI
  - 7.5 General Research Requirements for Ecological and Biological EFI
  - 7.6 General Research Requirements for Socioeconomic EFI
  - 7.7 Ecological and Biological Data Needs
  - 7.8 Socioeconomic Data Needs
  - 7.9 Protocols for Fishery-Dependent Monitoring and Fishery-Independent Assessment
  - 7.10 Operational Framework for Implementation of DFG and Collaborative Research Efforts
- 8 Environmental Impact Analysis
  - 8.1 Environmental Variability
  - 8.2 Water Quality
    - 8.2.1 Municipal Discharges
    - 8.2.2 Dredge and Non-Dredge Material Disposal
    - 8.2.3 Coastal Shipyards and Industrial Pollutants
    - 8.2.4 Fuel Use
  - 8.3 Air Quality
  - 8.4 Importance of Habitat Loss, Degradation, and Modification
    - 8.4.1 Coastal Development and Land Use

- 8.4.2 Gear Use in the Marine Environment
  - 8.4.3 Noise Effects in the Marine Environment
  - 8.5 Analysis of Alternatives
    - 8.5.1 Alternative A - No Change
      - 8.5.1.1 Effects of Ecological Interactions
      - 8.5.1.2 Effects on Finfish Species
      - 8.5.1.3 Effects on Invertebrate Species
      - 8.5.1.4 Effects on Seabirds
      - 8.5.1.5 Effects on Marine Mammals
      - 8.5.1.6 Effects on Sea Turtles
      - 8.5.1.7 Effects on Bycatch
      - 8.5.1.8 Effects on Habitat
        - 8.5.1.8.1 Effects of Consumptive Use on Environment
        - 8.5.1.8.2 Effects of Non-Consumptive Use on Environment
      - 8.5.9 Economic Implications
      - 8.5.10 Social Implications
    - 8.5.2 Alternative B - (Repeat Above)
    - 8.5.3 (etc.)
  - 8.6 Effects Found Not to be Significant
  - 8.7 Cumulative Effects
  - 8.8 Mitigation of Significant Environmental Impacts
- 9 Implementation Requirements and Costs
  - 9.1 Enforcement
  - 9.2 Data Collection and Reporting
  - 9.3 Management
- 10 List of Preparers
- 11 Appendices
  - 11.1 Bibliography
  - 11.2 Personal Communications
  - 11.3 Glossary of Terms and Abbreviations
  - 11.4 Index
  - 11.5 Methods and Data Sets
  - 11.6 Public Input
    - 11.6.1 Summaries of Public Hearings and Meetings
    - 11.6.2 Persons, Organizations, and Public Agencies Commenting on the Draft Fisheries Management Plan
    - 11.6.3 Comments Received and Response to Comments
  - 11.7 Regulations
  - 11.8 Location in the FMP of Each Requirement of the Marine Management Act
  - 11.9 Location in the FMP of Each Requirement of the California Environmental Quality Act
  - 11.10 Location in the FMP of Each Requirement of the Magnuson-Stevens Fishery Conservation and Management Act (Federal)- if appropriate

### **Appendix C. Data Sources Used to Compile List of California's Marine Fisheries**

The list of marine fisheries managed by the state was compiled from the following sources of current and historic marine landings and fishery information:

DFG's Commercial Fisheries Information System (CFIS) database: Commercial landings of fish, invertebrates, and algae.

Recreational Fisheries Information Network (RecFIN) database ([www.psmfc.org/recfin](http://www.psmfc.org/recfin)): Estimates of recreational fish landings.

California Fish and Game Code and Title 14: Commercial and sport regulations pertaining to fish, invertebrates, and algae.

PFMC web site ([www.pcouncil.org](http://www.pcouncil.org)): Groundfish and highly migratory fish species for which species-specific landings data may be lacking.

Aquarium and scientific collecting permits: Fish, invertebrates, and algae taken for commercial aquariums and scientific purposes.

Queries of DFG staff and experts outside the DFG: Sport-taken invertebrates.

## Appendix D. Marine Fisheries Managed by the State

Fishes Common Name	Scientific Name	FMP <sup>1</sup>
anchovy, northern	<i>Engraulis mordax</i>	CP
barracuda, Pacific	<i>Sphyræna argentea</i>	
bass, barred sand	<i>Paralabrax nebulifer</i>	
bass, giant sea	<i>Stereolepis gigas</i>	
bass, kelp	<i>Paralabrax clathratus</i>	
bass, spotted sand	<i>Paralabrax maculatofasciatus</i>	
bass, striped	<i>Morone saxatilis</i>	
blacksmith	<i>Chromis punctipinnis</i>	
bonito, Pacific	<i>Sarda chiliensis</i>	
butterfish (Pacific pompano)	<i>Peprilus simillimus</i>	
cabezon	<i>Scorpaenichthys marmoratus</i>	GF, NS
cod, Pacific	<i>Gadus macrocephalus</i>	GF
corbina, California	<i>Menticirrhus undulatus</i>	
croaker, black	<i>Cheilotrema saturnum</i>	
croaker, spotfin	<i>Roncador stearnsi</i>	
croaker, white	<i>Genyonemus lineatus</i>	
croaker, yellowfin	<i>Umbrina roncadore</i>	
dolphin (fish)	<i>Coryphaena hippurus</i>	HM
eel, California moray	<i>Gymnothorax mordax</i>	
eel, monkeyface- (prickleback)	<i>Cebidichthys violaceus</i>	NS
eel, wolf-	<i>Anarrhichthys ocellatus</i>	
escolar	<i>Lepidocybium flavobrunneum</i>	HM*
eulachon	<i>Thaleichthys pacificus</i>	
flatnose, Pacific (finescale codling)	<i>Antimora microlepis</i>	GF
flounder, arrowtooth	<i>Atheresthes stomias</i>	GF
flounder, starry	<i>Platichthys stellatus</i>	GF
flyingfish	<i>Exocoetidae spp.</i>	
garibaldi	<i>Hypsypops rubicundus</i>	
goby, blackeye	<i>Coryphopterus nicholsi</i>	
goby, bluebanded	<i>Lythrypnus dalli</i>	
goby, chameleon (oriental goby)	<i>Tridentiger trigonocephalus</i>	
goby, yellowfin (oriental goby)	<i>Acanthogobius flavimanus</i>	
greenling, kelp	<i>Hexagrammos decagrammus</i>	NS
greenling, painted	<i>Oxylebius pictus</i>	
greenling, rock	<i>Hexagrammos lagocephalus</i>	NS
grenadier, Pacific rattail	<i>Coryphaenoides acrolepis</i>	
grouper, broomtail	<i>Mycteroperca xenarcha</i>	
grouper, gulf	<i>Mycteroperca jordani</i>	
grunion, California	<i>Leuresthes tenuis</i>	
guitarfish, shovelnose	<i>Rhinobatos productus</i>	
hagfish	<i>Eptatretus spp.</i>	
halfmoon	<i>Medialuna californiensis</i>	
halibut, California	<i>Paralichthys californicus</i>	
halibut, Greenland	<i>Reinhardtius hippoglossoides</i>	
halibut, Pacific	<i>Hippoglossus stenolepis</i>	GF
herring roe on algae (sport)	<i>Clupea pallasii/ Algae</i>	
herring roe on kelp	<i>Clupea pallasii/ Macrocystis</i>	



## Appendix D. Marine Fisheries Managed by the State

Fishes Common Name	Scientific Name	FMP <sup>1</sup>
herring, Pacific	<i>Clupea pallasii</i>	
jacksmelt	<i>Atherinopsis californiensis</i>	
kelpfish, giant	<i>Heterostichus rostratus</i>	
kelpfish, island	<i>Alloclinus holderi</i>	
killifish, California	<i>Fundulus parvipinnis</i>	
lamprey, Pacific	<i>Lampetra tridentata</i>	
lamprey, western river	<i>Lampetra ayresii</i>	
lingcod	<i>Ophiodon elongatus</i>	GF
lizardfish, California	<i>Synodus lucioceps</i>	
louvar	<i>Luvarus imperialis</i>	HM*
mackerel, bullet	<i>Auxis rochei</i>	HM*
mackerel, chub (Pacific mackerel)	<i>Scomber japonicus</i>	CP
mackerel, jack	<i>Trachurus symmetricus</i>	CP
marlin, striped	<i>Tetrapturus audax</i>	HM
midshipman, plainfin	<i>Porichthys notatus</i>	
mudsucker, longjaw	<i>Gillichthys mirabilis</i>	
mullet, striped	<i>Mugil cephalus</i>	
needlefish, California	<i>Strongylura exilis</i>	
oilfish	<i>Ruvettus pretiosus</i>	
opah	<i>Lampris guttatus</i>	HM*
opaleye	<i>Girella nigricans</i>	
poacher	Agonidae	
queenfish	<i>Seriphus politus</i>	
ratfish, spotted	<i>Hydrolagus colliei</i>	GF
ray, bat	<i>Myliobatis californica</i>	
ray, Pacific electric	<i>Torpedo californica</i>	
rockfish, aurora	<i>Sebastes aurora</i>	GF
rockfish, bank	<i>Sebastes rufus</i>	GF
rockfish, black	<i>Sebastes melanops</i>	GF, NS
rockfish, black-and-yellow	<i>Sebastes chrysomelas</i>	GF, NS
rockfish, blackgill	<i>Sebastes melanostomus</i>	GF
rockfish, blue	<i>Sebastes mystinus</i>	GF, NS
rockfish, bocaccio	<i>Sebastes paucispinis</i>	GF
rockfish, bronzespotted	<i>Sebastes gilli</i>	GF
rockfish, brown	<i>Sebastes auriculatus</i>	GF, NS
rockfish, calico	<i>Sebastes dalli</i>	GF, NS
rockfish, canary	<i>Sebastes pinniger</i>	GF
rockfish, chameleon	<i>Sebastes phillipsi</i>	GF
rockfish, chilipepper	<i>Sebastes goodei</i>	GF
rockfish, China	<i>Sebastes nebulosus</i>	GF, NS
rockfish, copper	<i>Sebastes caurinus</i>	GF, NS
rockfish, cowcod	<i>Sebastes levis</i>	GF
rockfish, darkblotched	<i>Sebastes crameri</i>	GF
rockfish, dusky	<i>Sebastes ciliatus</i>	GF
rockfish, dwarf-red	<i>Sebastes rufinanus</i>	GF
rockfish, flag	<i>Sebastes rubrivinctus</i>	GF
rockfish, freckled	<i>Sebastes lentiginosus</i>	GF

## Appendix D. Marine Fisheries Managed by the State

Fishes Common Name	Scientific Name	FMP <sup>1</sup>
rockfish, gopher	<i>Sebastes carnatus</i>	GF, NS
rockfish, grass	<i>Sebastes rastrelliger</i>	GF, NS
rockfish, greenblotched	<i>Sebastes rosenblatti</i>	GF
rockfish, greenspotted	<i>Sebastes chlorostictus</i>	GF
rockfish, greenstriped	<i>Sebastes elongatus</i>	GF
rockfish, halfbanded	<i>Sebastes semicinctus</i>	GF
rockfish, harlequin	<i>Sebastes variegatus</i>	GF
rockfish, honeycomb	<i>Sebastes umbrosus</i>	GF
rockfish, kelp	<i>Sebastes atrovirens</i>	GF, NS
rockfish, Mexican	<i>Sebastes macdonaldi</i>	GF
rockfish, olive	<i>Sebastes serranoides</i>	GF, NS
rockfish, Pacific ocean perch	<i>Sebastes alutus</i>	GF
rockfish, pink	<i>Sebastes eos</i>	GF
rockfish, pinkrose	<i>Sebastes simulator</i>	GF
rockfish, pygmy	<i>Sebastes wilsoni</i>	GF
rockfish, quillback	<i>Sebastes maliger</i>	GF, NS
rockfish, redbanded	<i>Sebastes babcocki</i>	GF
rockfish, redstriped	<i>Sebastes proriger</i>	GF
rockfish, rosethorn	<i>Sebastes helvomaculatus</i>	GF
rockfish, rosy	<i>Sebastes rosaceus</i>	GF
rockfish, roughey	<i>Sebastes aleutianus</i>	GF
rockfish, sharpchin	<i>Sebastes zacentrus</i>	GF
rockfish, shortbelly	<i>Sebastes jordani</i>	GF
rockfish, shortraker	<i>Sebastes borealis</i>	GF
rockfish, silvergray	<i>Sebastes brevispinis</i>	GF
rockfish, speckled	<i>Sebastes ovalis</i>	GF
rockfish, splitnose	<i>Sebastes diploproa</i>	GF
rockfish, squarespot	<i>Sebastes hopkinsi</i>	GF
rockfish, starry	<i>Sebastes constellatus</i>	GF
rockfish, stripetail	<i>Sebastes saxicola</i>	GF
rockfish, swordspine	<i>Sebastes ensifer</i>	GF
rockfish, tiger	<i>Sebastes nigrocinctus</i>	GF
rockfish, treefish	<i>Sebastes serriceps</i>	GF, NS
rockfish, vermilion	<i>Sebastes miniatus</i>	GF
rockfish, widow	<i>Sebastes entomelas</i>	GF
rockfish, yelloweye	<i>Sebastes ruberrimus</i>	GF
rockfish, yellowmouth	<i>Sebastes reedi</i>	GF
rockfish, yellowtail	<i>Sebastes flavidus</i>	GF
sablefish	<i>Anoplopoma fimbria</i>	GF
salema	<i>Xenistius californiensis</i>	
salmon, chinook	<i>Oncorhynchus tshawytscha</i>	S
salmon, coho	<i>Oncorhynchus kisutch</i>	S
salmon, pink	<i>Oncorhynchus gorbuscha</i>	S
salmon, roe	<i>Oncorhynchus spp.</i>	S
sanddab, longfin	<i>Citharichthys xanthostigma</i>	
sanddab, Pacific	<i>Citharichthys sordidus</i>	GF
sanddab, speckled	<i>Citharichthys stigmaeus</i>	

## Appendix D. Marine Fisheries Managed by the State

Fishes Common Name	Scientific Name	FMP <sup>1</sup>
sardine, Pacific	<i>Sardinops sagax caeruleus</i>	CP
sargo	<i>Anisotremus davidsoni</i>	
saury, Pacific	<i>Cololabis saira</i>	
scad, Mexican	<i>Decapterus scombrinus</i>	
scorpionfish, California	<i>Scorpaena guttata</i>	GF, NS
sculpin, buffalo	<i>Enophrys bison</i>	
sculpin, Pacific staghorn	<i>Leptocottus armatus</i>	
sculpin, prickly	<i>Cottus asper</i>	
sculpin, unspecified	Cottidae	
seabass, white	<i>Atractoscion nobilis</i>	WS
senorita	<i>Oxyjulis californica</i>	
shad, American	<i>Alosa sapidissima</i>	
shark, basking	<i>Cetorhinus maximus</i>	HM*
shark, blue	<i>Prionace glauca</i>	HM
shark, brown smoothhound	<i>Mustelus henlei</i>	
shark, gray smoothhound	<i>Mustelus californicus</i>	
shark, horn	<i>Heterodontus francisci</i>	
shark, leopard	<i>Triakis semifasciata</i>	GF
shark, Pacific angel	<i>Squatina californica</i>	
shark, salmon	<i>Lamna ditropis</i>	HM*
shark, sevengill	<i>Notorynchus cepedianus</i>	
shark, shortfin mako	<i>Isurus oxyrinchus</i>	HM
shark, sixgill	<i>Hexanchus griseus</i>	
shark, soupfin	<i>Galeorhinus zyopterus</i>	GF
shark, spiny dogfish	<i>Squalus acanthias</i>	GF
shark, swell	<i>Cephaloscyllium ventriosum</i>	
shark, thresher	<i>Alopias vulpinus</i>	HM
shark, thresher bigeye	<i>Alopias superciliosus</i>	HM*
shark, thresher pelagic	<i>Alopias pelagicus</i>	HM*
shark, white	<i>Carcharodon carcharias</i>	HM
shark/ray egg cases	Elasmobranch	
sheephead, California	<i>Semicossyphus pulcher</i>	NS
skate, big	<i>Raja binoculata</i>	GF
skate, California	<i>Raja inornata</i>	GF
skate, longnose	<i>Raja rhina</i>	GF
skate, sandpaper	<i>Bathyraja interruptus (Raja kincaidii)</i>	
skate, starry	<i>Raja stellulata</i>	
smelt, delta	<i>Hypomesus transpacificus</i>	
smelt, longfin	<i>Spirinchus thaleichthys</i>	
smelt, night	<i>Spirinchus starksi</i>	
smelt, surf	<i>Hypomesus pretiosus</i>	
smelt, whitebait	<i>Allosmerus elongatus</i>	
sole, bigmouth	<i>Hippoglossina stomata</i>	
sole, butter	<i>Pleuronectes isolepis</i>	GF
sole, C-O	<i>Pleuronichthys coenosus</i>	
sole, curlfin	<i>Pleuronichthys decurrens</i>	GF
sole, dover	<i>Microstomus pacificus</i>	GF

## Appendix D. Marine Fisheries Managed by the State

Fishes Common Name	Scientific Name	FMP <sup>1</sup>
sole, English	<i>Pleuronectes vetulus</i>	GF
sole, fantail	<i>Xystreurus liolepis</i>	
sole, flathead	<i>Hippoglossoides elassodon</i>	GF
sole, petrale	<i>Eopsetta jordani</i>	GF
sole, rex	<i>Errex zachirus</i>	GF
sole, rock	<i>Pleuronectes bilineatus</i>	GF
sole, sand	<i>Psettichthys melanostictus</i>	GF
sole, slender	<i>Lyopsetta exilis (Eopsetta exilis)</i>	
sole, unspecified	Pleuronectiformes	
steelhead (rainbow trout)	<i>Oncorhynchus mykiss</i>	S
stickleback, threespine	<i>Gasterosteus aculeatus</i>	
stingray	Dasyatidae	
stingray, round	<i>Urolophus halleri</i>	
sturgeon, green	<i>Acipenser medirostris</i>	
sturgeon, white	<i>Acipenser transmontanus</i>	
sunfish, ocean	<i>Mola mola</i>	HM*
surfperch, barred	<i>Amphistichus argenteus</i>	
surfperch, black (perch)	<i>Embiotoca jacksoni</i>	
surfperch, calico	<i>Amphistichus koelzi</i>	
surfperch, dwarf (perch)	<i>Micrometrus minimus</i>	
surfperch, island	<i>Cymatogaster gracilis</i>	
surfperch, kelp (perch)	<i>Brachyistius frenatus</i>	
surfperch, pile (perch)	<i>Rhacochilus vacca</i>	
surfperch, pink (seaperch)	<i>Zalemnius rosaceus</i>	
surfperch, rainbow (seaperch)	<i>Hypsurus caryi</i>	
surfperch, redbtail	<i>Amphistichus rhodoterus</i>	
surfperch, reef (perch)	<i>Micrometrus aurora</i>	
surfperch, rubberlip (seaperch)	<i>Rhacochilus toxotes</i>	
surfperch, sharpnose (seaperch)	<i>Phanerodon atripes</i>	
surfperch, shiner (perch)	<i>Cymatogaster aggregata</i>	
surfperch, silver	<i>Hyperprosopon ellipticum</i>	
surfperch, spotfin	<i>Hyperprosopon anale</i>	
surfperch, striped (seaperch)	<i>Embiotoca lateralis</i>	
surfperch, walleye	<i>Hyperprosopon argenteum</i>	
surfperch, white (seaperch)	<i>Phanerodon furcatus</i>	
swordfish	<i>Xiphias gladius</i>	HM
thornback	<i>Platyrrhinoidis triseriata</i>	
thornyhead, longspine	<i>Sebastolobus altivelis</i>	GF
thornyhead, shortspine	<i>Sebastolobus alascanus</i>	GF
tilapia, Mozambique	<i>Tilapia mossambica</i>	
tomcod, Pacific	<i>Microgadus proximus</i>	
tonguefish, California (tongue sole)	<i>Symphurus atricauda</i>	
topsmelt	<i>Atherinops affinis</i>	
tuna, albacore	<i>Thunnus alalunga</i>	HM
tuna, bigeye	<i>Thunnus obesus</i>	HM
tuna, bluefin	<i>Thunnus thynnus</i>	HM
tuna, skipjack	<i>Katsuwonus pelamis</i>	HM

## Appendix D. Marine Fisheries Managed by the State

Fishes		
Common Name	Scientific Name	FMP <sup>1</sup>
tuna, skipjack black	<i>Euthynnus lineatus</i>	HM*
tuna, yellowfin	<i>Thunnus albacares</i>	HM
turbot, diamond	<i>Hypsopsetta guttulata</i>	
turbot, hornyhead	<i>Pleuronichthys verticalis</i>	
turbot, spotted	<i>Pleuronichthys ritteri</i>	
whitefish, ocean	<i>Caulolatilus princeps</i>	
whiting, Pacific (Pacific hake)	<i>Merluccius productus</i>	GF
wrasse, rock	<i>Halichoeres semicinctus</i>	
yellowtail	<i>Seriola lalandi</i>	
zebraperch	<i>Hermosilla azurea</i>	

\* species included in plan if it becomes targeted or significant bycatch, discard, or incidental catch

### <sup>1</sup> Fishery Management Plan (agency)

CP=Coastal Pelagic Species (PFMC)

GF=Groundfish (PFMC)

HM=Highly Migratory Species (PFMC)

NS=Nearshore Fishery (DFG)

S=Salmon (PFMC)

WS=White Seabass (DFG)

PFMC=Pacific Fishery Management Council

DFG=California Department of Fish and Game

## Appendix D. Marine Fisheries Managed by the State

Invertebrates Common Name	Scientific Name	FMP <sup>1</sup>
abalone, black	<i>Haliotis cracherodii</i>	AB
abalone, flat	<i>Haliotis walallensis</i>	AB
abalone, green	<i>Haliotis fulgens</i>	AB
abalone, pink	<i>Haliotis corrugata</i>	AB
abalone, pinto	<i>Haliotis kamtschatkana</i>	AB
abalone, red	<i>Haliotis rufescens</i>	AB
abalone, threaded	<i>Haliotis assimilis</i>	AB
abalone, white	<i>Haliotis sorenseni</i>	AB
amphipod	Amphipoda	
anemone	Coelenterata	
barnacle, acorn	<i>Balanus nubilus</i> , <i>B. aquila</i>	
barnacle, gooseneck	<i>Pollicipes polymerus</i>	
barnacle, stalked	<i>Pollicipes spp.</i>	
chione, banded	<i>Chione californiensis</i>	
chione, smooth	<i>Chione fluctifraga</i>	
chione, wavy	<i>Chione undatella</i>	
chiton	Polyplacophora	
clam, California jackknife	<i>Tagelus californianus</i>	
clam, common littleneck	<i>Protothaca staminea</i>	
clam, common Washington	<i>Saxidomus nuttalli</i>	
clam, gaper	<i>Tresus nuttalli</i> , <i>Tresus capax</i>	
clam, geoduck	<i>Panopea generosa</i>	
clam, Japanese littleneck	<i>Tapes japonica</i> , <i>T. philippinarum</i>	
clam, northern quahog	<i>Mercenaria mercenaria</i>	
clam, northern razor	<i>Siliqua patula</i>	
clam, Pismo	<i>Tivela stultorum</i>	
clam, rosy razor	<i>Solen sicarius</i>	
clam, rough-sided littleneck	<i>Protothaca laciniata</i>	
clam, softshell	<i>Mya arenaria</i>	
clam, thin-shelled littleneck	<i>Protothaca tenerrima</i>	
cockle, basket	<i>Clinocardium nuttalli</i>	
coral	Coelenterata	
cowrie, chestnut	<i>Cypraea spadicea</i>	
crab, box	<i>Lopholithodes foraminatus</i>	
crab, brown rock	<i>Cancer antennarius</i>	
crab, California king	<i>Paralithodes californiensis</i>	
crab, California hermit	<i>Pagurus spp.</i> , <i>Isochelis sp.</i>	
crab, claws	<i>Cancer spp.</i> , <i>Loxorhynchus grandis</i>	
crab, dungeness	<i>Cancer magister</i>	
crab, fiddler	<i>Uca crenulata</i>	
crab, forknose king	<i>Paralithodes rathbuni</i>	
crab, king	<i>Paralithodes spp.</i>	
crab, pelagic red	<i>Pleuroncodes planipes</i>	
crab, red rock	<i>Cancer productus</i>	
crab, sand (mole crab)	<i>Emerita analoga</i>	
crab, sheep	<i>Loxorhynchus grandis</i>	
crab, shore	<i>Pachygrapsus crassipes</i>	
crab, slender	<i>Cancer gracilis</i>	

## Appendix D. Marine Fisheries Managed by the State

Invertebrates Common Name	Scientific Name	FMP <sup>1</sup>
crab, tanner	<i>Chionoecetes tanned</i>	
crab, umbrella	<i>Cryptolithodes stichensis</i>	
crab, yellow rock	<i>Cancer anthonyi</i>	
cucumber, California sea	<i>Parastichopus californicus</i>	
cucumber, sea	Holothuroidea	
cucumber, warty sea	<i>Parastichopus parvimensis</i>	
gorgonians	Gorgonacea	
invertebrate, colonial	Cnidaria, Porifera	
jellyfish	<i>Pelagia spp.</i>	
limpet, owl	<i>Lottia gigantea</i>	
limpet, unspecified	Archaeogastropoda	
lobster, California spiny	<i>Panulirus interruptus</i>	
mantis shrimp, blueleg	<i>Hemisquilla ensigera</i>	
mussel	<i>Mytilus galloprovincialis</i> , <i>M. trossulus</i> , <i>M. californianus</i>	
nudibranch, hermissenda	<i>Hermisenda crassicornis</i>	
nudibranch, lion's mouth	<i>Melibe leonina</i>	
nudibranch, shagg rug	<i>Aeolidia papillosa</i>	
nudibranch, spanish shawl	<i>Flabellinopsis iodinea</i>	
octopus, two-spot	<i>Octopus bimaculoides</i> , <i>O. bimaculatus</i>	
octopus, unspecified	<i>Octopus spp.</i>	
ophistobranch	Ophistobranchia	
oyster, unspecified	Ostreidae	
polychaete	Polychaeta	
prawn, golden	<i>Penaeus californiensis</i>	
prawn, ridgeback	<i>Sicyonia ingentis</i>	
prawn, spot	<i>Pandalus platyceros</i>	
rock, live	Invertebrata	
sand dollar	<i>Dendraster spp.</i>	
scallop, rock	<i>Crassadoma gigantea</i>	
scallop, speckled (bay)	<i>Argopecten aequisulcatus</i>	
sea hare, black	<i>Aplysia vaccaria</i>	
sea hare, California	<i>Aplysia californica</i>	
sea pansy	<i>Renilla kollikeri</i>	
sea pen	Pennatulacea	
sea slug	Opisthobranchia	
shrimp, bay	<i>Crangon franciscorum</i> , <i>C. nigricauda</i> , <i>C. nigromaculata</i> , <i>Palaemon macrodactylus</i>	
shrimp, blue mud	<i>Upogebia pugettensis</i>	
shrimp, brine	<i>Artemia salina</i>	
shrimp, coonstriped	<i>Pandalus danae</i>	
shrimp, ghost	<i>Callinassa californiensis</i> , <i>Callinassa affinis</i> , <i>C. gigas</i>	
shrimp, Pacific ocean (pink shrimp)	<i>Pandalus jordani</i>	
shrimp, red rock	<i>Lysmata californica</i>	
snail, moon	<i>Polinices spp.</i>	
snail, sea	Gastropoda	
snail, three-winged murex	<i>Pteropurpura trialata</i>	
snail, trivia	<i>Trivia solandri</i> , <i>T. californiana</i>	
shell, top	Trochidae, Turbinidae, <i>Tegula spp.</i>	

## Appendix D. Marine Fisheries Managed by the State

Invertebrates Common Name	Scientific Name	FMP <sup>1</sup>
shell, wavy top	<i>Astraea undosa</i>	
spider, sea	Pycnogonida	
sponge	Porifera	
squid, Humboldt (jumbo squid)	<i>Dosidicus gigas</i>	
squid, market	<i>Loligo opalescens</i>	CP*
star, brittle	Ophiuroidea	
star, sea	Asteroidea	
tunicate	Urochordata	
urchin, purple sea	<i>Strongylocentrotus purpuratus</i>	
urchin, red sea	<i>Strongylocentrotus franciscanus</i>	
urchin, white sea	<i>Lytechinus anamesus</i>	
whelk, kellet's	<i>Kelletia kelletii</i>	
worm, feather-duster	<i>Eudistylia polymorpha</i>	
worm, marine	Polychaeta	

<sup>1</sup> Management Plan (agency)

AB =Abalone (DFG)

CP =Coastal Pelagic Species (PFMC). \* Monitored species only. Pacific Fishery Management Council has deferred management of squid to the State as long as management is consistent with federal regulations.



**Appendix D. Marine Fisheries Managed by the State**

Algae		
Common Name	Scientific Name	FMP
kelp, bull	<i>Nereocystis spp.</i>	
kelp, giant	<i>Macrocystis spp.</i>	
sea palm	<i>Postelsia palmaeformis</i>	
	Chlorophyta	
	<i>Fucus spp.</i>	
	<i>Gelidium</i>	
	<i>Gigartina</i>	
	<i>Gloiopeltis</i>	
	<i>Gracliaria</i>	
	<i>Laminaria</i>	
	<i>Mastocarpus</i>	
	<i>Mazaella (Iridaea)</i>	
	<i>Monostrema</i>	
	Phaeophyta	
	<i>Porphyra</i>	
	<i>Pterocladia</i>	
	<i>Rhodoglossum</i>	
	Rhodophyta	
	<i>Sarcodiotheca</i>	
	Spermatophyta	
Vascular Plants		
Common Name	Scientific Name	
eelgrass	<i>Zostera marina</i>	
surfgrass	<i>Phyllospadix spp.</i>	

## Appendix E. Management Authority for California's Marine Fisheries (by Species)

### A. Species for which the Commission has complete management authority

#### 1. Sport fisheries only (all sections refer to Title 14)

Anchovy (all species; section 27.60 c)  
Barracuda, California (section 28.25)  
Bass, Striped (section 27.85)  
Bonito, Pacific (section 28.32)  
Butterfish (Pacific pompano; section 27.60 c)  
Clams (gaper, Washington, geoduck, littleneck, soft shell, chiones, quahogs, cockles, Pismo, razor; sections 29.20-29.45)  
Crab (Dungeness and all other species of the *Cancer* genus; section 29.85)  
Eel grass, surf grass, sea palm (section 30.10)  
Flounder, starry (section 27.60 c)  
Grunion (section 28.00)  
Grouper (Gulf and broomtail; section 28.12)  
Halibut, California (section 28.15)  
Halibut, Pacific (section 28.20)  
Jacksmelt (section 27.60 c)  
Lobster (section 29.90)  
Mackerel (jack, Pacific; section 27.60 c)  
Marlin (all species; section 28.50)  
Moon snail (section 29.71)  
Queenfish (section 27.60 c)  
Sanddabs (all species; section 27.60 c)  
Sardine, Pacific (section 27.60 c)  
Scallop (rock, speckled; sections 29.60, 29.65)  
Sculpin (Pacific staghorn; section 27.60 c)  
Shark, (blue, thresher, shortfin mako, soupfin, sixgill, sevengill, leopard (sections 27.60 b, 28.56)  
Smelt (surf, night, day, whitebait; section 28.45)  
Squid (all species; section 29.70)  
Sturgeon (all species; section 27.90)  
Surfperch (shiner; section 27.60 c)  
Swordfish (section 28.40)  
Topsmelt (section 27.60 c)  
Tuna (albacore, bluefin, skipjack; section 27.60 c)  
Whitefish, ocean (section 28.58)  
Yellowtail (section 28.37)

and all other species not specifically listed in either Title 14 or Fish and Game Code (Title 14 sections 27.56, 27.60 c, 29.05, 30.00; FGC section 200)

2. Sport and Commercial fisheries (Management authority for sport and commercial fisheries does not mean that both fisheries currently exist for that particular species.)

Abalone (all species; Title 14 section 29.15, 100; FGC sections 5220-5222)  
Bass (kelp, barred sand, spotted, giant sea; Title 14 sections 28.30, 28.10; FGC sections 8586, 8587.1)  
Blacksmith (FGC sections 8586, 8587.1)  
Croaker, black (FGC sections 8586, 8587.1)  
Eel, (monkeyface-prickleback, California moray, wolf; FGC sections 8586, 8587.1)  
Garibaldi (Title 14 section 28.05; FGC sections 8586, 8587.1)  
Goby (blackeye, bluebanded; FGC sections 8586, 8587.1))  
Greenling (rock, painted; Title 14 section 28.29; FGC sections 8586, 8587.1)

Halfmoon (FGC sections 8586, 8587.1)  
Herring (Pacific, round; Title 14 sections 27.60, 163-163.5; FGC section 8550)  
Herring eggs (Title 14 sections 28.60, 164; FGC section 8389)  
Kelp and other aquatic plants (all species; Title 14 sections 30.00, 165-165.5; FGC section 6653)  
Kelpfish (giant, island; FGC sections 8586, 8587.1)  
Mussels (California sea, bay; Title 14 section 29.55, 115; FGC section 8344)  
Opaleye (FGC sections 8586, 8587.1)  
Ray, Pacific electric (FGC sections 8586, 8587.1)  
Salema (FGC sections 8586, 8587.1)  
Sargo (FGC sections 8586, 8587.1)  
Sculpin, buffalo (FGC sections 8586, 8587.1)  
Seabass, white (Title 14 sections 28.35, 155; FGC section 7071)  
Sea urchins (all species; Title 14 section 120.7; FGC section 9054).  
Senorita (FGC sections 8586, 8587.1)  
Shark (basking, horn, swell; FGC sections 8586, 8587.1, 8599.4)  
Sheephead, California (Title 14 section 28.26; FGC sections 8586, 8587.1)  
Shrimp and prawns (bay shrimp, blue mud shrimp, coonstripe shrimp, ghost shrimp, Pacific ocean shrimp, red rock shrimp, golden prawn, ridgeback prawn, and spot prawn; Title 14 sections 29.86-29.88, 120, 120.3, 120.6, 180.1; FGC sections 8591, 8842)  
Surfperch (black perch, dwarf perch, kelp perch, pile perch, rainbow seaperch, reef perch, rubberlip seaperch, striped seaperch; FGC sections 8586, 8587.1)  
Tidal invertebrates (barnacles, chiones, cockles, sand crabs, limpets, mussels, sand dollars, octopuses, shrimp, sea hares, starfish, worms, and native oysters; Title 14 section 123; FGC section 8500).  
Whitefish, ocean (FGC sections 8586, 8587.1)  
Wrasse, rock (FGC sections 8586, 8587.1)

B. Species for which the Legislature has complete management authority

1. Commercial fisheries only

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

and all other species not specifically listed in either Title 14 or Fish and Game Code (FGC 8140) and not primarily inhabiting rocky reef or kelp habitat in nearshore waters.

C. Species for which the Commission has limited management authority (commercial fisheries)

Anchovy (Title 14 section 147; FGC sections 7708, 8183, 8780.1). Authority limited to reduction permit and use of bait nets only. Anchovy managed under Pacific Fishery Management Council (PFMC) Coastal Pelagic Species FMP.

Goby (chameleon, yellowfin), midshipman (plainfin), mudsucker (longjaw), sculpin (Pacific staghorn); (Title 14 section 119). Authority limited to take by trawl nets inside of Golden Gate Bridge.

Groundfish (Title 14 section 189; FGC 8403). Authority limited to adopting regulations not in conflict with federal groundfish regulations. Groundfish managed under PFMC Groundfish FMP. Species include: cabezon; cod (Pacific); finescale codling; flounder (arrowtooth, starry); greenling (kelp); grenadier (Pacific rattail); lingcod; ratfish; all rockfishes of the genus *Sebastes*; sanddab (Pacific); sablefish; scorpionfish (California); shark (leopard, soupfin, spiny dogfish); skate (big, California, longnose); soles (butter, curlfin, dover, English, flathead, petrale, rex, rock, sand); thornyhead (longspine, shortspine); whiting (Pacific (hake));

Lobster (Title 14 section 121-122; FGC sections 8254, 8259). Authority limited to issuance and revocation of permits, and establishment of permit conditions. Season and size restrictions in Fish and Game Code.

Mackerel, Pacific (Title 14 section 148; FGC 8411, 8412). Authority limited to conforming regulations to FMP. Authority limited to issuance and revocation of permits, and establishment of permit conditions. Pacific mackerel managed under PFMC Coastal Pelagic Species FMP.

Pelagic Sharks (Title 14 106; FGC sections 8561-8577). Authority limited to issuance and revocation of drift gill net permits. Several pelagic sharks and other species are being addressed in a PFMC Highly Migratory Species FMP currently being developed<sup>a</sup> (see below).

Salmon (Title 14 sections 27.80, 182-183; FGC sections 7652, 8210-8226). Authority limited to conforming regulations to FMP. Salmon managed under PFMC Salmon FMP.

Sardine (Title 14 section 157; FGC sections 8150.7, 8780.1). Authority limited to conforming regulations to FMP, importation of sardines for bait, and use of bait nets. Sardine managed under PFMC Coastal Pelagic Species FMP.

Sea Cucumber (FGC section 8405.3). Authority effective until 1/1/03.

Squid (Title 14 section 149; FGC section 8425). Authority effective until 1/1/04. Squid listed under PFMC Coastal Pelagic Species FMP but is a monitored species only. Pacific Fishery Management Council has deferred management of squid to the State as long as management is consistent with federal regulations.

Swordfish (Title 14 section 106,107; FGC section 8394, 8561-8577). Authority limited to issuance and revocation of drift gill net permits. Authority for management of hand-held hook and line and harpoon fishery. Swordfish are being addressed in a PFMC Highly Migratory Species FMP currently being developed.

\*\*\*\*\*

<sup>a</sup> The following species are included in a Draft Highly Migratory Species FMP currently being developed. These finfishes would be under management authority of the PFMC: dolphin fish; escolar\*; louvar\*; bullet mackerel\*; marlin (striped); opah\*; sunfish (ocean)\*; shark (basking\*, blue, salmon\*, shortfin mako, thresher, bigeye thresher, pelagic thresher, white); swordfish; tuna (albacore, bigeye, bluefin, skipjack, black skipjack\*, yellowfin).

\* denotes species that would be included in the plan if they become targeted or significant bycatch, discard, or incidental catch.

## **Appendix F. Management Authority for California's Marine Fisheries (by Gear)**

### **A. Complete management authority under the Commission**

Fin fish taken in traps (FGC section 8403)

Experimental gear fisheries (FGC section 8606)

Trawl net fisheries in waters inside the Golden Gate Bridge (FGC section 8832); including shrimps, oriental gobies, longjaw mudsucker, plainfin midshipman, and staghorn sculpin

Possession of trawl nets in specified waters (FGC section 8833)

Powered equipment to take crustaceans and molluscs (suction dredges on mud flats) (FGC section 9053)

Bait nets (8780.1)

### **B. Complete management authority under the Legislature**

Nets (FGC section 8601)

Areas closed to gill and trammel nets by the Marine Resources Protection Act of 1990 (FGC sections 8610-8610.16)

Purse, seine, and roundhaul nets (FGC sections 8623-8626)

Nets in Districts (FGC sections 8660-8665)

Gill and trammel nets (FGC sections 8680, 8685)

Incidental take of swordfish and marlin (FGC section 8684)

Salmon, steelhead, and striped bass taken in gill and trammel nets (FGC sections 8685.5-8685.7)

Drift gill nets in districts 6-10 (FGC sections 8687)

Gill nets in districts 11-13 (FGC section 8688)

Rockfish and lingcod in gill nets (FGC sections 8691-8692.5)

Use of nets in districts 17, 18, 19, 20A (FGC sections 8693-8694)

Gill nets west of Pt. Reyes Headlands (FGC section 8696)

Trammel nets (FGC sections 8720-8725)

Roundhaul nets (FGC sections 8750-8757)

Beach nets (FGC sections 8800-8807)

Trawl nets (FGC sections 8830-8840, 8843)

Dip nets (FGC section 8870)

Baited hoop nets (FGC section 8890)

## Appendix G. List of Fishes, Invertebrates, and Algae Used in the Prioritization Approaches

Fishes	
Common Name	Scientific Name
barracuda, Pacific	<i>Sphyræna argentea</i>
bass, barred sand	<i>Paralabrax nebulifer</i>
bass, kelp	<i>Paralabrax clathratus</i>
bass, spotted sand	<i>Paralabrax maculatofasciatus</i>
bonito, Pacific	<i>Sarda chiliensis</i>
butterfish (Pacific pompano)	<i>Peprilus simillimus</i>
corbina, California	<i>Menticirrhus undulatus</i>
croaker, spotfin	<i>Roncador stearnsi</i>
croaker, white	<i>Genyonemus lineatus</i>
croaker, yellowfin	<i>Umbrina roncadore</i>
eel, California moray	<i>Gymnothorax mordax</i>
eel, wolf	<i>Anarrhichthys ocellatus</i>
goby, bluebanded	<i>Lythrypnus dalli</i>
grunion, California	<i>Leuresthes tenuis</i>
guitarfish, shovelnose	<i>Rhinobatos productus</i>
hagfish	<i>Eptatretus spp.</i>
halfmoon	<i>Medialuna californiensis</i>
halibut, California	<i>Paralichthys californicus</i>
herring, Pacific	<i>Clupea pallasii</i>
jacksmelt	<i>Atherinopsis californiensis</i>
mudsucker, longjaw	<i>Gillichthys mirabilis</i>
mullet, striped	<i>Mugil cephalus</i>
opaleye	<i>Girella nigricans</i>
perch, black	<i>Embiotoca jacksoni</i>
perch, pile	<i>Rhacochilus vacca</i>
perch, shiner	<i>Cymatogaster aggregata</i>
queenfish	<i>Seriphus politus</i>
ray, bat	<i>Myliobatis californica</i>
ray, Pacific electric	<i>Torpedo californica</i>
sanddab, longfin	<i>Citharichthys xanthostigma</i>
sargo	<i>Anisotremus davidsoni</i>
sculpin, Pacific staghorn	<i>Leptocottus armatus</i>
seaperch, rainbow	<i>Hypsurus caryi</i>
seaperch, rubberlip	<i>Rhacochilus toxotes</i>
seaperch, striped	<i>Embiotoca lateralis</i>
seaperch, white	<i>Phanerodon furcatus</i>
shad, American	<i>Alosa sapidissima</i>
shark, brown smoothhound	<i>Mustelus henlei</i>
shark, gray smoothhound	<i>Mustelus californicus</i>
shark, horn	<i>Heterodontus francisci</i>
shark, Pacific angel	<i>Squatina californica</i>
shark, sevengill	<i>Notorynchus cepedianus</i>
shark, sixgill	<i>Hexanchus griseus</i>
smelt, night	<i>Spirinchus starksi</i>
smelt, surf	<i>Hypomesus pretiosus</i>
smelt, whitebait	<i>Allosmerus elongatus</i>
sole, fantail	<i>Xystreurus liolepis</i>
stingray, round	<i>Urolophus halleri</i>
surfperch, barred	<i>Amphistichus argenteus</i>

## Appendix G. List of Fishes, Invertebrates, and Algae Used in the Prioritization Approaches

Fishes	
Common Name	Scientific Name
surfperch, calico	<i>Amphistichus koelzi</i>
surfperch, redbtail	<i>Amphistichus rhodoterus</i>
surfperch, silver	<i>Hyperprosopon ellipticum</i>
surfperch, walleye	<i>Hyperprosopon argenteum</i>
thornback	<i>Platyrhinoidis triseriata</i>
tomcod, Pacific	<i>Microgadus proximus</i>
topsmelt	<i>Atherinops affinis</i>
turbot, diamond	<i>Hypsopsetta guttulata</i>
whitefish, ocean	<i>Caulolatilus princeps</i>
yellowtail	<i>Seriola lalandi</i>

## Appendix G. List of Fishes, Invertebrates, and Algae Used in the Prioritization Approaches

Invertebrates	
Common Name	Scientific Name
chione, banded	<i>Chione californiensis</i>
chione, smooth	<i>Chione fluctifraga</i>
chione, wavy	<i>Chione undatella</i>
clam, California jackknife	<i>Tagelus Californianus</i>
clam, common littleneck	<i>Protothaca staminea</i>
clam, common Washington	<i>Saxidomus nuttalli</i>
clam, gaper	<i>Tresus nuttalli, T. capax</i>
clam, Japanese littleneck	<i>Tapes japonica</i>
clam, northern quahog	<i>Mercenaria mercenaria</i>
clam, northern razor	<i>Siliqua patula</i>
clam, Pismo	<i>Tivela stultorum</i>
clam, rough-sided littleneck	<i>Protothaca laciniata</i>
clam, softshell	<i>Mya arenaria</i>
clam, thin-shelled littleneck	<i>Protothaca terrima</i>
crab, brown rock	<i>Cancer antennarius</i>
crab, dungeness	<i>Cancer magister</i>
crab, red rock	<i>Cancer productus</i>
crab, sand (mole crab)	<i>Emerita analoga</i>
crab, slender	<i>Cancer gracilis</i>
crab, spider	<i>Loxorhynchus spp.</i>
crab, tanner	<i>Chionoecetes tanned</i>
crab, yellow rock	<i>Cancer anthonyi</i>
cucumber, sea	<i>Holothuroidea</i>
geoduck	<i>Panopea generosa</i>
hermissenda	<i>Hermissenda crassicornis</i>
limpet, giant (owl)	<i>Lottia gigantea</i>
lobster, California spiny	<i>Panulirus interruptus</i>
mussel	<i>Mytilus spp.</i>
octopus, two-spot	<i>Octopus bimaculoides, O. bimaculatus</i>
prawn, golden	<i>Penaeus californiensis</i>
prawn, ridgeback	<i>Eusicyonia ingentus</i>
prawn, spot	<i>Pandalus platyceros</i>
scallop, rock	<i>Crassadoma gigantea</i>
scallops, speckled (bay)	<i>Argopecten aquiscalatus</i>
sea star	<i>Astroidea</i>
shrimp, bay	<i>Crangon franciscorum, C. nigricauda, C. nigromaculata, Palaemon macrodactylus</i>
shrimp, bluemud	<i>Upogebia pugettensis</i>
shrimp, ghost	<i>Callinassa californiensis</i>
shrimp, Pacific ocean	<i>Pandalus jordani</i>
shrimp, red rock	<i>Lysmata californica</i>
snail, moon	<i>Polinices spp.</i>
shell, top	<i>Tegula spp.</i>
shell, wavy top	<i>Astraea undosa</i>
sponges	<i>Porifera</i>
tunicate	<i>Urochordata</i>
urchin, purple sea	<i>Strongylocentrotus purpuratus</i>
urchin, red	<i>Strongylocentrotus franciscanus</i>
whelk, kellek's	<i>Kelletia kelletii</i>
Algae	
kelp, giant	<i>Macrocystis pyrifera</i>
kelp, bull	<i>Nereocystis luetkeana</i>



## Appendix H. Prioritization Approach A Used to Identify Top Finfishes for Fishery Management Plans

Species of greater concern are identified by evaluating their exploitation history in combination with their productivity. Exploitation history was based on the amount and trends of sport and/or commercial landings over the past 20 years, taking into consideration effort, market conditions, regulations, oceanographic conditions, and other factors.

A species' productivity was determined by comparing several of its life history parameters to the following table (modified from Musick et al., 2000):

<u>Parameter</u>	<b>Productivity Category</b>			
	<u>High</u>	<u>Medium</u>	<u>Low</u>	<u>Very Low</u>
r (yr-1)	>0.5	0.16-0.50	0.05-0.15	<0.05
von Bertalanffy k	>0.3	0.16-0.30	0.05-0.15	<0.05
Fecundity (yr-1)	>10 <sup>3</sup>	10 <sup>2</sup> -10 <sup>3</sup>	10 <sup>1</sup> <10 <sup>2</sup>	<10
Age at maturity	<1 yr	2-4 yr	5-10 yr	>10 yr
Maximum age	1-3 yr	4-10 yr	11-30 yr	>30 yr

where:

r (yr-1)= the intrinsic rate of increase of the population.

von Bertalanffy k = a growth equation constant indicating the rate of growth approaching maximum size.

fecundity (yr-1)= the number of eggs or offspring produced per year.

age at maturity= the age at which the species first becomes sexually mature.

maximum age= the life span of a species.

A species was classified according to the lowest productivity category for which data were available.

Those species that had low or very low productivity for one or more of the parameters, along with declining landings trends were identified as species of greatest concern.

## **Appendix I. Prioritization Approach B Used to Identify Top Finfishes for Fishery Management Plans**

Each of the following 18 questions are scored from 0-3. If an answer to a question is not known, it is given a score of one.

1. Special habitat need: Does the species depend on habitats that are especially susceptible to damage or loss at any life stage? If not, assign zero points for this criterion. If so, is that habitat subject to episodic variability (e.g. kelp habitat loss during El Niño events), long term damage (e.g. human disturbance of intertidal areas, pollution), or permanent loss (e.g. filling of bays and estuaries)? If the species has a special habitat need, but that habitat has not been altered, assign zero points. If the habitat has been altered, assign 1,2, or 3 points as specified below):

- 0** - no special need
- 1** - episodic variability (1 to 5 years)
- 2** - long term damage (over 5 years)
- 3** - permanent loss

2. Migrational vulnerability: Is the species residential or does the species aggregate in areas where it is more vulnerable to harvest? This could include spawning aggregations or returns to predictable areas.

- 0** - no special vulnerability
- 3** - vulnerability exists at some stage

Special characteristics: Does the species possess certain characteristics making it more vulnerable to over fishing?

3. Does the species experience high mortality upon capture and release?

- 0** - no
- 3** - yes

4. Does the species change sex? (i.e. removing larger, older individuals may change the sex ratio of the population)

- 0** - no
- 3** - yes

5. Does the species have a low fecundity? (less than 100 embryos per spawning event)

- 0** - no
- 3** - yes

6. Does the species mature late? (based on age at 50% maturity for females)

- 0** - 0 to 2 years
- 1** - 3 to 5 years
- 2** - 6 to 10 years
- 3** - over 10 years

7. Is the species long-lived?

- 0 - 0 to 2 years
- 1 - 3 to 10 years
- 2 - 11 to 20 years
- 3 - over 20 years

8. Distribution range: How large or small is the species' distribution?

- 1 - Pacific or Eastern Pacific
- 2 - California (northern and/or southern)
- 3 - Localized (small part of northern or southern California)

9. Recruitment potential: What type of recruitment best characterizes the species?

- 0 - strong and steady
- 1 - capable of large boom years
- 2 - moderate or not sure
- 3 - low but steady

10. Ocean conditions: Is the species susceptible to large scale (in space and time) oceanographic changes that affect primary productivity, such as warming and cooling episodes?

- 1 - little or no impact
- 2 - moderate or possible impact
- 3 - high impact

11. Changes in ex-vessel prices in commercial fishery: This criterion is defined as average ex-vessel price per pound over the past five years (1995-1999) divided by the average ex-vessel price over the past 20 years (1980-1999), expressed as a decimal fraction and adjusted for inflation.

- 0 - decrease, no change, or not taken
- 1 - increase by 1.01 to 1.20
- 2 - increase by 1.21 - 1.50
- 3 - increase by more than 1.50

Example:  $\frac{\text{Adjusted ave. price 1995-99 } \$3.50}{\text{Adjusted ave. price 1980-99 } \$2.75} = 1.27 = 2 \text{ points}$

12. Sport ranking: Average rank in recreational harvest for the past twenty years, based on Recfin data (Marine Recreational Fishery Statistics Survey):

- 0 - not taken
- 1 - bottom 1/3 of ranks
- 2 - middle 1/3 of ranks
- 3 - top 1/3 of ranks

13. Increases or decreases in commercial landings: This criterion is defined as the average commercial landings over the past five years divided by the average over the past 20 years, expressed as a percent.

- 0** - no increase, no decrease, or not taken
- 1** - increase to 101 - 120%, or decrease to 80 - 99%
- 2** - increase to 121 - 150%, or decrease to 50 - 79%
- 3** - increase to >150%, decrease to <50%

14. Increases or decreases in sport landings: This criterion is defined as the average sport landings over the past five years divided by the average over the past 20 years, expressed as a percent.

- 0** - no increase, no decrease, or not taken
- 1** - increase to 101 - 120%, or decrease to 80 - 99%
- 2** - increase to 121 - 150%, or decrease to 50 - 79%
- 3** - increase to >150%, decrease to <50%

15. Special commercial harvest limitations: Does the species have a commercial quota, trip limits, or zero commercial take allowed?

- 0** - no special limit
- 3** - special limit exists

16. Special sport harvest limitations: Is there a sport fishing bag limit less than the 10-fish standard single species limit?

- 0** - no special limit
- 3** - special limit exists

17. Additive take: How many fisheries actively take the species?

- 1** - single (sport or commercial)
- 2** - sport and commercial
- 3** - multiple fisheries within sport or commercial

18. What is the level of conflict among users?

- 0** - none or little
- 3** - high

**Appendix J. California Marine Fisheries Requiring Logbooks**

Logbook name	Targeted species
Dive	Sea urchins and sea cucumbers
General/Drift gill net	Sharks, swordfish, California halibut, and white seabass
Swordfish/Harpoon	Swordfish
Daily Trap	Spot prawn and sablefish
Shrimp/Prawn Trawl	All prawns and shrimp (including spot prawn, ridgeback prawn, golden prawn, pink shrimp); sea cucumbers
Lobster	California spiny lobster
Market Squid Vessel	Market squid
Market Squid Light Boat	Market squid
Bay Shrimp	Bay shrimp
Commercial Passenger Fishing Vessel	All species
Washington-Oregon-California Trawl	California halibut and groundfish
Live Bait*	Sardines and anchovy

\* required only if load contains sardines

## **Appendix K. Principles of Public Involvement**

Public involvement provides an opportunity for all potentially affected and interested parties to become informed about and involved in the process of developing and implementing Fishery Management Plans (FMPs) and research plans. Public involvement also ensures that decision-makers are better informed when making management decisions. It provides a process for obtaining a wide range of perspectives and information that helps ensure that FMPs and research plans are thorough, well-rounded and effective. Public involvement early in the process can provide decision-makers with advance notice of the public's concerns and potentially reduce delays in the approval process. To help ensure effective involvement and achieve these benefits, adherence to the following principles is important:

### **1. Timeliness and Efficiency**

- a. Purposes and goals of public involvement should be clearly defined and communicated in a timely manner.
- b. Public involvement should begin at the initial planning stages so that opportunities for input can be clearly identified and appropriately scheduled in the planning process.
- c. Public involvement should be planned in such a way that the circumstances and facts are presented and conveyed in a manner that allows the public to determine how best to participate.
- d. Formats for public involvement should be tailored to meet the needs of each situation.
- e. The public should be informed of what decisions the participation process can affect and how that particular process can affect them.

### **2. Equity and Inclusiveness for all of the public**

- a. The Department of Fish and Game (DFG) should seek to communicate effectively with the full range of the public and use methods that involve diverse groups.
- b. The DFG should recognize the public's potential economic limitations in participating and provide opportunities that equalize participation and support needs and economic requirements of different individuals and groups.
- c. The DFG should apply active, innovative methods in order to offer comparable opportunities for informing, educating and consulting with varied members of the public to achieve broad and equitable participation.
- d. When appropriate, the DFG should use several types of meetings to provide a more equitable opportunity for public involvement. Notice of such meetings will provide information on how the public can participate and any restrictions that may apply.

### **3. Accessibility**

- a. The DFG should conduct its business in an open way.
- b. The DFG should make all relevant documents available for public review.
- c. Documents to be discussed at meetings should be made available to all interested persons with enough time to allow them to review the documents.
- d. Records of meetings with the public should be kept. The summary report of a meeting should include recommendations made, may be available on the Marine Life Management Act (MLMA) web page, and may be provided upon request.

### **4. Accountability and Evaluation**

- a. The DFG should have clear objectives for public participation established in advance of meetings.
- b. The DFG will provide the public with information on possible next steps and decisions that need to be taken by the DFG regarding specific subject areas that the public will be discussing.
- c. The DFG will inform the public how and when their comments will be considered in the ongoing activities of the DFG.
- d. The DFG will evaluate the effectiveness of public involvement processes to allow for continuous improvement of those processes by obtaining both internal and external comments and suggestions.

**Appendix L. California Commercial Marine Fisheries Using a Restricted Access Program**

Fishery	Species	Who establishes management authority (FMP)
Salmon	Coho, chinook, and pink salmon	PFMC (Salmon)
Herring	Pacific herring	Commission
Coastal pelagics	Northern anchovy, Pacific sardine, jack mackerel, Chub (Pacific) mackerel, market squid <sup>a</sup>	PFMC (Coastal Pelagic Species)
Nearshore finfish	Cabezon, monkeyface-eel (prickleback), kelp greenling, rock greenling, rockfishes (black-and-yellow, China, gopher, grass, kelp), California scorpionfish, California sheephead	Commission <sup>b</sup> (Nearshore)
Dungeness crab	Dungeness crab	Legislature
Cucumber <sup>c</sup>	California sea cucumber, warty sea cucumber	Commission
Lobster	California spiny lobster	Legislature
Spot prawn <sup>d</sup>	Spot prawn	Commission
Pink shrimp	Pacific ocean shrimp	Commission
Urchin	Purple sea urchin, red urchin	Commission
Finfish trap	All finfish south of Point Arguello	Commission
Drift gill net	Highly migratory species (e.g. sharks and swordfish)	PFMC (Highly Migratory Species)
Set gill net <sup>e</sup>	Nearshore species (e.g. white seabass and California halibut)	Legislature

<sup>a</sup> Limited entry pending; This is a monitored species only. PFMC has deferred management of squid to the State as long as management is consistent with federal regulations.

<sup>b</sup> Management authority pending

<sup>c</sup> Trawl fishery for California sea cucumbers and dive fishery for warty sea cucumbers

<sup>d</sup> Begins 2002/03

<sup>e</sup> No new permits are being issued

PFMC=Pacific Fishery Management Council

## **Appendix M. Definitions and Descriptions of Public Involvement Terms**

**Arbitration** - A process in which the parties voluntarily submit their case to a neutral party for decision, often resulting in negotiating a tailored set of rules of procedure which all parties agree to follow.

**Arbitrator** - A person that hears presentations of the facts and make recommendations (binding or non-binding) as to settlement.

**Consensus** - Everyone understands, can live with, and supports the decision. Consensus only works with a clear fall-back decision-making process. The power of consensus comes from agreement among all of those who might differ or block. Consensus decisions may be self implementing and may need less monitoring than a mediated agreement.

**Consensus building** - Refers to a range of processes used to foster dialogue, clarify areas of agreement and disagreement, and resolve controversial issues. Voluntary processes in which the participants seek a mutually acceptable resolution of their differences.

**Conciliation** - Consists of the attempt by a neutral party, generally with no stake in the dispute, to communicate separately with disputing parties for the purpose of reducing tensions and agreeing on a process for resolving the issues.

**Dispute resolution** - Method that focuses on structuring incentives to deal with differences in interests or values and on improved communication between parties in order to better identify options that satisfy these different interests and values.

**Facilitation** - A process to increase the potential for dialogue and productivity in public meetings, informal workshops, and consensus building processes.

**Facilitator** - The role of the facilitator is to help keep the discussion on topic, encourage participation by everyone, maintain a constructive tone, and summarize areas of agreement or disagreement, as needed.

**Joint fact-finding** - A process to help deal with the technical complexity of issues and scientific uncertainty, where this creates obstacles to agreement (parties discuss what factual questions they believe to be relevant to the decision, exchange information, identify where they agree and where they disagree, and negotiate an approach for seeking additional information, either to fill the gaps or to resolve areas of disagreement). A process in which parties agree on the design of a scientific model or scientific study in advance.

**Mediation** - Involves the assistance of a neutral third party in the negotiation process. However, a mediator, unlike a judge, has no power to direct the parties. Instead, the mediator helps parties reach their own agreement. Mediation can take various forms, depending on the decision to be made and the stage of the dispute.

**Mediator** - The role of the mediator is to assist the settlement or agreement-seeking process. A person with no stake in the outcome of the dispute.

**Negotiation** - Is a process in which parties meet face to face to reach a mutually acceptable resolution of competing interests. Negotiation, broadly defined, is common in all aspects of our lives and for all kinds of conflicts. Negotiations are often difficult processes to organize and conduct effectively, especially when they involve resource management issues, which are both politically and technically complex. The large number of parties, disagreements about the facts, and other complicating factors often create circumstances in which parties question the appropriateness of negotiation, give up, or reach impasse.



**Negotiator** - The role of the negotiator is to help parties convene negotiations, to prevent impasse during the negotiations, and to assist parties to continue when their discussions have broken down.

## **Appendix N. Dispute Resolution Process for Fishery Management Plans**

The Marine Life Management Act (MLMA) requires the Department of Fish and Game (DFG) to prepare dispute resolution processes appropriate to each element in the marine life and fishery management process (Section 7059). The DFG's goal is to limit disputes by providing meaningful, and constructive public involvement from the early stage of deciding which fisheries need management plans through the development, implementation, and amendment of those plans. Disputes, however, are inevitable in any process. People need to recognize that underlying conflicts should not be avoided. Without understanding and accepting their differences, people cannot jointly solve problems.

Major obstacles hinder dispute resolution processes for marine fisheries management. In many cases, user groups are extremely broad-based. Conflicts between different groups, such as sport fishing, commercial fishing, and environmental, are compounded by differences within each group. Individuals within a group may ally themselves based on gear types, fishing locations, or various other reasons.

In many cases, it is physically difficult to reach all concerned parties due to their sheer numbers. While it is relatively simple to reach coordinated and organized public groups, individuals who are not affiliated with a group can be overlooked. These individuals, if left out of the dispute resolution process, may not feel bound to agree with management decisions and may seek action after an FMP and regulations are enacted. We cannot "alter the basic fact that many of the interests of participating parties are inherently competitive and that often one party's interests can only be satisfied at the expense of another's" (Burgess and Burgess, 1994). In other words, it is impossible to fulfill everyone's needs and reach consensus without compromise.

A formal dispute resolution process recognizes underlying differences between members of the public and may help them reach consensus. Consensus processes require that all involved parties must agree to a decision for it to move forward. This does not necessarily mean the decision is the favored one for all parties, but one that is acceptable and fair. In a consensus decision there is no majority vote and each member's concerns must be addressed. If any member of the process cannot accept a decision, they are required to state their concerns and offer a constructive solution that addresses their concerns while recognizing those of other members.

The dispute resolution process should recognize all parties' needs and differences early on and treat them fairly in the final management decisions. The formal dispute resolution process outlined here will seek binding agreement from all parties. This should not only limit future conflict but increase compliance with regulations. Both of these results should reduce costs in time and money to the DFG and result in better management of the state's resources.

The DFG's intent is to limit disputes through effective public involvement, as required by the MLMA. Dispute resolution, however, may be necessary to meet the concerns of one or more affected parties. The following preliminary recommendations will help determine if a formal process should continue.

### Determination of applicability of dispute resolution

The DFG must consider whether issues are suitable for, or require negotiated dispute resolution. Consensus-based negotiation of an issue must not countermand the DFG's primary mission and responsibilities. Many factors are involved in this determination including: suitability of issues, ripeness for decision, time available, political climate and especially the nature of past or current controversies among the interest groups. The following factors should be met in the initial screening before proceeding with dispute resolution: (a) The issues are identifiable and negotiable; (b) The various interest groups are identifiable and willing to openly discuss the issues; (c) The issues are sufficiently developed so parties are reasonably informed and willing to negotiate; (d) The outcome is genuinely in doubt (if parties are willing to compromise, without a formal process, time should be spent on more pressing issues); (e) Appropriate time is made available to successfully complete the negotiations; and (f) Possible outcomes do not countermand the DFG's primary mission and responsibilities.

If the factors above are met, the DFG must prepare for the dispute resolution process. This preparation includes decisions on the DFG's role in the process, the desired outcome (consensus, majority, or recommendation to higher authority) and the proposed participants.

### Willingness to participate

In order for the dispute resolution process to be credible and legitimate, representatives from all parties involved or affected by the decision must agree to participate. Representation may take the form of a single representative from each group. In this case, however, the DFG must be certain that the representative is acceptable to the group they are expected to represent. A group may not participate, so long as they do not object to the process continuing without their direct input. The acceptance of the process is critical so that the final decision is credible. If a group is not willing to participate and will not support the process, the final decision must include input on their concerns and differences.

Before beginning, the DFG should actively seek participation from interested parties. This includes not only the public and consumptive users, but also other government agencies. The involvement of outside agencies may be critical to successfully resolving disputes and implementing the chosen decisions. The burden of assuring that participants have the ability to voice concerns falls on the DFG. While this does not mean the DFG must financially support participants, it does mean that meetings and activities should be planned with all participants in mind.

It is critical that the DFG itself is willing to participate. Clear endorsement of the process should be sought from the DFG Directorate before proceeding. This endorsement will ensure that not only the proper staff and funding are provided for the dispute resolution process, but that the final outcome will not be changed at a higher level. Support of the process will encourage concerned parties to participate fully and work toward an agreement.

### Agreement to format

While the basic needs of dispute resolution processes can be outlined, the actual format of individual processes will vary. All participants in the process should be involved in developing and agreeing to the final format. This format should include objectives, ground rules and facilitation. The DFG should ensure that any facilitator is acceptable to the participants and accountable to the group. If it is determined that formal facilitation is necessary, the facilitator must be a neutral party. It is preferable that all participants share in selection of the facilitator. If this is not practicable, the participants must formally endorse the chosen facilitator. If the facilitator does not serve the group as a whole, or becomes partisan in the discussion, the participants must have the right to replace him/her.

If an outside facilitator is contracted for a dispute resolution, the decision should be made early enough so they can participate in the pre-negotiation assessment and planning. Participants must be made aware of the fact that facilitators may be paid through the DFG and accept their neutrality. Selection criteria should be based on experience, skill, ability and acceptability to participants.

Finally all participants must commit to an agreement. If the involved parties do not believe their decision will be binding, they will not feel the need to participate fully. The end decision will have more validity if the parties involved agree to abide by the final outcome.

### Formulating Ground Rules for Agreement Seeking Process\*

Ground rules usually address the following issues:

1. The purpose and scope of the process.
2. Participation: roles of agency staff; whether participation of alternates is permissible; provision for inclusion of new parties; observers; public participation; other interested parties.
3. The roles of participants: whether all participants will have equal status.
4. Decision rules: the meaning of consensus or majority as well as what will happen if consensus is not reached. It is also important for participants to know if they are making a recommendation that may be changed, or whether their decision will be final.
5. The end product gaining ratification; what the agency will do with the agreement; the degree of commitment by participants to abide by the agreement.
6. Understandings about participants' activities in other proceedings: whether "good faith" participation will constrain the activities of participants or their constituents in other forums, such as a legislative session, administrative hearing, or judicial proceeding.
7. Responsibilities of representatives: keeping their constituencies informed and gaining ratification of agreements reached at the negotiating table.
8. Informing those not at the table: who will be kept informed of progress and how this will happen.

9. Organization and conduct of the meetings: agendas; record keeping; responsibilities of the facilitator.
10. Selection and removal of the facilitator: the role of participants in the selection, evaluation and/or payment of a mediator or facilitator. Provision for replacing the facilitator if the participants feel he or she is biased or ineffective.
11. Withdrawal of a participant: If a participant withdraws, everyone left at the table should determine whether the process can go forward. If the participants want some other default procedure, they should agree to it beforehand and include it in the protocols.
12. Communications with the media: how this will occur; whether a chosen spokesperson will be referred to for all communications; how the other participants will be informed.
13. The timetable or schedule.
14. Provisions for the use of caucuses.
15. Information: provisions for sharing of information; confidentiality of data.

\*Adapted from: Bourne, et al. 1997.

### **Dispute resolution process**

If it is determined that a formal dispute resolution process is necessary and applicable, the following guidelines will be used. It should be noted that each individual process will necessarily be different and these guidelines are only a starting point.

#### Information gathering

Often data concerns are at the core of disputes among the public. Much of the fisheries information used by the DFG is collected in ongoing programs and will likely be valuable for dispute resolution processes. If, however, other critical information is needed, it should be collected in an open manner, so that all involved parties understand and accept the methods. Not only should the DFG gather information itself, but it should seek all sources of advice and assistance. By involving the disputing parties in information gathering and actively seeking information from other sources, the DFG will fulfill its portion of a cooperative process.

The scope of information gathering should not be so great as to hinder the process. If new data is not available, the process should continue using the best available sources. It is important, however, to consider all available sources. The validity of available data can be assured in the review and oversight steps of the process. The DFG should not make judgements on the validity of outside data without consultation, review and oversight from qualified scientists.

#### External review and oversight

Data gathered for a dispute resolution process should be handled in a similar, if not more critical, manner than all other data. This includes review by the public and scientific peers. Depending on the level of controversy, it may be useful to establish a data review panel, consisting of qualified members from the scientific community. Review panels should be accepted by all parties involved to ensure credibility of their findings. If a panel is not necessary, all data should be peer reviewed either during or prior to the process, to insure its validity. If a review panel or peer review deems any data unacceptable, the finding should be clearly stated and available to participants in the process, as well as the general public.

Public review is also necessary, but should not supercede scientific review. Within the data gathering and review process the public should be made aware of the available data. This will allow concerned parties to input other data, if available, or to suggest sources of new data.

#### Public presentation of data

Formal presentation of the final data gives participants, the DFG, and the public the ability to assimilate it before negotiations begin. This presentation may be made through a variety of methods. If public meetings are used, they should be easily accessible to all interested parties, have early announcement and a clear structure. Data presentations should be clearly separate from discussions of

solutions or formal scoping. The data collection and oversight process should be reviewed and reasons for rejecting certain data, if any, described.

Other methods may be used to distribute data. Because of the separation of data presentation and option development, this may be more appropriate than actual public meetings. It must be assured, however, that all participants agree to the method used and that a sincere effort to inform the public at large is made.

#### Option development and professionally mediated consensus building

The DFG must be clear in its role in a dispute resolution process and make this role clear to the assembled representatives. A formal dispute resolution process differs from normal scoping, input, and decision-making in that the preferred option will be determined by the group as a whole. The substantive agreement of the group should be used as the basis for the preferred management option. The assembled representatives must agree to use the gathered data and negotiate openly. If a representative disagrees with the preferred alternative, they must explain their reasoning and offer an alternative. The level of initial commitment is important to ensure agreement with the final decision. Participants must feel bound by the group's decision to encourage honest input and avoid future dispute.

This phase of the process will rely heavily on neutral facilitation and mediation. For consistency it is important to involve any professional facilitators early in the process. This includes involvement during the planning stages to assist in public analysis, identifying issues, and convening an appropriate public panel. It is the facilitator or mediator's role to keep the negotiation focused, productive and moving forward. It is desirable to have the person who assisted in convening the group serve as the continuing facilitator, as they will have developed rapport and credibility with the group.

Option development must be based on the gathered and reviewed data, each party's interests, including the DFG's, and the agreed scope of issues. While other processes and management should be considered and incorporated, the final agreement must focus on the issues at hand.

#### Consensus-based management decisions

At the completion of a consensus-based dispute resolution the final agreement should have the support of all participants. It is important to recognize this consensus and the information and negotiation used to form it. The DFG, as an active participant, must also agree with the consensus decision. When agreement is reached, the DFG will publish the consensus-based option as the preferred alternative. If total agreement is not reached in the time allotted, the DFG will publish the most acceptable option as preferred along with any opposing options as secondary. In this case, the overall value of dispute resolution will be lessened, but not completely lost. As long as the concerns of each participant are clearly displayed and related to the facts, an informed decision can be made. Consensus, however, should be strived for as the ultimate goal.

Management based on a consensus will benefit from higher compliance and less controversy upon implementation. Affected parties will be more likely to accept management measures when they have actively participated in their formulation. Savings in time and costs will be achieved by lessening future disputes.

## Appendix O. Comments Received and Response to Comments

Comment A: Alan M. Grant; September 25, 2001

The listing of nudibranchs in Appendix D is incomplete and should include many other species. These species should be included in any list of important marine species worth preserving.

Response A: Appendix D is a list of marine fisheries managed by the state and includes all species for which there has been take or harvest (past or present). This list does not include all species found in California waters, or attempt to address the incredible biodiversity of our marine species and their preservation. We recognize the incredible diversity of nudibranchs but list only four that have regulations regarding their take for aquaria purposes; it is illegal to take all other nudibranchs.

Comment B: Bob Osborne; United Anglers of southern California; August 24, 2001

The issue of allocation should be addressed in the Marine Life Management Act Master Plan as this would provide direction and consistency between all fishery management plans.

Response B: The Master Plan has addressed allocation by identifying the issue and suggesting a framework be developed to provide guidance. This framework would involve extensive public consultation and involvement of an ad hoc committee to address the issues and develop potential policy options for the Commission. The Commission would decide whether an allocation policy would be placed in the Master Plan or reside as a separate document.

Comment C: Chris Miller; Lobster Fisherman; October 8, 2001

1)The list of collaborators in the section on ecosystem management and habitat considerations (2.5.5) should include fisheries scientists, resource economists, and ocean monitoring experts.

2)"...this section on ecosystem management needs some mention of the need for a holistic goal and an assessment of the goals being applied to method and practice."

3)The draft seems to be perpetuating the dichotomy of ecosystem management and fishery management. The current approach is fragmented and lacking in its vision for our future.

4)To the end of a more defined goal of sustainable fisheries that are ecosystem based, It is critical that fishermen embrace a fundamental concept of building a framework for professionalism in their trade that needs to be brought to and integrated into the master plan.

Response C: 1)The Master Plan mentions the need for collaboration with marine and ecological scientists and other interested persons. Although not mentioning them by name, this includes fishery scientists, resource economists, ocean monitoring experts, and any other interested persons.

2)The Master Plan mentions the need to establish ecosystem guidelines for inclusion in FMPs. These guidelines would naturally have defined goals with methods to assess their success. This is a very important area that requires considerable public input and the establishment of an advisory committee. As soon as these guidelines are developed, they will be incorporated into the Master Plan and FMPs.

3)The Master Plan's intention was to point out that the DFG is committed to ecosystem management, and is striving to achieve this. However, this is a long-term process that will require substantially more public input and collaboration with ecosystem experts. At present, there is still much needed information on individual species for fishery management that would also be useful for ecosystem management.

4)We agree. Fishermen need to participate considerably in the establishment of ecosystem management goals and the guidelines to be included in future versions of the Master Plan and FMPs.

## References

Bourne, G., C. Carlson, J. Arthur, H. Bellman, D. Dalton, M. Elliott, J. Kunde, M. Lewis, C. McEwen, S. Goulet, C. Pou and W. Warfield. 1997. Best practices for government agencies: Guidelines for using collaborative agreement-seeking processes. Society of Professionals in Dispute Resolution. Washington, D.C.

Burgess, G. and H. Burgess. 1994. Environmental mediation: Beyond the limits applying dispute resolution principles to intractable environmental conflicts. Working Paper 94-50. Conflict Research Consortium, University of Colorado at Boulder. Boulder, CO.

California Code of Regulations, Title 14, Natural Resources. 1999. Barclay's Law Publishers, Chicago, IL. 382 p.

California Fish and Game Code. 2000. Lexis Law Publishing, Charlottesville, VA. 553 p.

CERES (California Environmental Resources Evaluation System). California Department of Fish and Game, <http://www.ceres.ca.gov/catalog>.

Langton, R.W. and R.L. Haedrich. 1997. Ecosystem-based management. Pages 153-158 in: J. Boreman, B.S. Nakashima, J.A. Wilson and R.L. Kendall (eds.) *Northwest Atlantic Groundfish: Perspectives on a Fishery Collapse*. American Fisheries Society, Bethesda, Maryland.

Likens, G. 1992. An Ecosystem Approach: Its Use and Abuse. Excellence in Ecology, Book 3. Ecology Institute, Oldendorf/Luhe Germany.

Musick, J.A., M.M. Harbin, S.A. Berkeley, G.H. Burgess, A.M. Eklund, L. Findley, R.G. Gilmore, J.T. Golden, D.S. Ha, G.R. Huntsman, J.C. McGovern, S.J. Parker, S.G. Poss, E. Sala, T.W. Schmidt, G.R. Sedberry, H. Weeks, and S.G. Wright. 2000. Marine, Estuarine, and Diadromous Fish Stocks at Risk of Extinction in North America (Exclusive of Pacific Salmonids). *Fisheries* 25(11):6-30.

Pauly, D., V. Christensen, J. Dalsgaard, R. Froese, and F. Torres Jr. 1998. Fishing down marine food webs. *Science* 279:860-863.

Weber, M.L. and B. Heneman. 2000. Guide to California's Marine Life Management Act. Common Knowledge Press, Bolinas, California. 133 p.

## Glossary of Terms and Abbreviations

**Adaptive management** – In regard to a marine fishery, is 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.

**Bycatch** – Fish or other marine life that are taken in a fishery but which are not the target of the fishery. Bycatch includes discards.

**Cohort** – A group of fish spawned during a given period, usually within a year.

**Commission** – Fish and Game Commission.

**Depressed** - In regard to a marine fishery, means the condition of a fishery for which the best available scientific information, and other relevant information that the Commission or DFG possesses or receives, indicates a declining population trend has occurred over a period of time appropriate to that fishery. With regard to fisheries for which management is based on maximum sustainable yield, or in which a natural mortality rate is available, "depressed" means the condition of a fishery that exhibits declining fish population abundance levels below those consistent with maximum sustainable yield.

**Discards** – Fish that are taken in a fishery, but are not retained because they are of an undesirable species, size, sex, or quality, or because they are required by law not to be retained.

**Essential fishery information (EFI)** – In regard to a marine fishery, means 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 according to the requirements of this code.

**Fishery** – One of the following:

(a) One or more populations of marine fish or marine plants that may be treated as a unit for purposes of conservation and management and that are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics.

(b) Fishing for or harvesting of the populations described in (a).

**Marine living resources** – Includes all wild mammals, birds, reptiles, fish, and plants that normally occur in or are associated with salt water, and the marine habitats upon which these animals and plants depend for their continued viability.



**Maximum sustainable yield (MSY)** – In regard to a marine fishery, means the highest average yield over time that does not result in a continuing reduction in stock abundance, taking into account fluctuations in abundance and environmental variability.

**Optimum yield (OY)** – In regard to a marine fishery, means the amount of fish taken in a fishery that does all of the following:

(a) Provides the greatest overall benefit to the people of California, particularly with respect to food production and recreational opportunities, and takes into account the protection of marine ecosystems.

(b) Is the maximum sustainable yield of the fishery, as reduced by relevant economic, social, or ecological factors.

(c) In the case of an overfished fishery, provides for rebuilding to a level consistent with producing maximum sustainable yield in the fishery.

**Overfished** – In regard to a marine fishery, means both of the following:

(a) A depressed fishery.

(b) A reduction of take in the fishery is the principal means for rebuilding the population.

**Overfishing** – A rate or level of taking that the best available scientific information, and other relevant information that the Commission or DFG possesses or receives, indicates is not sustainable or that jeopardizes the capacity of a marine fishery to produce the maximum sustainable yield on a continuing basis.

**Participants** – In regard to a fishery, means the sport fishing, commercial fishing, and fish receiving and processing sectors of the fishery.

**Population or stock** – A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

**Restricted access** – In regard to a marine fishery, means 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.

**Sustainable, sustainable use, and sustainability** – In regard to a marine fishery, mean both of the following:

(a) Continuous replacement of resources, taking into account fluctuations in abundance and environmental variability.

(b) Securing the fullest possible range of present and long-term economic, social, and ecological benefits, maintaining biological diversity, and, in the case of fishery management based on maximum sustainable yield, taking in a fishery that does not exceed optimum yield.