MARINE PROTECTED AREAS "NEED CRITERIA" FOR THE MONTEREY BAY NATIONAL MARINE SANCTUARY

In the summer of 2007, the Monterey Bay National Marine Sanctuary (MBNMS, Sanctuary) initiated a process to consider criteria and thresholds that would define the need for marine protected areas (MPAs) in Federal waters of the sanctuary for additional resource protection. The Council was approached as a stakeholder in the process (see Agenda Item I.1.a, Attachment 1), which was scheduled for conclusion by February 15, 2008. A letter from the Council's Executive Director was sent December 11, 2007 noting that discussions between Sanctuary and Council representatives had yet to occur, and suggested a process by which the Council could consider this question at one of the spring 2008 Council meetings (Agenda Item I.1.a, Attachment 2). The Council received a letter dated February 11 from the Alliance of Communities for Sustainable Fisheries (ACSF), a Monterey, California-based group which advocates for the heritage and economic value of fishing to California coastal communities, requesting that the Sanctuary and the Council (SAC) review a variety of reports and analyses on the subject (Agenda Item I.1.e, Attachments 1 through 8).

In a March 19, 2008 letter to the Council (Agenda Item I.1.b, Attachment 1), MBNMS Superintendent, Mr. Paul Michel, is seeking Council advice on ways the Council and MBNMS can collaborate in this effort. He attached a February 15, 2008 letter to the MBNMS MPA Workgroup and the SAC (Agenda Item I.1.b, Attachment 2), that characterizes in general terms the rationale and criteria behind a determination that MPA are needed. The three principal needs are stated in the letter as follows: "1) There is a need for areas where the natural ecosystem structure and function are restored and maintained; 2) there is a need for research areas to examine human impacts to the marine environment; and 3) there is a need to preserve some areas in their natural state for future generations." Council staff understands this decision has been characterized as similar to the Council decision of September 2000 that MPAs be considered as a tool for Council action to address six prioritized objectives adopted in June 2000 (Agenda Item I.1.a, Attachment 3). In a supporting letter to the SAC, also dated February 15, 2008 (Agenda Item I.1.b, Attachment 3), Mr. Michel provides a list of concepts for a potential process for establishing MPAs in the MBNMS and a draft time line for such a process that includes additional coordination with the Council and the National Marine Fisheries service in the summer of 2009.

At the March, 2008 Council meeting, the Council scheduled review by the Scientific and Statistical Committee (SSC) of scientific papers in the ACSF request, and requested NOAA General Counsel review the legal analysis in the ACSF request. The SSC is scheduled to review these materials on Tuesday, April 8 (see Ancillary F, SSC Agenda).

At this meeting, the Council should take into account statements of the SSC and other Council advisory bodies and public testimony, and consider providing advice to the MBNMS on criteria and thresholds in identifying a need for MPAs in federal waters of the MBNMS. Further, the Council may wish to provide guidance on future collaboration with the MBNMS on their MPA consideration process.

Council Action:

Provide Council comments on the "Need Criteria" for MPAs provided by the MBNMS and provide guidance on future collaboration with MBNMS.

Reference Materials:

1. Agenda Item I.1.a, Attachment 1: July 26 email from Mr. Paul Michel to Mr. Rod McInnis, Dr. Donald McIsaac, and Mr. Mark Helvey, with attached letter of same date, both describing a process to identify the need for MPAs in Federal waters of the MBNMS.
2. Agenda Item I.1.a, Attachment 2: December 11, 2007 letter from Dr. Donald McIsaac to Mr. Paul Michel regarding scheduling input from the Council on determining the need for MPAs in federal waters of the MBNMS.
3. Agenda Item I.1.a, Attachment 3: Excerpts from September 2000 Council Minutes and "*Marine Reserves to Supplement Management of West Coast Groundfish Resources, Phase I Technical Analysis, February, 2001*."
4. Agenda Item I.1.b, Attachment 1: March 19, 2008 cover letter from Mr. Paul Michel to the Council.
5. Agenda Item I.1.b, Attachment 2: February 15, 2008 letter from Mr. Paul Michel to the MPA Working Group and the Sanctuary Advisory Council conveying rationale and criteria for the need for MPAs.
6. Agenda Item I.1.b, Attachment 3: February 15, 2008 letter from Mr. Paul Michel to the Sanctuary Advisory Council including concepts and a draft timeline for the MPA process.
7. Agenda Item I.1.e, Attachment 1: February 11, 2008 cover letter from Mr. Emerson to MR. Paul Michel presenting the analyses conducted on behalf of ACFS.
8. Agenda Item I.1.e, Attachment 2: Summary of the ACFS reports and analyses.
9. Agenda Item I.1.e, Attachment 3: October 10, 2007 memorandum from Mr. Walsh to ACSF regarding legal guidance on MBNMS authority.
10. Agenda Item I.1.e, Attachment 4: Socioeconomic report to ACFS.
11. Agenda Item I.1.e, Attachment 5: MPAs and Research Needs report to ACFS.
12. Agenda Item I.1.e, Attachment 6: Report on fishery management in the MBNMS to ACSF.
13. Agenda Item I.1.e, Attachment 7: Report on ecosystem consequences of MPAs to ACSF.
14. Agenda Item I.1.e, Attachment 8: National Marine Sanctuary staff report "*State and Federal Laws, Regulations, and Programs other than those of the State Department of Fish and Game and Pacific Fishery Management Council that Contribute to the Protection of Marine Resources."*

Agenda Order:

a. Agenda Item Overview — Mike Burner
b. MBNMS Report — Paul Michel
c. Agency and Tribal Comments
d. Reports and Comments of Advisory Bodies
e. Public Comment
f. **Council Action:** Provide Council Comments on "Need Criteria"

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Agenda Item I.1.a
Attachment 1
April 2008

Subject: Marine Protected Areas
From: Paul Michel <Paul.Michel@noaa.gov>
Date: Thu, 26 Jul 2007 16:05:26 -0700
To: Rod Mcinnis <Rod.Mcinnis@noaa.gov>, Donald McIsaac <Donald.McIsaac@noaa.gov>, Mark Helvey <Mark.Helvey@noaa.gov>
CC: William Douros <William.Douros@noaa.gov>

Rod, Mark, and Don,

One of the more pressing priority challenges I face as the new Superintendent here at MBNMS is the issue of marine protected areas in sanctuary waters. It is a complicated and controversial issue as you all very aware, but one in which the sanctuary program has an inherent interest and responsibility. Moreover, there is mounting pressure here to respond to the demand for and question of MPAs. I have been thinking about this issue a lot and have decided to initiate a process to gather input on the "need question."
I wanted to provide you with a copy of the attached letter addressed to the members of the Sanctuary's Marine Protected Areas Working Group. As you may know, over the last five years the Sanctuary has been convening a stakeholder working group to discuss the utility and potential design of MPAs. The group has made significant progress in some areas, but has not been able to come to consensus on the basic threshold issue of whether MPAs are needed. This letter lays out a process that we will be following in order to reach a decision on the need for MPAs in federal waters of the Sanctuary. In order for MBNMS/NMSP to reach a decision on need we will be meeting with groups of MPA Work Group stakeholders over the coming months, and asking for the advice of our Sanctuary Advisory Council in December. It is envisioned that we would make a decision on need at the February SAC meeting. I welcome the opportunity to meet with you anytime over the coming months to discuss MPAs and how to best communicate and coordinate on this issue. Thank You,

Paul

--
Paul E. Michel - Superintendent
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, CA 93940
Phone: (831) 647-4201
Fax: (831) 647-4250
Email: paul.michel@noaa.gov
Web: http://montereybay.noaa.gov

Letter to MPA group.pdf **Content-Type:** application/pdf
Content-Encoding: base64

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, California 93940

July 26, 2007

Dear Marine Protected Areas Working Group Member:

As you know, for the last five years the Monterey Bay National Marine Sanctuary's (Sanctuary) MPA working group has been meeting to discuss the potential for new MPAs in federal waters of the Sanctuary. We appreciate the time and effort you have given to this process. Your input has been invaluable. We have made significant progress in implementing the action plan that the working group created. This includes identifying conservation goals, compiling data, developing support tools, and analyzing particular areas of interest. Perhaps most importantly, the members of the group have gained an understanding and appreciation for the expertise and the perspectives of the others at the table. We are now however, at the point where additional progress will require further guidance, more focused discussion, and ultimately a decision on the need for MPAs in federal waters.

To date, we have focused on resource and use evaluations, which was where meaningful progress could be made. These discussions educated us all on Sanctuary habitats, resources, use patterns, and the role MPAs may play in achieving Sanctuary goals. At the last meeting in April, you were given a chance to draw on that knowledge and state your own conclusions regarding the need for new MPAs in the federal waters of the Sanctuary. That input was highly valued, but it underscored the fact that agreement on the need for MPAs in the Sanctuary is probably unattainable. In order for us to reach a conclusion on this important issue, we will be reviewing your past input and considering the possible need for additional information.

Over the next two months, we will schedule separate meetings with the working group constituents, the fishing community, environmental groups, and the science community to discuss the issue of the need for MPAs in the federal waters of the Sanctuary. We recognize that some may not feel that they fit into one of these groups and we will work to ensure that we hear these additional perspectives as well. In addition, I will be asking the Sanctuary Advisory Council (SAC) for advice on this issue during a two-day meeting in early December.

The first day of the December SAC meeting will be largely devoted to the SAC receiving input from the MPA working group members on the need for MPAs. We encourage those presenting to the SAC at this meeting to discuss the need for MPAs in the context of the National Marine Sanctuaries Act and the MPA working group's goals. The SAC

will be asked to provide its advice to the Sanctuary on the second day of the meeting. In order to facilitate SAC discussion and advice, we ask that a written summary of working group member presentations be available to circulate 10 days prior to the meeting.

With the benefit of the work conducted over the last five years, stakeholder presentations, and the SAC's advice, we will reach a decision on the need for MPAs in the federal waters of the Sanctuary. We hope to present this decision at the February SAC meeting. Should we conclude that there is a need for MPAs, the SAC will be asked for advice regarding next steps.

We will contact each of you to discuss the details of this approach and to address questions and concerns that you may have. We appreciate the contributions that each of you have made during this process and ask for your continued participation and thoughtful input. Should you have any questions please contact Huff McGonigal at 831-647-4254.

Sincerely,

Paul Michel
Superintendent

cc: Sanctuary Advisory Council Members

Pacific Fishery Management Council

7700 NE Ambassador Place, Suite 101, Portland, OR 97220-1384
Phone 503-820-2280 | Toll free 866-806-7204 | Fax 503-820-2299 | www.pcouncil.org
Donald K. Hansen, Chairman — Donald O. McIsaac, Executive Director

December 11, 2007

Mr. Paul Michel, Superintendent
National Oceanic and Atmospheric Administration
National Ocean Service
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, California 93940

Dear Mr. Paul Michel:

Thank you for your July 26, 2007 letter regarding the Monterey Bay National Marine Sanctuary's (Sanctuary) effort to determine the need for marine protected areas (MPAs) within the Sanctuary, and your phone call soon thereafter. The Pacific Fishery Management Council (Pacific Council) reviewed your letter and my briefing of your phone call at its September 10-14, 2007 meeting in Portland, Oregon. The Pacific Council agrees that determining need criteria for MPA establishment is fundamental in gaining the credibility and public confidence necessary for a successful effort. Further, they asked that I present some process suggestions when a meeting occurs on matters of substance between Sanctuary and Pacific Council representatives.

A meeting between Sanctuary and Pacific Council representatives has yet to be scheduled; we hope scheduling efforts will be successful in arranging a meeting in the near future. However, we would like to present the essence of the Pacific Council input on the process for reaching a conclusion to the need question at this time.

We understood the proposed process to include (1) gathering input from your established working group and a variety of other relevant parties, including the Pacific Council, (2) solicitation of further advice at a December Sanctuary Advisory Committee (SAC) meeting, and (3) reaching a final decision by February 2008, where it would be presented at a subsequent SAC meeting. The essence of our proposed alternative process is to expand the decision process to include the step of public review of a proposed (February) decision, before reaching any final conclusion. During such a public review stage, the Pacific Council could offer further input via the process scheduled for our March or April Pacific Council meetings. We can expand upon this concept when we meet with Sanctuary staff to discuss issues of substance.

The Pacific Council remains supportive of the general goals and objectives of the Sanctuary, appreciates the intent being included early in the process, and looks forward to continued coordination. The Pacific Council is interested in receiving an update on the findings of the Marine Protected Areas Working Group that are scheduled to be presented to the Sanctuary Advisory Committee later this month. The Pacific Council will be particularly interested in the criteria used by the Sanctuary in determining the need for MPAs as well as the science and rationale behind MPA alternatives. Additionally, the Pacific Council believes the opportunity to

review the recommendations of the SAC and any MPA alternatives developed by the Sanctuary next February will result in an improved final decision.

The Pacific Council's next two meetings are scheduled for the week of March 9, 2008 in Sacramento, California and the week of April 6, 2008 in Seattle, Washington. These two meetings represent the best opportunity for the Pacific Council to consider the results of your internal analysis of MPAs and develop relevant recommendations.

Again, the Pacific Council looks forward to coordination with the Sanctuary on this important marine resource issue.

Sincerely,

D. O. McIsaac, Ph.D.

MDB:ckm

c: Council Members
William J. Douros, National Ocean Service, Marine Sanctuaries Division
Huff McGonigal, Monterey Bay National Marine Sanctuary
Debora Streeter, Sanctuary Advisory Committee Chair

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Excerpt from September 2000 Council Minutes, Agenda Item B.1.d, Marine Reserves Phase I Consideration Report:

B.1.d. *Council Action:* Finding on Application as a Management Tool

Mr. Anderson extended his thanks for the work of the ad hoc marine reserve committee and his appreciation for the public comment on this issue. Other Council members agreed. Based on the committee's work, the public comment and the Council's deliberations, Mr. Anderson thought it overwhelmingly apparent that marine reserves should have a role in managing West Coast fisheries. He moved that the Council include marine reserves as a management tool for West Coast groundfish fisheries. Seconded by Patty Wolf. On questioning of his intent, Mr. Anderson said that based on a preliminary evaluation marine reserves should be utilized as a management tool for the Council. He also stated that the motion did not include the adoption of an option within the report. The motion is to move forward in evaluating how the tool can be used. Additional supporting technical analysis will be needed in the next phase. Mr. Coenen agreed with Mr. Anderson and noted that by moving to Phase II, the Council is not adopting something that is definitive, but is adopting concepts. Ms. Wolf supported the motion, California is already involved in marine reserves. She stated that it is important that the ad-hoc strategic plan committee strongly supported the use of marine reserves. Motion 3 passed.

Excerpt from "*Marine Reserves to Supplement Management of West Coast Groundfish Resources, Phase I Technical Analysis, February, 2001*."

1.3 Objectives

Following the recommendations of the MRC [Ad Hoc Marine Reserve Committee], the Council adopted six fishery management objectives that might be addressed by marine reserves as a supplemental tool for management of groundfish fisheries. These objectives are interlinked. The following are the objectives that marine reserves might help address, ranked in order beginning with the top priority objective.

Objective 1: Stock Rebuilding. Assist in rebuilding overfished stocks and maintaining them at productive levels.

Objective 2: Biological Productivity. Enhance long-term biological productivity.

Objective 3: Economic Productivity. Assist in achieving long-term economic production, while minimizing short-term negative economic impact on all users.

Objective 4: Insurance. Provide protection for the resource, as a hedge against the realities of management uncertainty and the effects of natural environmental variability.

Objective 5: Habitat Protection. Conserve and protect EFH [essential fish habitat].

Objective 6: Research and Education. Provide unfished areas for research that will serve as controls for assessment of the effects of long-term environmental variations and the potential habitat alterations due to fishing, and also increase our understanding of the role marine reserves may play in fishery management.

Agenda Item I.1.b
Attachment 1
April 2008

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, California 93940

March 19, 2008

Dear Members of the Pacific Fishery Management Council,

Thank you for the opportunity to share two letters I provided to the Monterey Bay National Marine Sanctuary's (MBNMS) Advisory Council (SAC) at their February 15 meeting in Half Moon Bay. I am providing these letters to the Pacific Fishery Management Council (Council) to inform you of the MBNMS's decision to consider using MPAs for additional marine resource protection and to seek the Council's advice on how to best collaboratively shape a process for identifying and assessing MPAs in the Federal waters of the Sanctuary. The MBNMS considers the Council an essential and valuable partner in managing our shared marine resources.

The main letter I submitted to the SAC summarized the three principle reasons behind the need for MPAs in the federal waters of the MBNMS: 1) to preserve especially unique and rare areas in their natural state for future generations; 2) to establish areas where natural communities and ecological processes are restored and maintained; 3) to establish research areas to better understand those natural communities and ecological processes. The second letter I presented to the SAC addressed draft process principles and timing for identifying and assessing MPAs in the Sanctuary.

While this decision comes after years of public process and stakeholder input, much work remains ahead. In the near term, MBNMS staff will be asking the SAC, the Council, and other resource managers and experts for input on how to ensure an effective and timely public process for this initiative. In addition, we welcome advice on how best to coordinate with the Council prior to engaging via formal consultation requirements under the National Marine Sanctuaries Act.

Over the long term we would like to keep the lines of communication open in our evolving partnership, from leadership to staff, to improve coordination. We are dedicated to seeking avenues of effective coordination, as exemplified by bottom contact closed areas implemented by the Council to meet shared goals and objectives to protect habitat areas within the Cordell Bank, Monterey Bay, and Channel Islands National Marine Sanctuaries.

In deciding to move ahead, the National Marine Sanctuary Program is committing to dedicate the resources necessary to fully capitalize on the community's continued input as well as to adequately understand the ecological and socioeconomic impacts of any proposed action. Any action proposed by the MBNMS to specifically designate MPAs in the Sanctuary will be accompanied with a full environmental analysis per the requirements of the National Environmental Policy Act and the Administrative Procedure Act.

The public depends on us to provide coordinated marine resource management. Thank you again for your valuable time and advice.

Sincerely,

--

Paul Michel
Superintendent

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, California 93940

February 15th, 2008

Dear Members of the MPA Working Group and Sanctuary Advisory Council,

As you know, the time has come for a decision on the need for marine protected areas (MPAs) in federal waters of the Monterey Bay National Marine Sanctuary (MBNMS). I want to begin by thanking you for contributing your perspectives and knowledge to the consideration of this important issue. Your involvement over the last five years has been invaluable to increasing our understanding of the issue. The presentations and discussions we had at the December Advisory Council meeting were especially helpful and I commend you for your thoughtful input.

The National Marine Sanctuary Program (NMSP) has broad congressional direction to protect marine ecosystems. While the scope of this mandate allows for the management flexibility needed to protect dynamic sanctuary environments, charting the best course of action often takes time and patience. This is due to both the complexity of ocean issues and the NMSP's emphasis on extensive public input. In 2001, the MBNMS solicited this input from the public as part of a review and rewrite of its management plan. Over a five year period, the MBNMS received thousands of comments, held over a hundred meetings, and with the help of the SAC, identified 26 priority action areas that represent the future of Sanctuary management. Of these 26, the highest priority was the issue of marine protected areas in the Sanctuary. Given the complexity and diversity of opinions on this topic, the MBNMS convened a multi-stakeholder working group to develop a plan for evaluating the utility and potential siting of MPAs. As the State of California was re-focusing on MPAs in state waters through the Marine Life Protection Act, the MBNMS working group focused its attention on MPAs in the Sanctuary's federal waters (beyond 3 miles).

Over the last five years MBNMS staff and the members of the MPA working group have compiled data layers, completed a resource assessment, conducted socioeconomic studies, sponsored workshops, and developed a web-based decision support tool. However, while the working group was able to compile and consider all of this information, it was not able to agree on the fundamental question of whether there is a need for MPAs in federal waters. It was the MBNMS's hope that consensus on the question of need could be reached, or that by focusing on specific areas, all sides might be able to live with particular MPA configurations. However, in the absence of consensus on this question it is the MBNMS's responsibility to consider the arguments on both sides and make a decision regarding whether to move forward with a process to propose new MPAs. To that end, in December 2007, the MPA working group members presented their arguments for and against federal water MPAs to the Sanctuary Advisory Council, which in turn gave its advice to the MBNMS. Since then, we have received about twelve thousand comments on this issue and I have continued to meet with stakeholders and partners to explain the process and solicit input.

With the benefit of the community's advice, input from partner agencies, and the last six years of consideration, the MBNMS has concluded that there is a need for MPAs in the federal waters of the Sanctuary. The following pages discuss the reasons in support of this decision.

The Role of the National Marine Sanctuaries Act (NMSA)

The NMSA is unique in that the primary purpose is to set aside nationally significant areas of the marine environment for their permanent protection and to provide comprehensive ecosystem management to achieve this goal. As such, the NMSA provides broad authority for management actions focused on the protection and conservation of the full spectrum of biological diversity at a sanctuary. It can also fill gaps in protection that other authorities, such as the Magnuson-Stevens Fishery Conservation Act (MSFCA), Marine Mammal Protection Act, or Endangered Species Act, are not able to address. Through the NMSA, Congress mandated that national marine sanctuaries be managed to maintain the habitats and ecological services of the natural assemblage of living resources that inhabit these nationally signigicant marine areas. Among the purposes and policies of the NMSA is provision of authority for comprehensive and coordinated management to maintain the natural biological communities and to protect, restore, and enhance natural habitats, populations, and ecological processes. In specifying the management of "natural biological communities," "natural assemblages of living resources," and "natural habitats," rather than focusing on species populations *per se*, Congress essentially mandated that national marine sanctuaries be managed to protect and conserve ecosystem structure and function.

The Benefits of MPAs

As has been described to the Advisory Council in the past, the MBNMS has used zoning, or spatial management, extensively since its designation in 1992. The MBNMS has zones where:

- A harmful human activity otherwise prohibited throughout the Sanctuary is allowed (motorized personal watercraft, harbor dredge disposal, jade collecting)
- A harmful human activity is specifically prohibited (shark chumming, low over-flights)

These areas have proven effective in the context of managing the Sanctuary ecosystem by restricting or otherwise managing human activities.

Scientific research has shown that carefully crafted MPAs can be effective tools for conserving the diversity of animals and plants, protecting habitats, and increasing both numbers and individual sizes of some species. Recent studies have shown that an MPA, in which the removal or alteration of marine life is prohibited or restricted, generally contains a greater abundance of species, higher diversity of species, and larger fish within its boundaries relative to similar habitats outside the protected area. These larger fish produce many more young than do smaller fish, and studies for some species have shown that their young are healthier and more likely to survive. MPAs have also been shown to be a useful tool for preventing, slowing, or reversing the degradation of ocean habitats and maintaining the diversity and abundance of species inhabiting them.

Ocean ecosystems worldwide are threatened because of pollution, overfishing, habitat destruction or coastal development. In response, many governments, scientists, conservation organizations, commercial groups and citizens are increasingly discussing the idea of establishing new, well-designed MPAs to complement existing ocean management strategies.

In the United States, both the U.S. Commission on Ocean Policy and Pew Oceans Commission recently declared that our oceans are in trouble, and are calling for MPAs to be used as a management tool to support the protection of ocean ecosystems.

Existing Spatial Management Efforts in the MBNMS

Interest in implementing a system of marine protected areas has increased in California too. In 1999, the Legislature and Governor approved the Marine Life Protection Act (MLPA) mandating the state to design and manage an improved network of marine protected areas in state waters to protect marine life and habitats, marine ecosystems, and marine natural heritage. Currently the California Resources Agency and California Department of Fish and Game are partnering with others to achieve the goals of the MLPA, with initial efforts focused on developing a MPA network for California's central coast region. In September 2007, after an intensive public processes in ocean governance, the first round of 29 new state MPAs (204 square miles) went into effect on the central coast. 27 of the 29 areas are within the MBNMS.

In the federal waters of the Sanctuary, there are other spatial management measures in place that protect Sanctuary resources from extraction. For example, in 2002, as a means of protecting depleted groundfish species such as bocaccio and canary rockfishes, the Pacific Fishery Management Council and NOAA Fisheries imposed depth-based restrictions on the trawl and non-trawl groundfish fisheries termed Rockfish Conservation Areas (RCAs). Furthermore, in June of 2006, NOAA Fisheries published the final rule designating and protecting Essential Fish Habitat (EFH) for Pacific groundfish. The action closed large areas of the west coast, primarily to bottom trawling.

However, while the existing spatial management measures in state and federal waters of the Sanctuary provide valuable protections from fishing impacts in certain habitats. Those habitats further offshore are either not adequately represented in existing MPAs, or not fully protected by the gear based restrictions associated with EFH or the temporary RCAs.

The Need for MPAs in the MBNMS

The MBNMS has three principal reasons for moving forward with MPAs in the federal waters of the Sanctuary: 1) There is a need for areas where the natural ecosystem structure and function are restored and maintained; 2) there is a need for research areas to examine human impacts to the marine environment; and 3) there is a need to preserve some areas in their natural state for future generations. Additional detail in support of these reasons is provided below. Further, the MBNMS, in consultation with NOAA Fisheries, will be releasing shortly an ecosystem analysis in support of this decision.

1) There is a need for areas where the natural ecosystem structure and function is restored and maintained.

The environmental condition of the Sanctuary is subject to major alterations that are largely due to the effects of human activities. Threats to Sanctuary resources, such as water quality or habitat complexity, fall into two general categories: 1) those that involve exploitation of resources above a certain level or threshold and 2) those that destroy or degrade marine habitats

and their associated biological communities. Exploitation includes both directed harvest and incidental take of marine life. Threats to habitat include activities leading to physical alteration, various sources of pollution, coastal development, and introduction of alien species. Many of these threats are interrelated and have cumulative impacts.

The Sanctuary ecosystem has been impacted from human activity (e.g., fishing activities) to a degree where the MBNMS believes that it is appropriate to set aside some areas in federal waters where these impacts are minimized. These impacts include altered size and age structure of fish and invertebrate species, altered habitats, altered species assemblages and biodiversity, reduced abundance, and altered ecosystem function. Where appropriate, it is envisioned MPAs in Federal waters could build off of and supplement the state MPAs established under the MLPA in the Sanctuary. While there are other management measures in place such as those under the MSFCA, their stated purpose is to manage fisheries and are not designed to provide areas where the natural ecosystem structure and function are restored and maintained throughout the Sanctuary's representative habitats.

It is important to reiterate that the primary purpose of any action taken by the MBNMS to establish MPAs in the Sanctuary is the conservation of Sanctuary ecosystem structure and function. This action would not be taken for the purpose of managing any single human activity or impact, but rather to manage for the protection of the Sanctuary ecosystem from a wide variety of existing or potentially new threats.

2) There is a need for research areas to examine human impacts to the marine environment.

Setting aside areas of the Sanctuary as MPAs can provide critical research opportunities in offshore habitats in order to more fully understand the effects of fishing and other uses on the Sanctuary environment. Even though the Sanctuary is one of the better understood marine areas in the world, there is a need to better distinguish human induced change from natural variability. In its 2001 publication entitled "Marine Protected Areas – Tools for Sustaining Ocean Ecosystems," the National Research Council characterized the need for MPAs to help understand marine ecosystems:

> *Understanding the influence of human actions on marine systems is critical to evaluating the need for and effectiveness of management actions, but differentiating between natural and anthropogenic events is extremely difficult. Any indicator of change in a system must be compared to a well-defined natural standard, or benchmark, against which the magnitude of the change can be evaluated to determine its cause and significance. Without control areas, such as MPAs, that are relatively free from human influence to compare with areas altered by human activities, explaining the sources of variability becomes even more difficult...There is a significant need for fishery-independent sampling programs that include areas closed to fishing and other activities that disturb fish populations and habitats.*

While the new MPAs in state waters do afford the opportunity to distinguish human induced change from natural variation and fluctuation, offshore habitats are not represented. These

deeper water habitats are distinct from those nearshore as is their likely response to fishing impacts. Understanding impacts in these commercially important offshore areas is not only critical to effective Sanctuary management, but is also potentially key to effective ecosystem based fisheries management.

The Marine Life Protection Act was intended in part to help the State understand the marine environment by providing the opportunity to study areas that are not directly impacted by fishing. Having comparable areas in federal waters, potentially adjacent to state MPAs, would have the benefit of not only providing a greater range of habitat types in which to study the effects of fishing, but larger contiguous areas could provide better control sites and enhanced opportunity for complementary federal and state research efforts.

3) There is a need to preserve some areas in their natural state for future generations.

Section 301(a)(4)(c) of NMSA states that the National Marine Sanctuary System will maintain for future generations the habitat, and ecological services, of the natural assemblages of living resources that inhabit national marine sanctuaries (16 U.S.C. 1431(a)(4)(c)). There are certain areas of the Monterey Bay National Marine Sanctuary environment with extraordinary features or attributes, such as habitat, biological diversity, or sensitivity, and warrant a higher level of protection than is currently provided by MBNMS regulations or those of other authorities, so that those features remain conserved for future generations in as close to a natural state as possible This rationale of "wildernesses of the sea" (areas of the marine environment that, like their counterpart on land, have inherent or intrinsic value due solely to their unique and/or exceptional qualities and receive the maximum level of protection) received strong support during the public comments periods on this process, as well as during the comment period for the Joint Management Plan Review.

In addition, affording these areas with an elevated level of protection will provide them security against currently unknown human and environmental impacts and threats that may arise in the future. Changes in technology to a wide variety of marine-dependent human activities, such as energy development, communication systems, desalination, or aquaculture often result in significant deviations from how the activity had been previously conducted. In many cases, although these technological changes occur quickly, it takes several years for their impacts to be fully understood. Although the impacts of these activities may not immediately be known, it is the NMSP's responsibility to steward our sanctuaries and to ensure, as much as possible, that they are enjoyed and appreciated by the American public in the future. Providing certain areas of the Sanctuary with elevated protection, while continuing to allow compatible uses elsewhere, furthers this goal.

Furthermore, by managing these areas with additional protections in place, the MBNMS seeks to reduce the effects of cumulative impacts from human activities or from large scale environmental changes, such as climate change that are already occurring or may occur in the future. Restricting extractive or invasive human activities in these areas is expected to limit the effects on their special qualities to only those impacts that may occur as part of environmentally-driven events. Marine protected areas, by controlling for impacts for extractive human activities, will allow the MBNMS to assess the nature and severity of these events over time.

Conclusion

While this decision comes after years of public process and stakeholder input, much work remains ahead. Over the next several months, MBNMS staff will be asking the Sanctuary Advisory Council and the Pacific Fishery Management Council for input on how best to build on the efforts of the MPA working group to ensure an effective and timely public process.
In deciding to move ahead, the NMSP is committing to dedicate the resources necessary to fully capitalize on the community's continued input as well as to adequately understand the ecological and socioeconomic impacts of any proposed action.

Any regulatory action proposed by NOAA to designate MPAs in Federal waters, whether under the NMSA, MSFCA or both, to specifically designate areas will be accompanied with a full environmental analysis per the requirements of the National Environmental Policy Act and the Administrative Procedure Act.

Thank you again for your valuable time and advice, and willingness to help chart the course.

Sincerely,

Paul Michel

Paul Michel
Superintendent

Agenda Item I.1.b
Attachment 3
April 2008

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, California 93940

February 15th, 2008

Dear Members of the Sanctuary Advisory Council:

SUBJECT: Concepts for Process for MPA Identification and Assessment

At the December 13th and 14th Sanctuary Advisory Council (SAC) meeting in Monterey, you provided your perspectives on the need for marine protected areas (MPAs) in Federal waters. That input was invaluable and I want to again thank you for your insights. Having found after careful consideration that there is a need for MPAs in Federal waters (see separate decision document), the MBNMS is now focused on the process ahead. At the December meeting, many of you also provided thoughts on how any process to move forward with MPAs should look. The attached draft list of concepts for a process builds upon what I heard from SAC members and can help define the road ahead. I would like to ask you to consider these concepts and provide preliminary input and advice at the February 15th meeting and, after a chance for further consideration, again at the April 18th meeting. In the meantime I will be meeting with NOAA Fisheries and the Pacific Fishery Management Council to receive their ideas and advice about the process for MPA identification and assessment and about how to best coordinate with them as well.

Our goal is to establish a process that builds on the hard work and time investment by the MPA working group over the last five years. Carrying on from this point with well defined parameters and timelines will help ensure that the continuing effort remains inclusive and deliberate, but is also targeted and efficient. Thank you and I look forward to your input.

Sincerely,

Paul Michel

Paul Michel
Superintendent

Concepts for a Process to Move Ahead with MPAs in the Monterey Bay National Marine Sanctuary

The following concepts are draft and are put forward by the MBNMS for consideration and feedback from the Sanctuary Advisory Council:

1. Over the last 5 years, much work has gone into the consideration of MPAs including the development of tools, products and goals. To the maximum extent possible, the process ahead should capitalize on this previous work

2. The membership of the MPA working group should remain approximately the same, although some adjustment to stakeholder representation may be warranted (i.e. add groundfish representation)

3. Science members should remain involved but serve as subject matter experts, not as stakeholders. A separate but public science panel should be convened to evaluate eventual proposals

4. Working group meetings should be professionally facilitated

5. Working group and science panel meetings should be public and any products made publicly available

6. The MPA planning process should provide for appropriate PFMC input and coordination

7. There is a need for socioeconomic study to understand the impacts of Federal water MPAs

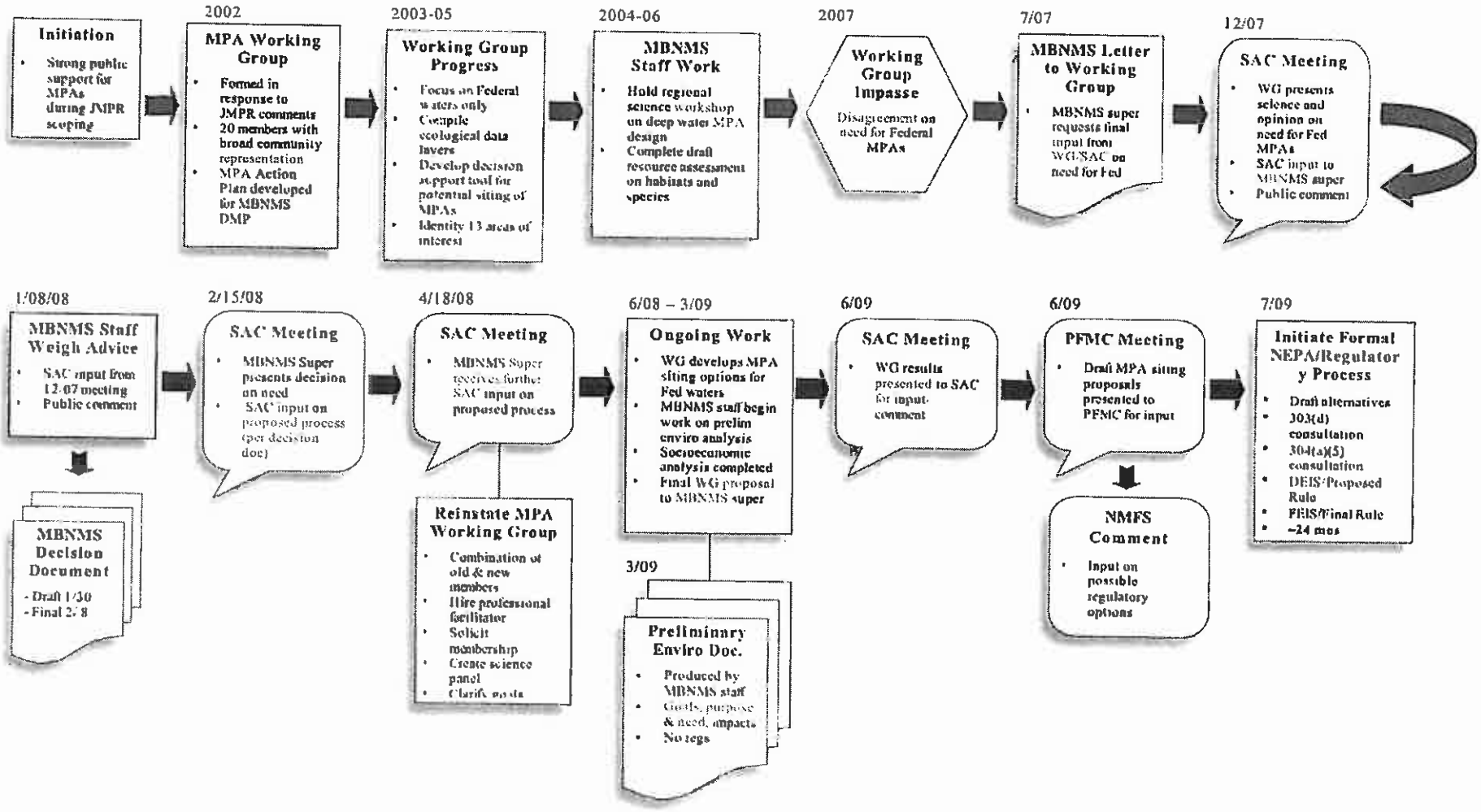
8. A starting point for discussions should be the Areas of Interest previously identified by the working group that are adjacent to MPAs in state waters

9. Adjacent State and Federal waters MPAs should generally have parallel regulations

10. Once the planning process begins, the working group will have approximately 6 meetings over 6 months to develop proposals to forward to the Sanctuary Advisory Council. The SAC will then provide it's advice to the MBNMS, and the MBNMS will consult with the PFMC regarding implementation

11. Any decision regarding how MPAs will be implemented under the NMSA, the MSA, or both will be made in the future in close coordination with NOAA Fisheries, and PFMC

DRAFT DECISION PROCESS AND TIMELINE for the MONTEREY BAY NMS CONSIDERATION OF MARINE PROTECTED AREAS



GROUNDFISH ADVISORY SUBPANEL REPORT ON MARINE PROTECTED AREA "NEED CRITERIA" FOR THE MONTEREY BAY NATIONAL MARINE SANCTUARY (MBNMS)

The Groundfish Advisory Subpanel (GAP) reviewed the many documents involved with this agenda item. The GAP believes that there are many criteria that should be considered when considering permanent closures of any area to fishing activities.

The GAP wishes to address the process that is being employed by the Sanctuary staff and advisory groups for this determination of a need. First of all, an implied final decision that marine protected areas (MPAs) are necessary is premature. Since fishing is the only activity being banned then it is a fishery management action. If a desire to alter current fishery management regulatory measures is desired then it must be done under the authority of the Pacific Fishery Management Council (Council) and National Marine Fisheries Service.

The GAP believes that the following criteria must be followed in the priority order as listed:

1. Baseline socioeconomic and ecosystem studies must be completed prior to any determinations. This must be done to determine if further economic constraints can be tolerated without losing any fishing economic value, and more importantly, capital infrastructure. Morro Bay is an example of fishing community economic collapse that needs to be avoided.

2. Council authority and involvement is crucial to this process. Fishing regulations are developed by the Council. It is mandated by the Magnuson-Stevens Fishery Conservation and Management Act. This council is also where fishery expertise resides. If a truly collaborative, transparent and objective approach is desired then the council must be involved in every step of the process when fishing issues are involved.

3. A statement of desired status of any select sanctuary site must be made. A scientific and social analysis must occur in order to justify this preferred outcome. An MPA is only a tool to achieve a change in status. Many other tools exist which may be able to provide an acceptable and or identical result. All options need to be considered.

4. A realistic time line needs to be established. Apparently no prior consultation with fishery management authorities has been done as to their time requirements needed to process this action request. One month is not sufficient time for the Council analysis and comment on actions needed for a management proposal of this magnitude.

In summary the GAP wishes to comment on apparent biases that exist within the Sanctuary culture. This appears to be a drive to further restrict fishing. No other human impacts are being considered for constraints. There are numerous existing MPA's within the sanctuary. It may be that protection from fishing has become excessive. The Sanctuary could consider a vibrant, profitable, and sustainable fishery as a valuable sanctuary asset. This could be an asset that deserves protection. A fishery such as this would have a very high intrinsic value as well as provide cultural value for future generations. We would hope that fisheries will not have to become an economic shipwreck within the Sanctuary.

PFMC
04/10/08

HABITAT COMMITTEE REPORT ON MARINE PROTECTED AREA "NEED CRITERIA" FOR THE MONTEREY BAY NATIONAL MARINE SANCTUARY (MBNMS)

The Habitat Committee (HC) reviewed the Sanctuary's three stated reasons for supporting marine protected areas (MPAs). Not enough details were available in the February 15 letter (Agenda Item I.1.b, Attachment 2) to make useful comments on the rationale and management framework used to develop the needs criteria. We understand that a document that provides more detail on this subject is being developed by the Sanctuary, and ask that it be provided to the HC when available.

There is a need to improve coordination between the National Ocean Service, National Marine Fisheries Service, and the Council, such as improving synchronization of schedules. In addition, a review of the Scientific and Statistical Committee's White Paper on marine reserves may prove useful to all sanctuaries interested in interacting with the Council.

There are several benefits to increased collaboration. The Sanctuary will benefit by considering areas already under MPA status (such as groundfish essential fish habitat (EFH), and rockfish conservation areas) to see if they meet their objectives, and can coordinate with existing research areas/projects to see if there can be progress on mutual goals for habitat protection. On the other hand, the Council will benefit because the National Marine Sanctuaries Act (NMSA) provides authority over non-fishing activities that affect EFH. This allows sanctuaries to comment on laws that are separate from the Council process. The Council may consider whether commenting and collaborating with sanctuaries through the NMSA will achieve greater protections needed for Council resources.

PFMC
04/08/08

HIGHLY MIGRATORY SPECIES REPORT ON MARINE PROTECTED "NEED CRITERIA" FOR THE MONTEREY BAY NATIONAL MARINE SANCTUARY (MBNAS)

The Highly Migratory Species Advisory Subpanel (HMSAS) advises there is no need for expansion of Marine Protected Areas (MPAs) in the Federal water portion of the Monterey Bay National Marine Sanctuary (MBNMS). The HMSAS voted 9 to 1 in favor of this recommendation.

Majority Rationale

The MBNMS acknowledges that there has been a large increase in MPAs within the sanctuary since public opinion was expressed on the matter some years ago. The Joint Management Plan Review (JMPR) process noted below in the minority rationale occurred five years ago, several years prior to the implementation of a network of MPAs within the MBNMS through the implementation of the California Marine Life Protection Act (MLPA). The documentation provided by the MBNMS does not provide a rationale or any analysis for why the recently implemented network of MPAs within the sanctuary likely contains spacing or habitat gaps or is limited in its ability to identify additional human impacts from fishing activities.

From a highly migratory species perspective it has been established that fishing for pelagic finfish in waters outside the 50 meter isobath is scientifically presumed to not have an impact on living or physical habitat due to the movement of these fish in and out of marine protected areas and the remoteness of pelagic gears from benthic habitat. Further, while some concern has been expressed by some related to fishing for pelagic finfish inside the 50 meter isobath due to the potential of benthic bycatch, to date information made available in the various MPA processes (e.g. MLPA process and workshops) on pelagic bycatch indicates that it is likely that pelagic fishing will have no impact on habitats or fish populations within MPAs.

Minority Rationale

One member of the HMSAS (Meghan Jeans, Ocean Conservancy) believes that the MBNMS would benefit from the adoption of federal MPAs and urges the Council to support efforts to develop an improved public process and a coordinated management approach and establish a reasonable timeframe for adoption of federal MPAs in Sanctuary waters. Federal MPAs in the MBNMS would build upon and leverage the recent accomplishments of the State of California under the MLPA. Adoption of MPAs was a top priority identified by the JMPR process with over 20,000 plus public comments received in support of MPAs and the endorsement of the advisory council. Federal MPAs in Sanctuary waters are vital to conservation and ecosystem health and sustainability objectives.

PFMC
04/10/08

SALMON ADVISORY SUBPANEL REPORT ON MARINE PROTECTED AREA "NEED CRITERIA" FOR THE MONTEREY BAY NATIONAL MARINE SANCTUARY

The Salmon Advisory Subpanel (SAS) offers the following concerns and recommendations for Council consideration:

Concern 1: The recent final decision by the Monterey Bay National Marine Sanctuary (MBNMS) preempts the process that is outlined in the Magnuson-Stevens and Sanctuary Acts.

Recommendation 1: The MBNMS needs to evaluate the need for action in cooperation with the Council process before outlining any action. It should be noted that in a similar situation with agricultural runoff into MBNMS waters, the sanctuary approach was one based on education, not regulation.

Concern 2: The MBNMS appears to be preconceiving the need for Marine Protected Areas (MPAs) without any understanding of existing Council management actions

Recommendation 2: The MBNMS should commit to working within the Council process to ensure their concerns are addressed so there is not just another unnecessary layer of protection put on top of existing regulation.

Concern 3: Redundancies created by MBNMS by generating reserves in already closed areas.

Recommendation 3: MBNMS should work within the Council process, recognize the science based application and evaluation the Council process gives in the regulatory process.

Concern 4: MBNMS imposing further salmon fishing restrictions.

Recommendation 4: The MBNMS needs to be engaged in the ongoing Council process so as to understand how fisheries are regulated and protections are addressed. With benthic habitats being of concern, preventing fisheries with no bottom contact has no beneficial impact.

Concern 5: Lack of foundation by MBNMS relative to socioeconomic impacts and current profile of fishing communities.

Recommendation 5: The MBNMS needs to conduct a socioeconomic study into the fishing communities in and adjacent to the sanctuary.

Concern 6: The MBNMS was founded on the premise of not getting involved in managing fisheries, yet with their interest in MPAs the focus is only on regulating fisheries.

Recommendation 6: The MBNMS needs to own up to their promise as defined in the designation document and start taking on the role of a non-biased facilitator for issues instead of taking the role of an advocate.

. SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON MARINE PROTECTED AREAS "NEED CRITERIA" FOR THE MONTEREY BAY NATIONAL MARINE SANCTUARY (MBNMS)

The Scientific and Statistical Committee (SSC) reviewed the Briefing Book materials regarding the process established by Monterey Bay National Marine Sanctuary (the Sanctuary) to consider criteria and thresholds that would define the need for marine protected areas (MPAs) in Federal waters of the Sanctuary. The SSC was joined in its deliberations by Dr. Lisa Wooninck, a new member of the Sanctuary staff; Mr. Steve Scheiblauer, Harbormaster for Monterey, Board Member of the Alliance of Communities for Sustainable Fisheries (ACFS) and member of the Sanctuary MPA Working Group; Dr. Richard Parrish, fishery science consultant and author of the ACFS-sponsored report "A review of traditional and ecosystem-based fishery management in the Monterey Bay National Marine Sanctuary (Agenda Item I.1.e, Attachement 6); and Dr. Ray Hilborn, from the University of Washington and co-author of the ACFS-sponsored report "Ecosystem consequences of MPAs for the Monterey Bay National Marine Sanctuary" (Agenda Item I.1.e, Attachment 7). The five reports sponsored by the ACFS will be useful once the Sanctuary staff have established evaluation criteria.

There are three stated needs for establishing MPAs in the Sanctuary (Agenda Item I.1.b, Attachment 1), two of which are amenable to science-based evaluation: (1) MPAs would restore and safeguard ecosystem structure and function and (2) MPAs would provide research areas for examining human impacts on the marine environment. Arguably, the third aspect, the "intrinsic value" of wilderness areas, is not subject to scientific evaluation. Dr. Wooninck informed the SSC that the Sanctuary staff had developed rationales to accompany the statement of need for establishing MPAs within Federal waters of the Sanctuary. The rationales will be presented later this month to the Sanctuary Advisory Council. These rationales are currently under review and were not available to the SSC.

The SSC understands that the Sanctuary would welcome input from the Council and the SSC regarding the process they are developing for evaluating MPA proposals. To facilitate information exchange between the Sanctuary and the Council, the SSC suggests that several members of the SSC be appointed as scientific advisors to work with the Sanctuary's MPA Working Group. Of particular concern to the SSC is that any Sanctuary proposals for establishing MPAs consider a sufficiently wide range of alternatives (including status quo) and use an appropriate technical basis for evaluating the alternatives relative to the stated objectives for review under the National Environmental Policy Act. The Sanctuary has apparently concluded that there is a need for MPAs, but this conclusion is premature until there has been a formal evaluation of the MPA alternatives relative to the status quo alternative.

The draft time-line for the MPA development and review process (Agenda Item I.1.b, Attachment 3) indicates no Council involvement until the final stages. Council staff should work with the Sanctuary to develop mechanisms for an earlier review of Sanctuary proposals, including the range of alternatives, by the full SSC and Council.

The SSC notes that it would be advantageous to the Council if it had an Ecosystem Fishery Management Plan (with associated authorities) that specified a process for dealing with proposals to establish specific MPAs or a broader network of MPAs.

PFMC
4/09/08

Alliance of Communities for Sustainable Fisheries
256 Figueroa Street #1, Monterey, CA 93940
(831) 373-5238
www.alliancefisheries.com

February 11, 2008

Paul Michel, Superintendent
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey CA 93940

Don Hansen, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

Subject: Independent scientific analysis of the question: Does the MBNMS need additional MPAs to meet its conservation goals and preserve ecosystem health?

Action Requested: Forward this Analysis to the PFMC's Science and Statistical Committee for their review and report their conclusions to the Council.

Dear Paul and Don,

This analysis of the need, if any, for additional Marine Protected Areas (MPAs) within the Federal waters portion of the Monterey Bay National Marine Sanctuary (MBNMS) is being conducted on behalf of the Alliance of Communities for Sustainable Fisheries (ACSF) to provide information to the MBNMS and to the Pacific Fishery Management Council that is unlikely to be developed in the MBNMS's MPA Workgroup (MPAWG), which is led by Sanctuary Staff. Its purpose is to bring some of the best fishery biology, socioeconomic and legal minds to bear on the question: Are more MPAs needed in the MBNMS to meet its conservation goals and to assure ecosystem health? The analysis of this question is appropriate for the Mission of the ACSF, a 501(c)(3) organization:

> ***The Alliance of Communities for Sustainable Fisheries advocates for the heritage and economic value of fishing to California Coastal Communities. To preserve and enhance that value, the Alliance offers a broadly representative educational and promotional voice for waterfront communities to work constructively with interested agencies, individuals, and other marine protection organizations in order to ascertain and guarantee that: (1) the best and most current oceanographic, socio-economic, and fisheries science is accurately compiled; (2) this science is readily available to the public for use in crafting and promoting public policy; (3) the linkage between healthy sustainable fisheries, marine conservation, and coastal communities is firmly established in the public mind.***

The Alliance of Communities for Sustainable Fisheries (ACSF) both as individual members participating in this MPA Workgroup, as well as from the viewpoint of outside observers, did not feel that the Sanctuary's MPAWG process was designed to create an impartial science based foundation to answer the question regarding the need for additional MPAs. The ACSF felt that the MPAWG process was unlikely to ever fully assess the full range of existing regulations and programs both for fisheries management and other conservation measures that are relevant. Further, there was little discussion about how the National Marine Sanctuary Act (NMSA) coordinates with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), or how the NOAA Strategic Plan relates to all NOAA programs. Concerns were expressed in the MPAWG about the methodology used and quality of work that could be expected from the MBNMS's contractor for socio-economic products. When ACSF members suggested that the culture and heritage of fishing in MBNMS-region coastal communities is an important resource to be protected by the MBNMS along with biological resources, this was rejected out of hand. Lastly, the ACSF felt that the emphasis of this workgroup was focused on reducing fishing opportunities, and was unlikely to fairly consider other management tools which may be equally, or even more effective, to preserve the ecosystem health of the Monterey Sanctuary, but with fewer costs to the fishing community.

In addition to the failure of the MBNMS to provide any scientific analysis of the "need" question, two other significant shortcomings have emerged from this MPA discussion. First, it appears that the Monterey Bay National Marine Sanctuary, and for that matter perhaps the National Marine Sanctuary Program as a whole, has no real method of measuring whether or not the policies and purposes of the National Marine Sanctuary Act are being met. When asked to provide a quantitative assessment of the degree to which MBNMS regulations and programs accomplish Program goals, Sanctuary Staff was unable to provide this. It also appears to be the case that the MBNMS can not provide any assessment as to the degree to which other state and federal regulations and programs also contribute to meeting the Sanctuary's conservation and ecosystem health goals. This would include programs such as those put in place by the Pacific Fishery Management Council, the State of California's new MPA network, and a wide variety of other regulations, such as the California Coastal Act, the Marine Mammal Protection Act, the Clean Water Act, and other programs. This inability to measure the degree to which its goals are already being met by regulations and programs inevitably leads to the question, "How can the Sanctuary know that it needs additional protection if it can't measure the effectiveness of programs and regulations that are in place already?" It is exactly on this point that this scientific analysis was commissioned, to try to put some of the best scientific minds to create measurements for such things as the health and functioning of the ecosystem.

The last, very significant shortcoming that has emerged from this discussion of additional MPAs is in regard to the MBNMS's failure to live up to its Congressional mandate to provide leadership for coordinated and comprehensive marine resource management amongst all other federal, state, and local agencies. The MBNMS failed to demand comprehensive and coordinated management during the State's MLPA

process to the detriment of regional fisheries and true ecosystem benefits. We believe that a well-coordinated MPA program that integrated the RCA, EFH areas, Davidson Seamount, and the specific legal requirements of the MLPA, with true stakeholder involvement, would have created a network that looked considerably different than from the approved plan, and offer true ecosystem benefits with less cost or displacement to fishermen. The Sanctuary Program cannot pretend to be doing ecosystem-based management unless it is willing to actually provide leadership for this kind of comprehensive and coordinated management. The importance of this failure cannot be overstated.

With this being said, the ACSF has enjoyed a constructive relationship with MBNMS staff in conducting the Alternative Analysis. The new Sanctuary Superintendent, Paul Michel, and Policy Advisor Huff McGonigal and GIS Analyst Sophie De Beukelaer, have all been most helpful. We hope that meaningful discussions will occur in the context of this Analysis between the MBNMS Staff, the PFMC, and the fishing community.

This Analysis is broken into several broad questions…

1. What is the legal relationship between the National Marine Sanctuary and the Magnuson-Stevens Acts? How do these Acts coordinate and compliment with each other? This analysis is done by Bud Walsh, an attorney for Davis Wright Tremaine LLP, San Francisco, and is attached as “Exhibit A”.
2. What regulations, programs, and special closures affect sustainable fisheries and the health of the ecosystem in the MBNMS region? Can the conservation benefits of these programs be quantified? This section has been prepared by Dr. Richard Parrish, recently retired from NOAA Fisheries. MBNMS staff has also contributed to the section that describes the conservation benefits of the Sanctuary Program. Dr. Parrish is also the lead scientist for this Alternative Analysis, and wrote the “Introduction and Project Context Section.
3. What is the health of the ecosystem in the MBNMS region? How much protection is enough? Are more spatial closures or other types of conservation measures needed to satisfy the requirements of both the NMSA and the Magnuson-Stevens Act? This section is written by Dr. Ray Hilborn of the University of Washington School of Fishery Science and Dr. Carl Walters of the University of British Columbia. This section includes the use of modeling exercises to study the ecosystem consequences of existing and future spatial closures.
4. Are additional MPAs needed to satisfy pressing research needs about the status of the ecosystem within the Sanctuary region? Dr. Doyle Hanan, a retired fisheries biologist formerly with the California Department of Fish and Game, wrote this analysis.
5. If additional MPAs are needed, what types of socio-economic analysis must be done to avoid negative socio-economic and environmental consequences, enhance benefits, and meet the requirements of law? Dr. Barbara Walker of the Institute for Social, Behavioral, and Economic Research at the University of California, Santa Barbara, has written this section.

With the exception of the “Legal” chapter, each chapter of this report has been submitted for external peer review. As soon as those reviews are completed, they will be forwarded to the MBNMS and the PFMC, along with the final chapters, including changes warranted by the peer review.

The preliminary conclusion of this scientific Analysis is that the existing protections put into place by the State Fish & Game Commission and the Pacific Fishery Management Council, along with a wide range of other State and Federal regulations and programs, assure the healthy functioning of the ecosystem in the region of the MBNMS. No additional MPAs are needed for the MBNMS to meet its conservation or research goals. The ACSF requests that the PFMC’s science and statistical committee review this Analysis for accuracy. If this Analysis is correct, this is good news, and should be welcomed by resource managers, fishermen, and the general public. This analysis should be used by the MBNMS as a basis for deciding if it will continue to plan for MPAs. Any future MPA proposal that might come to the Council from the MBNMS or a NGO should be weighed against this scientific Analysis.

Thank you for your consideration of this request.

Sincerely,

Frank Emerson
Co-Chair, ACSF

Supporting Associations & Organizations

- Pacific Coast Federation of Fishermen’s Association
- Port San Luis Commercial Fishermen’s Association
- Morro Bay Commercial Fishermen’s Association
- Monterey Commercial Fishermen’s Association
- Fishermen’s Association of Moss Landing
- Santa Cruz Commercial Fishermen’s Marketing Association
- Half Moon Bay Fishermen’s Marketing Association
- Fishermen’s Alliance
- Western Fishboat Owners Association
- Ventura County Commercial Fishermen’s Association
- Federation of Independent Seafood Harvesters
- Golden Gate Fishermen's Association
- Port San Luis Harbor District
- City of Morro Bay Harbor
- City of Monterey Harbor
- Moss Landing Harbor District
- Santa Cruz Port District
- Pillar Pt. Harbor, San Mateo County Harbor District

cc:

Representative Sam Farr
Representative Lois Capps
Representative Anna Eshoo

MPA Needs Assessment Monterey Bay National Marine Sanctuary

Summary

This report was commissioned because sport and commercial fishers and other stakeholders who had participated on the Monterey Bay National Marine Sanctuary's marine protected areas workgroup (MPAWG) were extremely disappointed with the lack of information provided on (1) the status and trends of regional fish and shellfish populations (2) the effect of recent regulations on fisheries based on these populations and (3) a description of the current regulatory framework that has been established to maintain healthy populations, fisheries and ecosystems and (4) the total absence of population analyses or models that could be used to assess either the effect of present regulations or the need for additional protections; including but not limited to marine protected areas (MPAs).). After five years of meeting, it was clear to many stakeholders that the MBNMS MPAWG process was not going to conduct a scientific analysis of the key question: "Does the MBNMS need additional MPAs to assure ecosystem health and to meet the conservation goals of the National Marine Sanctuaries Act?"

Fishing stakeholders were also concerned that the Sanctuary staff was attempting to engage in adaptive ecosystem management using only a single tool, MPAs, and that this attempt was not being coordinated with either the Pacific Fishery Management Council (PFMC) or the California Fish and Game Commission. The reason that co-ordination is so important is that there has been a transformation in fishery and ecosystem management on the west coast and California. The transformation has been primarily the result of (1) increases in knowledge of marine resources due to extensive monitoring, data analyses and modeling activities and (2) political transformation of the scientific results into effective management strategies. The principal strategy adopted was the use of annual catch quotas based on the size of populations as determined by timely stock assessments. Species considered to be overfished have been assigned very small quotas, and in addition, species at very low levels had large portions of their habitat placed in rockfish conservation areas (RCAs) where directed fishing for all bottomfishes was prohibited.

The PFMC also created an extensive network of Essential Fish Habitat Areas (EFH Areas). Presently 64% of the MBNMS area from Cambria to Pigeon Point (i.e. the "Study Area") is in fishing restricted MPAs. This does not include the Davidson Seamount area, an 775 square miles slated to be added to the MBNMS, where no fishing is allowed at or near the bottom. In addition, several specialized set and drift gillnet fisheries have been stopped entirely (due to bycatch of marine birds, mammals and reptiles), vessel buyouts to reduce fleet size occurred in the trawl fishery, and the State of California nearshore fishery management plan was enacted.

Traditional and Ecosystem-based fishery management

In addition to the transformation in federal ecosystem management a complex management structure of traditional State of California fishery management regulations is in effect. A full description of traditional fishery management regulations is presented in the report. Briefly stated, traditional fishery management regulations in effect in the MBNMS study area provide

extensive protection from overfishing and the many layers of regulations from the different management agencies prevents a large number of exploitable species from being fished at any appreciable level. This is particularly true of species in soft bottom areas of the nearshore and shelf habitats, the shelf break habitat, the deep slope habitat and the rise habitat. In federal waters a small number of species are presently being fished at moderate to optimum exploitation levels and the few species that were overfished in the past are now in rebuilding plans and their habitat has been heavily protected by the RCA and newly created essential fish habitat areas and state MPAs. Presently there are no known species in the federal water portion of the study area that are being exploited at rates greater than that which produces maximum sustainable yield (MSY) for the species.

The effect of the extensive increase in protective regulations over the last decade has collapsed the fishery at Monterey and nearly collapsed the fisheries at Santa Cruz and Morro Bay; 2006 Monterey landings were only 1% and landings at Santa Cruz and Morro Bay were only 16% of the landings in 1996 (Table 1s). Landings at Moss Landing doubled over the same time period; however the increase was entirely due to greatly increased landings of sardine and anchovy. The value of the landings had extensive reductions at all ports in the area; reductions were largest at Monterey and least at Princton-Halfmoon Bay where the landings are dominated by salmon and Dungeness crab that were not heavily affected by regulatory changes.

Table 1s. Decadal change in the landings at central California ports.

	Tons 1996	Tons 2006	% of 1996	Value 1996	Value 2006	% of 1996
Princeton-Halfmoon Bay	2,656	1,398	52.6%	$6,354	$4,786	75.3%
Santa Cruz	896	147	16.4%	2,178	622	28,6%
Moss Landing	12,493	29,646	237.3%	10,233	4,877	47.7%
Monterey	12,383	179	1.4%	6,037	868	14.4%
Morro Bay	2,675	434	16.2%	6,471	1,906	29.5%

The total landings at ports within the MBNMS (Santa Cruz, Moss Landing and Monterey) increased from 25,774 tons in 1996 to 29,969 tons in 2006 (Table 2s). This increase was due to greatly increased landings of two pelagic species, sardine and anchovy (from 12,722 to 27,939 tons). The landings of all other species with landings greater than 100 tons had major declines, and 18 out of 20 species with landings between 10 and 100 tons also declined. Pelagic species, which are little protected by MPAs, comprised about 96% of the landings in 2006, rising from about 80% in 1996. Shelf break rockfish species, which were most affected by the federal RCA, had enormous declines in landings with 2006 bocaccio, widow and chilipepper landings being only 2% of their 1996 landings. The species most likely to be affected by additional MPAs in federal waters are those dwelling on the continental slope. As a group the landings of slope species declined by a factor of 4, with total 2006 landings of only 806 tons. With pelagic species and slope species removed the landings of all other species declined by more than a factor of 5, from 2,068 tons in 1996 to only 372 tons in 2006.

Table 2s. Landings in the Monterey Port Area (i.e. Santa Cruz, Moss Landing and Monterey) in 1996 and 2006, and 2006 landings as a percentage of 1996 landings.

	1996	1996	2006	2006	% of 1996
TOTAL Landings	25,774		29,969		116%
Total pelagic species	20,482	79.5%	28,812	96.1%	141%
Total slope species	3,228	12.5%	806	2.7%	25%
Total everything else	2,068	8.0%	372	1.2%	18%

In addition to the regulations enacted prior to 2006 extensive state and federal MPAs have been created in the study area, and the state no trawling area was greatly enlarged. Major areas that were open to fishing for demersal and littoral species in 2006 are now closed to fishing for these species and landings would be expected to decline further due to the additional regulations.

The increase in regulatory protections had the intended affect on population sizes of exploited species. Total biomass from stock assessments of the most significant groundfish species declined from about 2.4 million tons in 1950 to slightly less than 50% of hypothetical unfished value by the early 1990s (Figure 1s). In the last decade, primarily due to federal limitations on fishing, the biomass has been trending upwards to about 60% of the unfished value at present.

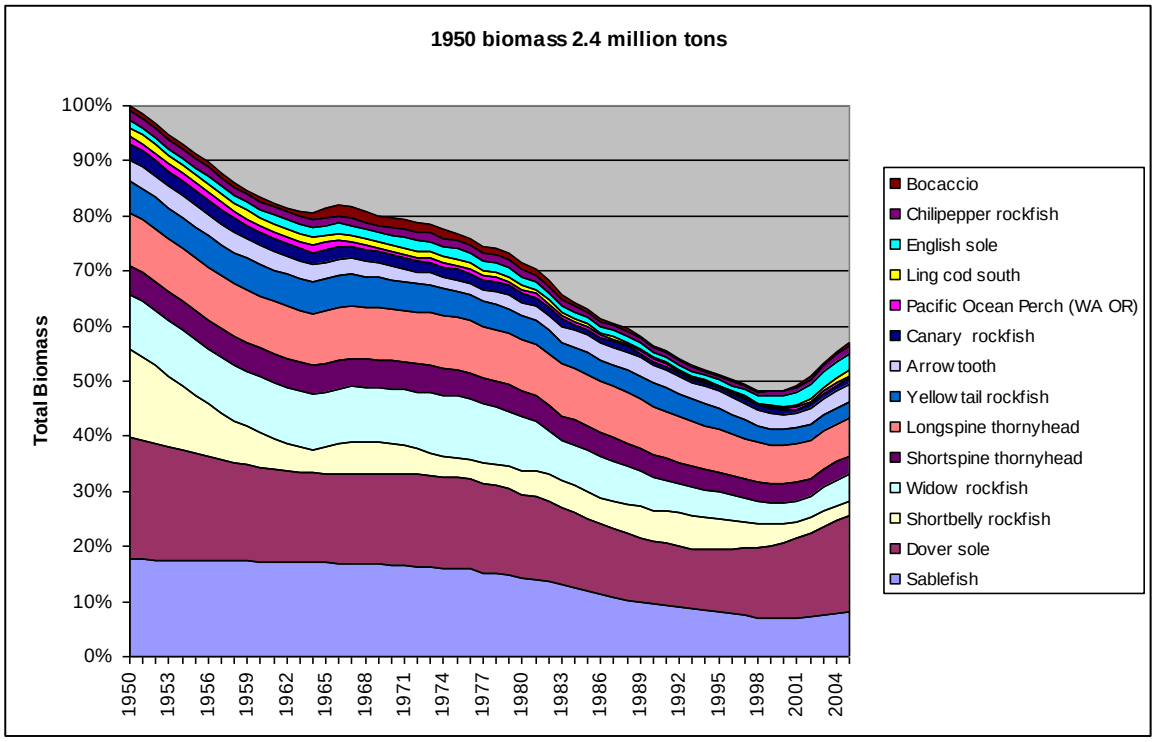


Figure 1s. Trends in abundance of groundfish stocks off the west coast of the U.S.

There seems to be little understanding of the consequences of combining management through the direct regulation of the volume of the catch (i.e. annual quotas with bimonthly catch limits) with enactment of MPAs. When fishery management is based on annual quotas MPAs will have little affect on annual landings; although they will alter the geographical distribution of the take and the resulting biomass. It does not require a complicated population model to know that if

the landings are not altered by the enactment of MPAs the increase in biomass inside of MPAs will be roughly balanced by the decrease in biomass outside. The principal result of this combination of management regulations will be the increased costs and fishing effort required to catch the annual quotas at the lower densities caused by the MPAs. In contrast, very little population alteration will occur due to the addition of MPAs as total catch will continue to be controlled by quotas. This points out that it is going to be very difficult to achieve profitable and sustainable fisheries if the several regulatory agencies continue to develop uncoordinated and/or counterproductive management measures.

Ecosystem consequences of MPAs for the Monterey Bay National Marine Sanctuary

The MBNMS ecosystem is a rich and diverse one that has been seriously impacted by fishing. Present fisheries management policies are extremely conservative, and should allow rebuilding of heavily impacted species over the next few decades. Potential fisheries production in the system is concentrated in mobile, pelagic species like sardine and hake. Sedentary species, mainly rockfishes, have high natural biomass but low production, so they were able to contribute substantially to overall fishery yields only by depleting stock sizes; on a sustainable basis, the sedentary species represent only a small proportion of total ecosystem production and potential yield.

MPAs in the MBNMS will not offer significant protection from potential future fishery management for any of the mobile species that represent most of the ecosystem biomass and production, since the area of protection is small compared to the dispersal-migration ranges of such species. However, protected areas could offer significant protection to a variety of inshore, sedentary species that have been historically impacted severely by fishing. If federal and state management policies are not coordinated, continued protection of offshore waters may lead to inshore shifts in fishing activity that could severely impact inshore species and threaten sources of larval seeding and recruitment within any inshore protected areas and sanctuaries. In such a scenario, fishing pressure increases dramatically inshore as offshore areas are closed. Since the RCAs and EFH closures have been in effect for several years, such an inshore shift in fishing effort should have already occurred. We have seen no data that suggests such a shift has occurred, but data on fishing effort has been limited.

The simulations show that the impacts of protected areas is confined to the benthic communities and specifically to the sedentary species within the benthic communities. Recognizing that the pelagic components of the community are highly mobile, neither any proposed MPAs or RCAs affect the pelagic community, nor the lower trophic levels in any significant way. Thus evaluation of the potential impact of MPAs within the MBNMFS is really an evaluation of the population dynamics of some individual, sedentary species because the species that are mobile, or dominantly deeper will be unaffected by MPA proposals.

The ecosystem model also shows that it is critical to coordinate state and federal management policies that may impact onshore-offshore distributions of fishing effort and differentially protect species that spend parts of their life cycles in State vs Federal waters (e.g. young fish in inshore nursery areas, older fish offshore in Federal waters). Lack of coordination could result in rapid depletion of inshore species/life stages if all the offshore effort were to shift inshore.

Socio-economic analyses

Several federal mandates require that thorough socio-economic analysis is conducted in conjunction with, and at the same scale and excellence as, natural science analysis in support of environmental decision making, management, and monitoring. If it is determined that there is a need for MPAs in the MBNMS, this chapter provides guidance on the scope and methods that should be used in a socio-economic analysis. First, the current, historical, and projected use patterns among all commercial and recreational uses should be analyzed, along with an understanding of the historical, economic, political, social, regulatory and ecological forces that underlie use patterns, with particular attention to the displacement effects of MPAs. Spatial use pattern analysis would be greatly improved if preliminary biological analyses were performed to assess the likely response of different species to the proposed MPAs. This kind of preliminary modeling can inform the socio-economic analysis, and increase the participation of stakeholders. Second, MPA planning processes should attempt to fully integrate the perceptions, attitudes, and beliefs of the range of stakeholders in order to create a shared sense of problems and opportunities, improve stakeholder attitudes about management, and enhance stakeholder compliance with the resulting regulations. Third, the costs and benefits of market and non-market values should be considered in establishing and evaluating an MPA. Spatial analyses of economic indicators, use patterns, and ecological data can allow planners to maximize the ecological benefits of MPAs while minimizing social and economic impacts. Fourth, the social and economic linkages between primary stakeholders, secondary actors, and surrounding communities should be accounted for in an assessment or evaluation of proposed or existing MPAs. Fifth, the legislative intent of the National Marine Sanctuary Act, the extent to which the MBNMS may regulate fisheries, and the legality of the cumulative economic effects of multiple, overlapping regulations should be analyzed. Finally, social science methods and genuine public participation should be engaged in the planning, implementation, monitoring, and evaluation of MPAs. There is not a one-size-fits-all methodological approach to collecting social science data for MPAs, but social science data must be collected systematically and reliably through valid methodologies. In relation to all of these areas of social science inquiry, the collection and analysis of data must be conducted with the utmost respect to the privacy and trust of stakeholders. Furthermore, a positive, transparent, efficient, and trusting relationship between social scientists and stakeholders is imperative to effective outcomes.

MPAs and Research Needs within the Monterey Bay National Marine Sanctuary.

Recently twenty-nine California central coast MPAs (effective 21 September, 2007) were incorporated into a state nearshore reserve system. The new federal EFH network of MPAs includes three federal MPAs inside the MBNMS (1,435 sp. mi.) and the Davidson Sea Mount (775 sq mi.). More than 60% of the MBNMS study area is now protected by MPAs. Therefore, it is a critical time to consider the potential success of any MBNMS MPAs, as well as, ensuring the proper assessment of the system's effectiveness in those endeavors. Within the 4,217 sq. mi. MBNMS study area, reserves and closures occupy a predominance of nearshore rocky habitat, in addition to shelf, shelf break, slope, and abyssal regions. Thus, the existing Sanctuary, and especially with the addition of the Davidson Seamount, encompasses the important habitats in the MBNMS region. Administrators of MBNMS are faced with the already enormous task of prioritizing and implementing research objectives. Baseline physical and biological information on habitats and species should be assessed before MPAs become established. Accommodations

that facilitate fisheries resource monitoring and stock assessment should be identified and implemented. Also, there is substantial uncertainty regarding the appropriate size and spacing, implementation and effectiveness of MPAs in general. MBNMS administrators should assess the effectiveness of existing MPAs and closed areas prior to designating additional MPAs.

The record on funding MPA monitoring and research in California is not good. In 1993 three reserves were enacted in California, two of these had extensive surveys and monitoring in the first year (Punta Gorda), or first couple of years (Big Creek) after the reserves were established. To date, there has been no follow up monitoring, repeat of surveys or analyses on the success of the reserves in protecting individual species or any analysis of ecosystem effects of MPAs (which is far more difficult than assessment of trend of individual species). Based on the number of MPAs in the South/Central phase of the State MLPA process and the Channel Islands process; the expected number of MPAs in California is expected to exceed 100 by the time the MLPA process is completed. In addition an extensive network of reserve areas (EFH) was recently established by the Pacific Fisheries Management Council. It is clear that there will soon be intense competition for funds to study MPAs and other reserves, it is unlikely that funding will be anywhere near the amount necessary to adequately monitor or research the reserves and MPAs expected to be in existence in California by 2010. It is clear that the limiting factor will be funding for monitoring and research, not availability of MPAs.

Based upon this examination of MBNMS research needs, three points should be restated regarding research objectives: First, given the extent of the existing MBNMS protected areas, funding and other logistical constraints are likely to limit the ability to implement basic research needs. Second, sufficient baseline information must be collected in a timely fashion at multiple sites (already large in number) before permanent research and monitoring regimes are established. Third, given the uncertainties which surround the designation and management of MPAs, there is a responsibility to assess effectiveness of existing MBNMS protected areas prior to summarily restricting use of more ocean area.

Finally, no additional MPAs are required within MBNMS to accomplish the research and monitoring objectives reviewed and outlined here. These include biological community structure surveys, assessments of density and overall stock size, collection of life-history information for both commercially exploited and unexploited marine resources, research on movement patterns of adult, juvenile, and larval stages of important species, and collection of fisheries-based data.

CONCLUSIONS

The marine resources of the MBNMS region are heavily protected by existing federal, state, and local regulations and programs and the effects of the transformation in management that has occurred over the last decade are clearly seen in the extensive decreases local landings and the increasing biomass of groundfishes.

Very extensive federal and state networks of marine protected areas were recently established in central California. No assessment of the affects of these networks, which presently occupy 64% of the MBNMS study area have been made. A full assessment of the affects of these MPA networks should be made before any additional MPAs are considered in the area.

The near collapse of the fisheries at ports in the MBNMS area appears to be primarily caused by recent regulatory action rather than recent declines populations of fishes and invertebrates. Management action by the several federal and state regulatory agencies shows little coordination. The MBNMS should play a major role in strengthening the coordination of ecosystem and fishery management. At present the major needs are for assessment of present management, development of tactics to achieve both healthy fisheries and a healthy ecosystem, and public discussion of ecosystem protection and healthy fisheries.

Davis Wright Tremaine LLP
SAN FRANCISCO OFFICE
MEMORANDUM

**PRIVILEGED AND CONFIDENTIAL
ATTORNEY-CLIENT AND ATTORNEY
WORK PRODUCT COMMUNICATION**

TO: Alliance of Communities for Sustainable Fisheries

FROM: Bud Walsh

DATE: October 10, 2007

RE: Consideration of Marine Protected Areas by the Monterey Bay National Marine Sanctuary: Can Fishing Activity be Regulated by the Sanctuary And, If So, How?

I. Introduction and Summary

You have asked for legal guidance with respect to activities being undertaken by the Monterey Bay National Marine Sanctuary Program ("Monterey Sanctuary") to examine the creation of "marine protected areas" within the boundaries of the Sanctuary outside three nautical miles. The activities of the Monterey Sanctuary are governed by the National Marine Sanctuaries Act, 16 U.S.C. § 1431 et seq.

One of the purposes of the National Marine Sanctuaries Act ("NMSA") is to establish areas to be managed that will improve the conservation, understanding, management, and wise and sustainable use of marine resources and maintain for future generations the habitat and ecological services of the natural assemblage of living resources that inhabit these areas. Any such activities undertaken in a marine sanctuary for these purposes must "complement existing regulatory authorities." The NMSA also states that all public and private uses are to be facilitated, to the extent compatible with the primary objective of "resource protection," a term that is not defined.

We understand that the Monterey Sanctuary is considering creating marine protected areas within the borders of the Sanctuary that would restrict and/or limit fishing activity, thereby possibly overriding existing federal fishery management regulations within the affected geographic area. It is stated that the purpose is to "protect" resources within the Sanctuary by limiting extraction activities from fishing. Presumably, the scientific argument is that "protection" of certain resources can only be achieved by completely banning fishing in a particular area.

A "marine protected area" or MPA is not defined in any Federal statute.[1] On May 26, 2000, President Clinton issued Executive Order 13158 on Marine Protected Areas. In that Order, he defined MPAs as follows:

> "Marine protected area" means any area of the marine environment that has been reserved by the Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein. [Sec. 2.a]

However, this Executive Order did not create new legal authority or change in any way any existing legal authority with regard to the management of the marine environment. Any effort by the Secretary of Commerce to implement the Order must proceed in a manner consistent with all applicable law, including the Magnuson-Stevens Fishery Conservation and Management Act ("Magnuson-Stevens Act"), which applies to any act of "fishing" in any area subject to a marine sanctuary within the U.S. 200-mile exclusive economic zone ("EEZ"), and the NMSA, 16 U.S.C. § 1434(5) (fishing regulation within marine sanctuaries).

Fishing, under the Magnuson-Stevens Act, is defined as—

> (A) the catching, taking, or harvesting of fish;
>
> (B) the attempted catching, taking, or harvesting of fish;
>
> (C) any other activity which can be reasonably be expected to result in the catching, taking, or harvesting of fish; or
>
> (D) any operations at sea in support of, or in preparation for, any activity described in subparagraphs (A) through (C).

It is my conclusion that the Monterey Sanctuary does not have legal authority to consider any MPA that would regulate fishing, directly or indirectly, as that term is defined in the Magnuson-Stevens Act.

The primary reason is that its Designation Document does not authorize that Sanctuary to regulate fishing activity, except for "aquaculture and kelp harvesting within the Sanctuary." Lacking such authority, it is questionable that it may expend federal funds that would primarily be aimed at regulating fishing activity or ask the Secretary to issue regulations that would regulate fishing activity. Of course, the Sanctuary may go forward with an MPA that would restrict any other ocean activity for which it does have clear authority to regulate. Until the Sanctuary is given authority to regulate fishing in the manner prescribed in the NMSA, it has no authority to restrict fishing, including by creating an MPA that would do just that.

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[1] In fact, the only reference in Federal statutes to "marine protected areas" is found in the Coral Reef Conservation Act, 16 U.S.C. §§ 6402, 6409, but the term is not defined.

II. What if the Monterey Sanctuary's Designation Document is amended?

If the Monterey Sanctuary's Designation Document is amended, to include the regulation of fishing, the question becomes how to interpret the competing provisions in the NMSA and the Magnuson-Stevens Act with respect to creation of an MPA that would restrict or prohibit fishing. As a general rule, each provision in each statute that is administered by the Secretary of Commerce must be given effect. *Traynor v. Turnage*, 485 U.S. 535, 548 (1988). The NMSA and the Magnuson-Stevens Act create concomitant duties and obligations for the Secretary of Commerce[2] to regulate fishing within a marine sanctuary. A proposed MPA that would restrict or prohibit fishing would fall within the definition of "fishing" used in the two Acts. Therefore, both statutes, to the extent possible, must be given effect.

First, the NMSA is written in a broad general fashion and does not focus simply on the fishing aspects of a marine sanctuary. And Congress authorized the Secretary of Commerce in that Act to adopt fishing regulations in a sanctuary if they "complement" existing fishery management regulations and are compatible with the primary objective of resource protection. The relevant fishing regulation portion of that Act reads as follows:

> The Secretary shall provide the appropriate Regional Fishery Management Council with the opportunity to prepare draft regulations for fishing within the Exclusive Economic Zone as the Council may deem necessary to implement to the proposed designation. Draft regulations prepared by the Council, or a Council determination that regulations are not necessary pursuant to this paragraph, shall be accepted and issued as proposed regulations by the Secretary unless the Secretary finds that the Council's action fails to fulfill the purposes and policies of this chapter and the goals and objectives of the proposed designation. In preparing the draft regulations, a Regional Fishery Management Council shall use as guidance the national standards of section 301(a) of the Magnuson-Stevens Act (16 U.S.C. 1851) to the extent that the standards are consistent and compatible with the goals and objectives of the proposed designation. The Secretary shall prepare the fishing regulations, if the Council declines to make a determination with respect to the need for regulations, make a determination that is rejected by the Secretary, or fails to prepare the draft regulations in a timely manner. Any amendments to the fishing regulations shall be drafted, approved, and issued in the same manner as the original regulations. The Secretary shall also cooperate with other appropriate fishery management authorities with rights or responsibilities within a proposed sanctuary at the earliest practicable stage in drafting any sanctuary fishing regulations.

The meaning of this provision has never been the subject of judicial review and may be susceptible to varying interpretations. Several questions arise in considering the meaning of this provision: (1) Did Congress intend only to apply the national standards of the Magnuson-Stevens Act to sanctuary fishing regulations? (2) Does this provision only apply to the original "proposed" designation of a marine sanctuary and not to any later amendments to the

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[2] The duties of the Secretary for both statutes have been delegated to the Administrator of NOAA. Thus, "Secretary" means the NOAA Administrator.

Designation Document? (3) Is the Secretary bound by the entire Magnuson-Stevens Act when taking action, in lieu of the Council acting, to implement fishing regulations in a sanctuary given the general nature of the NMSA and the duty to "complement" existing fishing regulations? (4) What is the meaning of the language requiring uses to be "compatible" with the primary objective of "resource protection?" The uncertainty of the answers to these questions is a qualifying factor with regard to the views expressed in this memorandum.

Second, Congress recently amended the Magnuson-Stevens Act to authorize the Regional Fishery Management Councils and the Secretary of Commerce to "designate zones where, and periods when, fishing may be limited, or shall not be permitted, or shall be permitted only by specified types of fishing vessel or with specified types and quantities of fishing gear." 16 U.S.C. § 1853(b)(2)(A). The specificity of this provision leads to the conclusion that its terms, rather than any other more general regulatory authority governing fishing (directly or indirectly), or MPAs that restrict or prohibit fishing, would control the manner of regulating fishing in an MPA, such as the general authorities under the NMSA.[3] Congress expressed no intent, direct or indirect, that either law was to preempt or override the other. Both laws must be given effect, if at all possible. Thus, the MPA standards in the amended Magnuson-Stevens Act can be met by the Secretary in issuing any sanctuary fishing regulations by simply using the conditions specified in the relevant provisions when developing sanctuary fishing regulations.

Third, Congress made clear in the amended Magnuson-Stevens Act that, should there be any area in which all fishing is prohibited, any such closure of fishing must comply with the following standards: (1) be based on the best scientific information available; (2) include criteria to assess the conservation benefit of the closure; (3) establish a timetable for review of the closed area's performance that is consistent with the purposes of the closed area; and (4) be based on an assessment of the benefits and impacts of the closure, including its size, in relation to other management measures (either alone or in combination with such measures), including the benefits and impacts of limiting access to users of the area, overall fishing activity, fishery science, and fishery conservation and management.

Thus, it would be contrary to Congressional intent if the NOAA Marine Sanctuary Program ignored these detailed directives in the Magnuson-Stevens Act and sought to issue a regulation creating an MPA that restricted fishing activity, in whole or in part, directly or indirectly without complying with the stated specific directives in the amended Magnuson-Stevens Act.

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[3] This may be referred to as "back-door regulation." In California, even though the creation of new MPAs only regulated fishing activity, the Department of Fish and Game claimed the purpose was protecting other natural and cultural resources and, therefore, MPAs were not fishery management regulations. As a consequence, the agency refused to ensure that these MPAs were consistent with existing California fishery management regulations and plans. Federal law does not allow this kind of regulatory slight of hand.

III. The Sanctuary's Investigation of MPAs

We do not conclude that the Monterey Sanctuary may not investigate the possible benefits of MPAs within the sanctuary boundaries. However, such investigation must be a neutral undertaking, based on available science, which does not target fishing activity. Nor can the Sanctuary claim, contrary to logic, that protection of the natural and cultural resources of the Sanctuary authorizes the regulation of fishing activity. In statutory interpretation, general authority may not override specific authority. *Santiago Salgado v. Garcia*, 384 F.3d 769, 774 (9th Cir. 2004)(it is an elementary tenet of statutory construction that where there is no indication otherwise, a specific statute will control a general one). Any MPA proposal by the Sanctuary must be based on a clearly established scientific need to "provide lasting protection of all or part of the natural and cultural resources therein" and must be limited to regulating those ocean uses within its legal sphere of authority, and no others.

IV. Conclusion

The Monterey Marine Sanctuary currently has no authority to create an MPA that would restrict or prohibit fishing, except for aquaculture and kelp harvesting. All regulations issued under the Magnuson-Stevens Act as fishing regulations take precedence within the EEZ areas that fall within the boundaries of that Sanctuary.

If the Monterey Sanctuary's Designation Document is amended to include the regulation of fishing generally, then the Sanctuary could create an MPA that restricts or prohibits fishing within its boundaries. However, before any such regulations are adopted, the Secretary of Commerce would, in addition to following the requirements in the NMSA in adopting fishing regulations, have to satisfy the conditions for instituting areas closures set forth in the amended Magnuson-Stevens Act, including basing the MPA restrictions on the best available scientific information, using criteria to assess the conservation benefit of the closure, instituting a timetable for reviewing the performance of the closure, and conducting an assessment of the benefits and impacts of the closure.

Alternative Analysis of the Need for Additional MPAs within the MBNMS

Socio-Economic Chapter

A Report to the Alliance of Communities for Sustainable Fisheries (ACSF)

by

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October 15, 2007

Executive Summary

A process is underway to update the management plan for the Monterey Bay National Marine Sanctuary (MBNMS). The new management plan may include marine protected area (MPA) zoning among other existing and prospective management tools (NOAA 2006). If it is determined that there is a need for MPAs in the MBNMS, this chapter provides guidance on the scope and methods that should be used in a socio-economic analysis, based on a review of best-practice examples and consensus in the academic and public agency literature.

Several federal mandates, such as the Sustainable Fisheries Act, the National Marine Sanctuaries Act, and Executive Order 12044 on improving governmental regulations, require that thorough socio-economic analysis is conducted in conjunction with, and at the same scale and excellence as, natural science analysis in support of environmental decision making, management, and monitoring. As such, this chapter provides guidance on how to meet these requirements for utilizing social and economic data in MPA analyses. The following key areas of social science research and analysis that are widely considered necessary for the effective planning, implementation, monitoring, and evaluation of an MPA:

- Current, historical, and projected use patterns among all commercial and recreational uses

  Information about use patterns related to both extractive and non-extractive activities, inside and outside of the MPA, should be collected. It is important to also understand the historical, cultural, economic, political, social, regulatory and ecological forces that underlie use patterns, with particular attention to the displacement effects of MPAs. Spatial data about use patterns should be analyzed in conjunction with spatial ecological data in order to maximize the ecological benefits of an MPA while simultaneously minimizing the economic and social costs. Spatial use pattern analysis would be greatly improved if preliminary biological analyses were performed to assess the likely response of different species to the proposed MPAs. This kind of preliminary modeling can inform the socio-economic analysis, and increase the participation of stakeholders.

- Perceptions, attitudes, and beliefs about the MPA area, its values, and its uses

  The use behaviors of MPA stakeholders are shaped by their perceptions, attitudes, and beliefs about the locations, characteristics, values, and uses of marine resources and ecological processes. There is agreement in the literature that MPA planning processes should attempt to fully integrate the perceptions, attitudes, and beliefs of the range of stakeholders in order to create a shared sense of problems and opportunities, improve stakeholder attitudes about management, and enhance stakeholder compliance with the resulting regulations.

- Economic values

  The costs and benefits of market and non-market values should be considered in establishing and evaluating an MPA. Capturing the total costs and benefits of and MPA is challenging because of the difficulty in assigning value to certain features of the marine environment or marine-dependent communities. Spatial analyses of economic indicators, use patterns, and ecological data can allow planners to maximize the ecological benefits of MPAs while minimizing social and economic impacts. However, the collection and analysis of these kinds of data must be conducted with the utmost respect to the privacy and trust of stakeholders.

- Community-wide social and economic relationships and linkages

  The social and economic linkages between primary stakeholders, secondary actors, and surrounding communities should be accounted for in an assessment or evaluation of proposed or existing MPAs. Impacts to all of the individuals and communities along a given commodity chain can have an effect on the success or failure of an MPA. In addition, the social and economic effects of multiple, overlapping fisheries regulations in the central coast should be considered in a thorough ecosystem approach to management and monitoring.

- The legal considerations required by the National Marine Sanctuary Act in relation to stakeholders and surrounding communities

  The formal governance of an MPA should take into account the formal regulations AND the informal rules and agreements among and between stakeholders and managers that existed prior to the establishment of the MPA. Establishing an MPA within a National Marine Sanctuary poses questions about the legislative intent of the National Marine Sanctuary Act and the extent to which the MBNMS may regulate fisheries.

- Social science methods for incorporating human dimensions analysis in MPA design

  Social science methods and genuine public participation should be engaged the planning, implementation, monitoring, and evaluation of MPAs. The term methods is used here to mean both social science research methods (ways of collecting and analyzing data) and the methods used by decision-makers, managers, and planners in regard to public outreach and engagement. Forums for public participation must engender fair, transparent, efficient, and positive relationships among and between stakeholders and managers. Social science data must be collected systematically and reliably through valid methodologies. There is not a one-size-fits-all methodological approach to collecting social science data for MPAs, but a positive and trusting relationship between social scientists and stakeholders is imperative to successful and effective results.

It is evident to many stakeholders that a lack of trust between stakeholders and sanctuary management has characterized the process to date to consider MPAs in the MBNMS. Should a socio-economic analysis be undertaken in regard to potential MPAs in the MBNMS, the problematic relationships between and among managers and stakeholders can be improved by a thorough, thoughtful, and transparent program of social and economic data collection and analysis.

Introduction

A process is underway to update the management plan for the Monterey Bay National Marine Sanctuary (MBNMS). The new management plan may include marine protected area (MPA) zoning among other existing and prospective management tools (NOAA 2006). If it is determined that there is a need for MPAs in the Monterey Bay National Marine Sanctuary (MBNMS), this chapter provides guidance on the scope and methods that should be used in a socio-economic analysis, based on a review of best-practice examples and consensus in the academic and public agency literature.

One of the original objectives of the National Marine Sanctuaries Act (NMSA) is to "preserve or restore areas… important to the survival and preservation of the nation's fisheries and other ocean resources" (Department of Commerce 1974, p. 10255). This and other preservation objectives (endangered marine life, oceanographic features, national monuments, and research areas, to name a few) comprise the multi-use intent and history of the NMSA (Chandler and Gillelan. 2004).

MPAs serve many different purposes and are established for a variety of reasons. As the popularity of MPAs as a marine management strategy has grown in the last two decades, MPA design has mainly focused on natural science information and goals. Unfortunately, sound social science practices regarding MPAs have been developed largely in reaction to failures – either ecological or socio-economic – in past efforts to establish and monitor existing MPAs (Farrow 1996; Badalamenti 2000; Pomeroy 2002; Davis 2005). The human dimensions of marine management have recently come into better focus as user conflicts, legal challenges, delays in process and implementation, and ineffective (or "paper") parks have come to characterize many MPA processes throughout the world (Fiske 1992; Alder et al. 1994, Alder 1996; White et al. 1994, 2002; Cocklin, et al. 1998; Pomeroy and Beck 1999; Russ and Alcala 1999). For these reasons, it is now clear that the social, cultural, political, economic, historical, and legal dimensions of MPAs must also be integrated into MPA design and monitoring to ensure successful outcomes.

According to the NOAA National Marine Protected Areas Center,

> Virtually all of the federal mandates relevant to MPAs refer to the integral role of social and economic factors in MPA policy development and management decisions (e.g. Sustainable Fisheries Act, National Marine Sanctuaries Act, Coastal Zone Management Act, Presidential

> Proclamations and Executive Orders). Similar requirements to address the social sciences of MPAs exist in national environmental legislation such as the National Environmental Policy Act (NEPA) and Executive Order 12044 on improving government regulations. In general, all of these mandates refer to the need for interdisciplinary assessment in support of policy and management decisions, including both formal social scientific data and the inclusion of public and stakeholder input.

For instance, the federal law that governs fisheries management, the Magnuson-Stevens Sustainable Fisheries Act, states that:

> Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2),[1] in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities [16 U.S.C. 1851 MSA § 301, 109-479(8)].

Thus this chapter provides guidance on how to meet these requirements for utilizing social and economic data in MPA analyses. This chapter covers the following key areas of social science research and analysis that are widely considered necessary for the effective planning, implementation, monitoring, and evaluation of an MPA:

- Current, historical, and projected use patterns among all commercial and recreational uses;
- Perceptions, attitudes, and beliefs about the MPA area, its values, and its uses;
- Economic values;
- Community-wide social and economic relationships and linkages;
- The legal considerations required by the National Marine Sanctuary Act in relation to stakeholders and surrounding communities; and
- Social science methods for incorporating human dimensions analysis in MPA design

This analysis relies on two sets of information about the social science and human dimensions of MPAs. The first is a small number of guidebooks and reports generated by NOAA and other regional and international organizations concerned with MPA design and management. These reports outline best-practice examples and guidelines for social

[1] paragraph 2 states that "Conservation and management measures shall be based upon the best scientific information available" [16 U.S.C. 1851 MSA § 301, 98-623(2)].

science research about MPAs. In particular, the NOAA National Marine Protected Areas Center published a "Social Science Research Strategy for MPAs" (Wahle et al. 2003) that identifies high priority needs for social research goals, themes, and topics.

The second set of information that informs this analysis is a broader collection of papers in the social science literature – largely in academic journals – that gives more general information about specific case studies and specific topical areas related to the social science of MPAs. The majority of case studies documented in this literature are from less-developed countries, particularly in the Caribbean and the Pacific, with fewer examples from the North America and Europe.

There are multiple definitions of "marine protected area" used in varying contexts and by different institutions. Similar terms are also used, such as "marine reserve," "marine park," or "conservation area." There is no international, national, or state standard for the use of these terms. Both the Marine Life Protection Act (California Fish and Game Code Section 2850-2863), and NOAA provide guidance about MPA management. The following definitions indicate that for both institutions, the human dimensions of marine use are integral to the planning and management of MPAs. These definitions notwithstanding, it is also important that local communities participate in the definition and naming of local MPAs (Day et al. 2007).

The California Marine Life Protection Act (MLPA) defines an MPA as:

> a named, discrete geographic marine or estuarine area seaward of the high tide line or the mouth of a coastal river, including any area of intertidal or subtidal terrain, together with its overlying water and associated flora and fauna that has been designated by law, administrative action, or voter initiative to protect or conserve marine life and habitat. An MPA includes marine life reserves and other areas that allow for specified commercial and recreational activities, including fishing for certain species but not others, fishing with certain practices but not others, and kelp harvesting, provided that these activities are consistent with the objectives of the area and the goals and guidelines of this chapter. MPAs are primarily intended to protect or conserve marine life and habitat, and are therefore a subset of marine managed areas (MMAs), which are broader groups of named, discrete geographic areas along the coast that protect, conserve, or otherwise manage a variety of resources and uses, including living marine resources, cultural and historical resources, and recreational opportunities [Fish and Game Code, Chapter 10.5, Section 2852(c)].

Related to this definition, an important element of the MLPA is to facilitate adaptive management of MPAs and ensure that the system meets the goals of the Act. The code defines adaptive management as:

> a management 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, and monitoring and evaluation shall be emphasized so that the interaction of different elements within marine systems may be better understood [Fish and Game Code, Chapter 10.5, Section 2852(a)].

Another definition of MPA is provided by the NOAA National Marine Protected Areas Center:

> An MPA is any specific area of the marine or estuarine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein [derived from Executive Order 13158 on MPAs] (Wahle et al. 2003, p. 3).

Specific operational criteria for the key terms lasting, protection, area, marine environment, and reserve within this broad definition were developed by the National MPA Center for MPAs participating in the national system (National Marine Protected Areas Center 2006).

In addition, NOAA affirms an ecosystem approach to management in its 2006-2011 Strategic Plan:

- An *ecosystem* is a geographically specified system of organisms, the environment, and the processes that control its dynamics. Humans are an integral part of an ecosystem.

- The *environment* is the biological, chemical, physical, and social conditions that surround organisms.

- An *ecosystem approach to management* is management that is adaptive, specified geographically, takes into account ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse social objectives (NOAA 2005, p. 3).

In sum, these definitions assert that human, social, and economic dimensions should be integral to the political and scientific processes that establish, manage, or monitor MPAs.

Current, Historical, and Projected Use Patterns among All Commercial and Recreational Users

Use patterns are the spatial and temporal characteristics of stakeholder activities (both extractive/consumptive and non-extractive/non-consumptive) within and surrounding an MPA. Understanding MPA use patterns is fundamental to the establishment,

management, and monitoring of an MPA. It is also critical to understand the forces (economic, political, social, and ecological) that underlie these uses (Walters 2000; Wahle et al. 2003; Adger et al. 2005; Lunn and Dearden 2006). Additionally, historical and projected future use patterns should be considered along with current uses in order to understand potential temporal patterns and trends (Wahle et al. 2003), and to anticipate and monitor the displacement of activities and income generation that typically occurs when an MPA is established (Jones 2006; Richardson et al. 2006; Guidetti 2007; Kellner et al. 2007). Unfortunately use pattern data, particularly for extractive activates, is sometimes difficult to collect. Because consumptive users of marine resources rely on detailed spatial information about their resource in order to maintain their incomes, they may not be willing to share this information with managers and/or other stakeholders. Thus, data collection techniques must be designed to overcome the privacy issues associated with consumptive use.

A comprehensive understanding of use patterns, in juxtaposition with spatial ecological data, is crucial to MPA siting decisions. Thorough use pattern data allows MPA planners to equitably distribute the costs and benefits of MPAs among stakeholders, while maximizing habitat protection (Edgar et al. 2004). Data about use patterns before and after the establishment of an MPA are necessary to monitor and evaluate both the ecological and socio-economic effectiveness of the MPA, particularly in regard to areas outside of the MPA, where use is likely to be redirected (Sanchirico et al. 2006; Kellner at al. 2007; Stelzenmuller et al. 2007). Baseline data about use patterns prior to the establishment of an MPA allows for anticipating and monitoring shifts in activities as a result of the MPA, thereby helping to minimize unintended ecological, economic, and social consequences of MPAs (Pomeroy 2002).

It is important to note that fishermen's scientific knowledge should be included in the collection of ecological data. Fishermen's scientific knowledge is alternately referred to in the literature as "anecdotal," "traditional," "experiential," and the like. A growing literature shows that this knowledge is often complimentary with Western positivist science (Johannes 1994, Ruddle 1998, Bergmann et al. 2004, Drew 2005), and can be valuable to modern management strategies in that it can contribute to management design, and scientific research (Dyer and McGoodwin 1994, Neis et al., 1999, Berkes and Seixas 2005). These studies have promoted the acceptance of environmental co-management (Christie et al. 2002), yet in many cases, state agencies and scientists are reluctant to fully accept the legitimacy of fishermen's scientific knowledge (Robinson et al. 2005, Gelcich 2006, Murray et al. 2006, Cinner and Aswani 2007).

The establishment of MPAs displaces fishing effort and other income-generating activities into the surrounding ecosystem, often directly adjacent to MPA boundaries (McClanahan and Kaunda-Arara 1996; Kelly et al. 2000, 2002; Bohnsack and Ault 2002; Goñi et al. 2006; Kellner et al. 2007). For this reason, social and natural scientists alike recommend adaptive management strategies in order to continuously mitigate and improve the ecological and socio-economic effects of the MPA (Young et al. 2007). Specifically, the boundaries and placement of MPAs should be considered flexible over time, and subject to being moved, expanded, contracted, or eliminated should future

studies determine that different spatial arrangements would create improved ecologically and socio-economically effective management (Walter and Hilborn 1976, 1978; Murray et al. 1999; McClanahan and Mangi 2000; Ehler 2003; Agardy et al. 2003; Grafton and Kompas 2005; Cook and Heinen 2005; Pomeroy et al. 2005; Uychiaoco et al. 2005; Granek and Brown. 2005; Cinner at al. 2006).

Spatial socio-economic analysis would be greatly improved if preliminary biological analyses were performed that assess the likely response of different species to the proposed MPAs. Walters, Hilborn and Parrish (2007), for instance, created a simple model to predict the effects of three MPA packages on five historically overfished indicator species on California's Central Coast. The results of this study suggest that MPA packages proposed by the Marine Life Protection Act Initiative (MLPAI) will not be successful at improving fisheries yields unless accompanying fisheries management measures are successful. This and other studies illustrate how predictive models can be used to anticipate the effects of MPAs (Walters, et al. 1999; Walters and Martell 2004; Hilborn et al. 2006), and thus can inform predictive socio-economic modeling as well. If such models can provide stakeholders with choices about likely spatial biological and economic MPA scenarios, stakeholders would be more likely to participate in the planning process.

While knowledge of use patterns is fundamental to MPA siting and management issues, it is also important to understand the economic, political, social, and ecological forces that underlie use patterns. These forces provide a context for managers to understand how and why stakeholders behave the way they do, and how changes in the management regime will affect them. For example, a fisherman might harvest species X at a certain location for several different and possibly overlapping reasons, such as: a) species x only exists in this location, b) this location is closest to the fisherman's port, c) weather patterns make fishing easier at this location, d) this is the location where the fisherman's family has fished for generations, e) the fisherman doesn't know that species x exists in other locations, f) State or Federal regulations disallow the fishermen from fishing in preferred areas, etc. Knowing this information would better inform MPA siting decisions, and allow managers to respond to stakeholder concerns with specific interventions such as subsidies or education.

Spatial information about marine resources is often extremely valuable to resource users and they are unlikely to yield this information to managers and other stakeholders (Maurstad 2002, Silver and Campbell 2005). Even if spatial information about use patterns is accurately described by stakeholders, faulty social science methods and analyses can skew the data in ways that can harm stakeholder livelihoods when MPA siting decision are made. In a previous study of potential MPAs on California's Central Coast, Ecotrust was contracted to collect and analyze commercial and recreational spatial socio-economic fishing data in order to help decision-makers review MPA packages in the MLPA Initiative process (Scholz et al. 2006). The data collection and analysis in this study was flawed in several ways, and led to the adoption of an MPA system that created uneven costs and benefits to different types of resources users, and to different people within the same user group (McCay et al. 2006). Major inadequacies of the study

included: a sample of interview participants that was too small and un-stratified; single species units of analysis as opposed to fishery groups that are more commonly harvested by individual fishermen; and a weighting system that skewed the relative value of harvest for individual fishermen (Ibid.). Among the problems resulting from the study was that some fishermen's use patterns were unaffected while other fishermen were completely displaced by the new MPAs (Ricketts, personal communication 2007). In order to improve the results of future studies by Ecotrust, several improvements can be made to the methodology, and these have been outlined in detail by McCay et al. (2006).

However, given the extremely sensitive nature of fishermen's information, it may be impossible for Ecotrust to gain the trust of fishery participants that is necessary to collect accurate data in future studies (Grafton 2005; Sall 2007; Sekhar 2007). Apart from the problems outlined above, one fisherman's confidentiality was violated during the Ecotrust interview process. According to Tom Hafer:

> I got a call from another fisherman about his interview with the Astrid [Ecotrust] team. He told me that the girls [field staff conducting the interviews] showed him all that I had done and said in their meeting with me the day before. I signed a contract that stated that all my information was confidential. This is a breach of that contract. I called Astrid and told her I was upset and she apologized and said the "girls" didn't know better, but I didn't believe her, because the "girls" had gone over the confidentiality agreement with me in advance. She wanted to know how she could make up for it but I told her the damage was done. (Tom Hafer, personal communication).

Confidentiality was stated as a principal tenet of the data collection process designed by Ecotrust. According to the consent form provided to fisheries participants in the data collection interviews, "only Ecotrust staff (operating under a strict confidentiality protocol) will handle the raw data generated during the interviews. All information collected in the interviews is anonymous and confidential on the individual level." Information about this breach of confidentiality spread throughout the fishing community and created mistrust and animosity toward Ecotrust, and has exacerbated fishermen's reluctance to share social and economic information with any social scientists or marine management agencies working in the area.

Perceptions, Attitudes, and Beliefs about the MPA Area, its Values, and its Uses

Perceptions, attitudes, and beliefs of marine stakeholders shape their behaviors and choices related to resource use. While natural science attempts to define single truths about the natural world, MPA planners and managers must accommodate the reality that different resources users may have radically disparate opinions about the location, characteristics, values, and uses of marine resources and ecological processes (Gelcich et al. 2005; Weible 2007). Furthermore, different stakeholders may have differing opinions about the utility and risks of MPAs and other management practices (Pomeroy and Beck

1999, Crosby et al. 2000; Fiske 2002). Conflicting perceptions, attitudes, and beliefs should be studied, addressed, and mediated in order to avoid contentious, protracted, and expensive planning processes, in addition to illegal uses in the resulting MPAs (White et al. 1994; Suman et al 1999; Alder et al. 2002; Himes 2003).

A planning process that fully engages a full range of stakeholders can contribute to a shared sense of the problems and opportunities inherent in an MPA (Pomeroy 2002; Dalton 2005; Carey et al. 2007). Genuinely incorporating the beliefs, attitudes, and perceptions of all stakeholders will improve the attitudes of stakeholders toward management, and the success of an MPA (Crosby et al. 2000; Pollnac at al. 2001; Agardy et al. 2003; Richardson et al. 2005; Alcala and Russ 2006). Similarly, according to NOAA directives and social science publications, socio-economic goals should be prioritized alongside conservation goals (Wahle et al. 2003; NOAA 2005), which has not been the case in the majority of MPA planning processes (Leslie 2005; Richardson et al. 2006).

The diverse expectations of stakeholders should be considered as well. Managers should present a realistic portrait of what can be expected from an MPA in both ecological and socio-economic terms. Along with this, stakeholders should be made aware that there are many unknowns in MPA science, and that beneficial outcomes are not guaranteed (Wolfenden 1994; Kaiser 2005; Holland and Schnier 2006; Hiddink et al. 2006; Jones 2007). In many cases, the commitment to adaptive management of an MPA has promoted positive stakeholder (particularly fishermen) involvement in the process, and higher rates of satisfaction and compliance with the resulting regulations (Russ and Alcala 1999; Clifton 2003; Uychiaoco et al. 2005; Danielsen 2005; Gelcich et al. 2005; Aswani 2005; Davis et al. 2006; Cinner et al. 2006).

As in many case studies documenting the establishment of MPAs, there is a particular disjuncture between the attitudes, perceptions, and beliefs of fishermen and environmentalist/protectionist stakeholders in the MBNMS. The attitudes, perceptions, and beliefs of fishermen have been especially shaped by the historical context of the establishment of the Sanctuary. Previous experiences among and between stakeholders and managers should be acknowledged in MPA planning processes. Prior experiences can go far to set the stage for new cooperative planning processes and co-management plans. During its inception in 1992, fishermen were assured by NOAA, environmentalists, and state and local decision-makers, that the Sanctuary would not impose regulations on fishermen (McLaughlin 2003). This historical agreement has significantly shaped fishermen's attitudes toward Sanctuary management. Former Congressman Leon Panetta was quoted as saying "I think the reason we were able to get such a large consensus [for the creation of the MBNMS] was that I made it clear the sanctuary wasn't going to represent a whole new bureaucracy imposing regulations on fishermen" (Ibid, p. 8B). Congressman Sam Farr recounted the "promise" made to fishermen in a letter to the MBNMA management, dated January 31, 2002:

> …in the process of building support for the designation of the sanctuary, a clear commitment was made to the fishing community that the sanctuary

> would not impose any regulations directed at fishing activities or fishing vessels. This agreement is based on the understanding that the fisheries within the sanctuary are already being regulated and that there is neither the necessity nor the resources for the National Marine Sanctuary Program to take on this responsibility. This management plan review process should not be used as a means toward altering this basic agreement. The regulation of fishing in the Sanctuary should remain under the jurisdiction of the California Department of Fish and Game and the Pacific Fishery Management Council. Any future reexamination of this relationship should be conducted directly with representatives of the fishing community and these two agencies.

In addition, a number of elected bodies in the Monterey Bay region have urged the Sanctuary to respect the promise made to the fishing community. Thus the prospect of creating MPAs in the Sanctuary has broken the trust that fishermen felt for management, has infuriated fishermen, and has made them reluctant to participate in future management processes. There is consensus among fishermen that the fisheries should be managed and regulated by the State Department of Fish and Game and its Commission, and the Pacific Fishery Management Council, guided by the Magnuson-Stevens Act (Ibid.).[2] Dave Danbaum is a retired Monterey Bay fisherman who led local fishermen in their original negotiations with NOAA representatives during the establishment of the MBNMS. His statement summarizes the perceptions, attitudes, and beliefs about the potential for MPAs in the Sanctuary:

> Concerns from the fishing industry about a Federal program that would call the Central Coast a "Sanctuary", leading to possible new regulations of fishing by this agency, mobilized fishermen to work against and defeat Sanctuary designation in the mid 1980's. Then a proposal for a Monterey Sanctuary surfaced again in the early 90's. At this time, as a leader in local and state fisheries, and a member of the Pacific Fishery Management Council (holding the obligatory seat for the State of California) I was asked by our Congressional Representative to assist him in bringing the commercial and recreational fishermen together in support of the proposed Sanctuary. Early on, fishermen were clearly promised that the new Sanctuary would not regulate fishermen or fishing activities. If the Sanctuary had any concerns, they would work with us for a mutually acceptable solution. This promise was made both by elected officials, and also NOAA representatives. It was unequivocal: we wouldn't have to worry about this new agency. We would get benefits, like the ban on oil development, a water quality program, and enhanced and collaborative research with us for better knowledge on fish populations. These are all things fishermen value. Fishermen had had a positive working relationship with Gulf of the Farollones National Marine Sanctuary Manager Ed Uber. With the promise in place, we anticipated that we would have that kind of

[2] These regulations are reviewed in the below section on legal considerations.

> relationship with the new Sanctuary. Now, the reality is frustrating and disappointing. Fishermen perceive the Sanctuary as working to find ways to break this promise, especially over the MPA issue. Fishermen were deeply angered to see the MBNMS go on record as wanting a State MPA network that was even more extreme than what the State wanted, and which had zero support from the fishing community. Because of my deep involvement in bringing the fishing industry, elected officials and NOAA together in reaching the agreement that led to the creation of the MBNMS, I feel personally responsible for any adverse consequences now facing the fishing industry. If this Sanctuary breaks its promise made to fishermen by changing the Designation Document to regulate fishing, I will go to my grave regretting my support of the new Sanctuary, and regret my role in getting other fishermen to go along (Dave Danbom, personal communication).

The attitudes, perceptions, and beliefs of the environmentalist/ protectionist stakeholders are also important to account for in a socio-economic study of potential MPAs in the MBNMS. According to Kaitlin Gaffney, Chair of the MBNMS Conservation Working Group:

> Marine Protected Areas (MPAs), including marine reserves, are an important ecosystem management tool that can contribute to protecting the living marine resources and habitats of the Monterey Bay National Marine Sanctuary. MPAs are supported by scientific and policy experts and are closely aligned with the statutory goals of the National Marine Sanctuaries Act and should therefore be included in the Monterey Bay National Marine Sanctuary's suite of management tools.
>
> Scientific experts including the American Fisheries Society, the American Association for the Advancement of Science, and the National Research Council of the National Academy of Sciences, as well as policy experts such as the Pew Oceans Commission and U.S. Commission on Ocean Policy have all identified marine protected areas and marine reserves as important, even necessary, tools for protecting and restoring marine ecosystems (American Fisheries Society Policy Statement #31a, Protection of Fish Stocks at Risk of Extinction; National Research Council, 2001, Marine Protected Areas: Tool for sustaining ocean ecosystems, National Academy Press; Pew Oceans Commission, 2003, America's Living Oceans: Charting a Source for Sea Change; U.S. Commission on Ocean Policy, 2004, An Ocean Blueprint for the 21st Century: Final Report of the U.S. Commission on Ocean Policy).
>
> According to the National Academy of Sciences (NAS): "A growing body of literature documents the effectiveness of marine reserves for conserving habitats, fostering the recovery of overexploited species, and maintaining marine habitats." The NAS Report concludes: "Networks of

> marine reserves, where the goal is to protect all components of the ecosystem through spatially defined closures, should be included as an essential element of ecosystems management" (National Research Council, 2001, Marine Protected Areas: Tool for sustaining ocean ecosystems, National Academy Press, p. 176.) Both the Pew Oceans Commission Report and the U.S. Commission on Ocean Policy Report specifically recommend use of MPAs as an important ecosystem management tool.
>
> The Sanctuary system has a statutory mandate to "maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations, and ecological processes" [16 U.S.C §1431(B)(3)]. The many scientifically documented benefits associated with MPAs match closely the goals of the National Marine Sanctuary Program. Accordingly, the Monterey Bay National Marine Sanctuary should adopt a system of MPAs capable of helping to protect, restore and enhance sanctuary resources (Gaffney, personal communication).

These are only partial perspectives of the perceptions, attitudes, and beliefs of two stakeholder groups involved in the management of the MBNMS. Another relevant source of information about stakeholder perceptions, attitudes, and beliefs indicates that when considering the livelihoods of California's fishing families, a random sample of 801 California residents support harvest limitations over complete harvest bans, and that only 23% of seafood consumers would be willing to forgo buying California seafood knowing that doing so would drive family-run commercial fishing boats in California out of business (Responsive Management 2007). These examples illustrate that a spectrum of perceptions, attitudes, and beliefs typically exists both among and between stakeholder types, and that many individuals may identify themselves as a member of multiple stakeholder groups when deliberating complicated situations that encompass both environmental and economic considerations (Ibid.; Gelcich et al. 2005; Richardson et al. 2005). Thus, information about the perceptions, attitudes, and beliefs of all stakeholders should be collected in a comprehensive socio-economic study of the potential for MPAs in the MBNMS.

Economic Values

Understanding the costs and benefits of market (consumptive) and non-market (nonconsumptive) values of an MPA is essential to successful MPA establishment and evaluation (Pomeroy 2002; Wahle at al. 2003; Richardson et al. 2006). It is often theorized that MPAs will simultaneously generate ecological benefits in the ecosystem AND social and economic benefits to stakeholders (Hannesson 1998; Sanchirico and Wilen 1999; Amo et al. 2005). However, these theories are controversial, and have not been substantiated with empirical evidence in very many cases (Alcala and Russ 1990;

Dixon 1993; White et al. 1994, 2002; Russ and Alcala 1999; Badalamenti 2000; Alder et al. 2002; Oracion et al. 2005).

Capturing the total costs and benefits of MPAs is challenging because it is difficult to assign market values to certain features, or "off-site experiences" of the marine environment, and there have been few empirical studies on the extent to which MPAs can directly affect nonconsumptive values (Carter 2003). Qualities such as the aesthetic value of the seascape, the social value of sport fishing, the cultural value of belonging to or visiting a fishing community, or the ability to bequest marine resources to future generations, are nearly impossible to quantitatively calculate.

Attempts to account for multiple values of the environment have been conceptualized by neo-classical economists as "non-market valuation," which attempts to identify and quantify economic values associated with goods and services that are not traded in organized markets. There are a variety of different non-market valuation methods, such as "total economic value" (Pearce and Turner 1990), biological or ecosystem service valuation (deGroot et al. 2002; Derous et al. 2007), limits of acceptable change analysis (Roman et al. 2007), travel cost method (Davis and Tisdell 1996; Bhat 2003) and willingness to pay analysis (Togridou et al. 2006), among others. The applicability of each method depends on the specific type of values and policy context in question. These methods are reviewed in several papers, including Freeman (2003), Champ et al. (2003), Lipton and Wellman (1995), Louviere et al. (2000), Bateman et al. (2002), Mitchell and Carson (1989).

There is not a standard measure for non-market values in an MPA, and these methods have been widely debated and critiqued (Eberle and Hayden 1991; More et al. 1996; Bateman and Langford 1997). None of these methods can be legitimized in a theoretical or applicable sense from a neoclassical, psychometric, or general systems point of view. Because neo-classical economics depends on assumptions about human behavior conforming to mathematical logic, the assumed human behavior in the theory is highly artificial (Eberle and Hayden 1991). Notwithstanding these debates, the majority of economists working in this area conclude that the theories, data, and empirical methods are sufficient to warrant including estimates of non-market values for many ecosystem services (Boyd et al. 2004; Holland et al. forthcoming).

An analysis of the economics of an MPA is more useful when integrated into a spatial analysis of use patterns and ecological indicators (Smith and Wilen 2003; Young et al. 2007). Such a spatial economic analysis will allow planners to simultaneously maximize the ecological benefits of MPAs and minimize socio-economic impacts (Richardson et al. 2006). As mentioned earlier, an economic analysis of the effects of potential MPAs in the MBNMS should be done in conjunction with predictive modeling of the biological effects of potential MPAs.

Collecting spatial economic data is often difficult, yet critical to future socio-economic monitoring of an MPA. Collecting spatial data from stakeholders, particularly consumptive users, may be hampered by privacy concerns, especially when these data are

coupled with spatial information about extractive activities (Silver and Campbell 2005). In at least two instances – separate MPA designation processes in the Channel Islands, CA (Pomeroy and Hunter 2005; Leeworthy et al. 2005) and the Central Coast area of California (Scholz et al. 2006) – protocols have been designed that allow stakeholders to confidentially report their spatial economic information. Stakeholders' (largely commercial fishermen's) data were then displayed or published only at an aggregate level that protected the privacy and "trade secrets" of the individual study participants. Nevertheless, because of the aforementioned issues regarding trust relationships between stakeholders and management, many fishermen in each designation process disagreed with the results of the spatial economic analysis, and felt that the data collection and analysis processes were flawed, if not purposefully manipulated (Helvey 2004; Pomeroy and Hunter 2005; McCay et al. 2006). Wilen and Abbott note that the potential for strategic bias (or gaming behavior) by study participants in studies of fishermen's activities is great when there are weak cooperative relationships between regulators and fleets, and when fishermen perceive that their interview responses may influence future punitive policies (2006). Under these circumstances, fishermen may identify fishing areas incorrectly – either identifying the wrong area altogether, or inflating or deflating the size of a fishing location – in an attempt to prevent their fishing areas from being regulated or closed off by an MPA.

Community-wide Social and Economic Relationships and Linkages

MPA stakeholders are not the only individuals or groups that should be considered in the process of establishing an MPA. Social and economic relationships and linkages – also known as a commodity chain – extend beyond the immediate location of an MPA and beyond the individual stakeholder. For instance, resources that are extracted from an MPA pass through several hands and institutions along the way to the consumer, including receivers, processors, harbors, and other support businesses (Pomeroy 2002; Bhat and Bhatta 2006). Less quantifiable resources, such as the MPA as a recreational area or the fishing community as a tourism destination, are also linked to wider communities through tourism services and retail businesses. Thus the costs and benefits of an MPA must be analyzed at a community-wide scale which accounts for the myriad linkages in each commodity chain associated with an MPA. In the case of the MBNMS, for instance, the area's heritage of commercial fishing, and the ability of visitors to eat fresh, local seafood, are major draws for a robust tourism industry (Responsive Management 2008). Historic Cannery Row, Fisherman's Wharf, the harbor, and seafood are all featured prominently on the City of Monterey's visitor web-site and other tourism publications (http://www.monterey.org/visitorinfo.html).

Attention to community relationships contributed to the successful establishment of a widely supported National Marine Sanctuary in Fagatele Bay, American Samoa (Fiske 1992) and the Apo Islands Reserve in the Philippines (White et al. 1994). The failure to incorporate community-wide participation and analysis resulted in unsuccessful attempts to establish MPAs in California's Central Coast (Wood 2007), Puerto Rico (Fiske 1992), St. Lucia (Sanderson and Koester 2000), and the Galapagos Islands (Davos et al. 2004).

Another set of social and economic linkages that should be thoroughly examined is the combination of regulations that may exist in a given marine area, prior to the establishment of an MPA (Robinson et al. 2005). Many areas of state and federal waters off the coast of California are already subject to spatial (for instance depth), gear-specific, and/or species-specific closures. These restrictions on fishing can be seasonal, year-round, permanent, or created in temporary response to emergencies. There is little coordination in California among the various agencies responsible for enacting and managing marine regulations (the National Marine Sanctuaries, the California Department of Fish and Game, the Pacific Fisheries Management Council, and the Marine Life Protection Act Initiative). It is impossible to accurately assess the biological and socio-economic effects of new regulations because of the unsystematic timing of each regulatory process, and the lack of coordination among agencies. Better planning among the various agencies would improve the conditions for natural and social scientific baseline data collection and subsequent evaluations before and after the introduction of each regulation, in addition to allowing for cumulative analyses and a cohesive ecosystem approach to management.

The Legal Considerations Required by the National Marine Sanctuary Act in Relation to Stakeholders and Surrounding Communities

According to Ostrom (2005), institutions are:

> the prescriptions that humans use to organize all forms of repetitive and structured interactions including those within families, neighborhoods, markets, firms, sports leagues, churches, private associations, and governments at all scales (p. 3).

The governance of an MPA occurs through multiple, over-lapping institutions that may range from social agreements among local fishermen to international regulations. An enormous body of research on common property systems shows that local groups of resource users typically have a dynamic set of rules and reward/punishment mechanisms that governs the use of a given resource. This system of local governance can operate in concert with, in opposition to, or in the absence of overarching formal governance structures such as municipal, state, and national regulations. Several studies have illustrated how interactions between local and formal institutions have both supported and undermined the effectiveness of MPAs (Fiske 1992; Johannes 1998; Pomeroy and Beck 1999). Thus, it is critical for MPA planners to understand existing local and formal regulations prior to establishing new MPAs and their attendant regulations. Efforts should be made to integrate or complement existing norms within new regulations.

The potential for establishing MPAs within a National Marine Sanctuary poses questions about prior informal arrangements among and between managers, fishermen, and other stakeholders in a Sanctuary. It also calls for a review of the formal laws that govern the management of our National Marine Sanctuaries, and their relevance to new MPA

regulations. There have been several public discussions regarding the extent to which the National Marine Sanctuary Act (NMSA) should prioritize the protection of natural resources over multiple uses within the Sanctuaries (CINMS 2001). The NMSA does not address this concern directly. A study by Chandler and Gillelan (2004) attempts to answer the question: "Is the overriding purpose of the Act the preservation and protection of marine areas, or is it the creation of multiple use management areas in which preservation use has to contend with every other use, even exploitive ones like oil and gas extraction?" (p.10506). The authors conclude that throughout the history of the Act, the U.S. House of Representatives has encouraged both preservation and extractive uses, and that Congress has repeatedly confirmed multiple use as a significant purpose of the Act. The ambiguity of the intention of the NMSA underscores the importance of incorporating all stakeholder institutions, perceptions, beliefs, and concerns in the establishment and management of an MPA in order to foster management decisions that are supported by stakeholders while meeting management objectives and conservation goals (Dalton 2005).

Another critical legal question is the extent to which National Marine Sanctuaries may impose fisheries regulations under their management plans. The National Marine Sanctuary Act requires that Sanctuaries first allow the appropriate regional Fisheries Management Council – the Pacific Fishery Management Council in this case – to draft regulations in accordance with the Magnuson-Stevens Act and in cooperation with other appropriate fishery management authorities, such as the Department of Fish and Game.

Specifically, the National Marine Sanctuary Act states that:

> The Secretary shall provide the appropriate Regional Fishery Management Council with the opportunity to prepare draft regulations for fishing within the Exclusive Economic Zone as the Council may deem necessary to implement the proposed designation. Draft regulations prepared by the Council, or a Council determination that regulations are not necessary pursuant to this paragraph, shall be accepted and issued as proposed regulations by the Secretary unless the Secretary finds that the Council's actions fail to fulfill the purposes and policies of this Chapter and the goals and objectives of the proposed designation. In preparing the draft regulations, a Regional Fishery Management Council shall use as guidance the national standards of section 301(a) of the Magnuson-Stevens Act (16 U.S.C. 1851) to the extent that the standards are consistent and compatible with the goals and objectives of the proposed designation. The Secretary shall prepare the fishing regulations, if the Council declines to make a determination with respect to the need for regulations, makes a determination which is rejected by the Secretary, or fails to prepare the draft regulations in a timely manner… The Secretary shall also cooperate with other appropriate fishery management authorities with rights or responsibilities within a proposed sanctuary at the earliest practicable stage in drafting any sanctuary fishing regulations (Sec. 304. [16 U.S.C. 1434]).

A body of case law illustrates that courts have repeatedly ruled against NOAA in cases brought by injured parties seeking damages for fisheries regulations that cause disproportionate economic impacts on small businesses or on specific resource-dependent communities. As a result of these lawsuits and a general desire by federal decision makers that agencies assess economic impacts and identify lower cost regulatory alternatives, NOAA fishery management decisions are required to be defensible based on scientific merit and on the rigor and timeliness of the underlying social science (Hendricks 2000). The key statutes governing this change are:

- the 1980 Regulatory Flexibility Act (RFA) (5 USC 601 et seq.) as amended under the 1996 Small Business Regulatory Enforcement Fairness Act (SBREFA) (5 USC 801 et seq.),
- the 1993 Executive Order #12866 (Regulatory Planning and Review).

These laws require judicially reviewable economic impact assessments for any regulations that create major impacts on the economy or significantly affect small business. Furthermore, economic and social impacts analysis must be rigorous on a par with scientific concerns and analysis. A report on these issues identified a variety of barriers that preclude NOAA from providing such rigorous and timely economic and social analysis (Ibid.). These include:

- Insufficient staff levels of economists and social scientists.
- Fragmented data availability and the lack of sufficiently detailed data.
- Unclear guidance on administration of analysis, and the absence of clear standards.
- Inadequate coordination of existing and potentially available resources.
- Lack of communication across offices in developing new capacity to address economic, social, and community based issues.
- Lack of trust and common understanding among NOAA, oversight bodies, and the regulated community, and insufficient structures for rapidly addressing constituent concerns.
- Need for earlier inclusion of economic analysis in policy design (Ibid. p. 5-6).

The above mentioned laws emphasize the critical need for thorough social and economic analysis of potential or proposed MPAs in the MBNMS. The report by Hendricks implies that NOAA may not have the capacity to undertake such a study.

The haphazard introduction of multiple fisheries regulations by different agencies in California (as discussed in the previous section) renders these agencies particularly vulnerable to lawsuits based on the lack of scientific rigor in assessing cumulative economic impacts. Data show that regulations enacted in the last decade in the central coast reduced landing for several species that were not overfished. As a result, the value of landings in the ports adjacent to the MBNMS has declined by 58% in the past decade (Parrish, this report). These data – which suggest the cumulative effects of multiple and overlapping regulations – pose questions about the legality of additional fisheries

regulations in relation to the Regulatory Flexibility Act, the Small Business Regulatory Enforcement Fairness Act, and Executive Order # 12866.

Social Science Methods for Incorporating Human Dimensions Analysis in MPA Design

Social science research methods and public participation go hand in hand when planning for and monitoring an MPA (Pomeroy 2002; Christie, et al. 2003; Dalton 2005). Different forms of eliciting public participation include public hearings, soliciting written comments, workshops, advisory panels, and focus groups. Despite ostensible good intentions, opportunities for public participation do not always foster meaningful dialogue between and among stakeholders and managers, and they can also created biases toward stakeholders who have more expertise, time, or interest in attending meetings.

Based on an analysis of U.S. terrestrial resource management case studies, Dalton (2005) outlines five goals of effective public participation in MPA decision-making. These are:

- active stakeholder involvement,
- complete information exchange,
- fair decision making,
- efficient administration, and
- positive participant interactions.

While public participation is crucial for MPA decision-making, it does not replace the necessity of the systematic, reliable, and valid collection of social and economic information that is necessary to establish and monitor an effective MPA in particular, and the wider ecosystem in general (Pomeroy 2002). The types of social science information outlined in this paper can be collected through a variety of overlapping methodologies. There is not a one-size-fits-all methodological approach to collecting social science data for MPAs. A protocol of several complementary methods should be designed based on the circumstances of each project. In addition, a positive and trusting relationship among social scientists and stakeholders is absolutely fundamental to the success of the social science research undertaken.

In the case of the MBNMS, it is evident to many stakeholders that a lack of trust between stakeholders and sanctuary management has characterized the process to date to consider MPAs in the MBNMS (Scheiblauer, personal communication).[3] Should a socio-economic analysis be undertaken in regard to potential MPAs in the MBNMS, the problematic relationships between and among managers and stakeholders can be improved by a thorough, thoughtful, and transparent program of social and economic data collection and analysis.

[3] To date, several letters from stakeholders have been submitted to MBNMS managers regarding trust issues and other problems related to the process of considering MPAs in the MBNMS. Some of these can be accessed via the MBNMS Sanctuary Advisory Council meeting agendas and minutes records, at: http://www.montereybay.noaa.gov/intro/advisory/advisory.html .

The following publications and web-sites are useful sources of information about social science methods for studying marine management in general and MPAs in particular:

- The NOAA Coastal Services Center provides a useful web-site that inventories potential methodological tools that can be used for various types of social science analyses regarding MPAs: http://www.csc.noaa.gov/mpass/.
- Wahle, et al. outline common research methods and approaches that can be used to elicit social science information about MPAs (2003, pp.26-27).
- The United Nations Food and Agriculture Organization (FAO) has published a technical paper to help fisheries officials better understand the cultures of small-scale fishing communities in order to develop more successful management policies and practices. Methods which might help fisheries managers to obtain trustworthy and reliable information about fishing cultures in an ethical manner are also suggested, including methods for rapidly acquiring important information while working within tight budgetary and time constraints: http://www.fao.org/DOCREP/004/Y1290E/Y1290E00.HTM
- The National Marine Protected Areas Center in cooperation with NOAA has published a guide to stakeholder participation, with useful sections on how to design, facilitate, and evaluate effective participatory processes. This publication also outlines regulatory requirements for public participation in MPA decision-making processes (Kessler 2004). http://www.csc.noaa.gov/mpa/Stakeholder_Synthesis.pdf

Conclusion

This chapter covers the key areas of social science research and analysis that are widely considered necessary for the effective planning, implementation, monitoring, and evaluation of an MPA. If it is determined that MPAs are an appropriate and necessary management tool for the MBNMS, a thorough social scientific study should be conducted and meaningfully integrated with ecological analysis, to determine the optimal placement of MPAs. It is also imperative that subsequent human dimensions data should be collected on a regular and on-going basis in order to document the socio-economic effects of the MPA, in addition to providing direction for adaptive, sustainable management of the MBNMS's marine resources. These efforts should also be expanded and integrated with analyses of ecosystem-wide biological and human processes.

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MPAs and Research Needs within the Monterey Bay National Marine Sanctuary

By Doyle Hanan

There are uncertainties regarding the effectiveness of MPAs especially in temperate regions (see Auster and Shackell, 2000; Salomon *et al.*, 2002; Kaiser 2005; Laurel and Bradbury, 2006). Research is required to improve scientific knowledge regarding MPAs while providing guidance to resource managers about the efficacy of MPAs, especially when considering new MPAs within existing national sanctuaries. Moreover, research and monitoring within and around MPAs should promote better understanding of optimum design and ecological conditions, as well as, socioeconomic costs and benefits for targeted resources. To correctly evaluate potential population and habitat effects, research must provide baseline knowledge of species and environmental condition; then management can act utilizing this best available scientific knowledge.

Management consideration of existing regional fisheries, fisheries regulations, and area closures is imperative when evaluating the usefulness of MPAs with respect to the resources they are designed to sustain (i.e. meeting the NOAA 2006-2011 Strategic Plan's goal of increasing the number of fish stocks managed at sustainable levels; see NOAA, 2005). As a tool for managing fisheries resources, MPAs are touted as able to sustain low productivity stocks and optimize production of healthy stocks with an overall goal of re-establishing or maintaining “biodiversity” of an ecosystem under consideration. However, MPAs cannot operate independently of other forcing factors acting upon the ecosystem in question and as noted by Field *et al.* (2006), fishing is typically the primary action limited by MPAs. Therefore, MPA effects on fish stocks, fisheries, and ecosystems in general must be central to any policy decisions concerning MPA implementation.

Scientific information regarding the effects of MPAs on marine resource population dynamics is essential to understanding the subsequent effects on fisheries yield and to assessing the overall effectiveness of MPAs for increasing the "number of protected species that reach stable or increasing population levels" (NOAA, 2005). MPAs may have the potential to alter life-history parameters such as growth and natural

mortality rates as a result of changes in community structure (predator, competitor, and prey abundance). For example, Boersma and Parrish (1999) remarked that, in theory, MPAs allow population growth in fish species through decreased adult mortality and increased average female fecundity. In such case, the production of adults and larvae and possible spillover to outside areas might ensure a sustainable population of these resources. However, increased size, abundance, and diversity of upper trophic-level species could also alter community structure and inadvertently increase mortality on populations targeted to benefit.

Hilborn *et al.* (2006) developed two quantitative models to evaluate California central coast MPA design criteria, based on adult and larval movement, as well as, population dynamics. Their models predicted very little build-up of species within these proposed MPAs over time and concluded that any notable increases in abundances would only be achieved for highly sedentary species such as abalone. In addition, Hilborn *et al.* (2006) demonstrated that the most critical parameters for MPA designation are not larval dispersal rates, but: 1) adult movement rates and 2) compensatory changes in post-settlement juvenile survival rates. These findings point to general research needs that should be addressed when considering establishment of MPAs within MBNMS, and include assessments of density and overall stock size in addition to life-history information for each life stage of commercially exploited and unexploited resources. Fisheries-based information particularly near MPA boundaries should be rigorously evaluated for potential effects of MPAs and reserves on life history trends and habitat condition in proposed MPA areas and boundaries.

The discussion below includes a general synopsis of current MBNMS research capabilities, followed by a brief description of regulatory-imposed research constraints and proceeds to an outline of research needs for MBNMS with regards to establishment of MPAs. Given these considerations, the research and monitoring needs should be evaluated with this question in mind:

<u>Given the number of MPAs and closures extant within and near the MBNMS, and the habitat variability of these areas, are additional MPAs warranted to accomplish NOAA and MBNMS research needs?</u>

CURRENT MBNMS RESEARCH CAPABILITIES

Under the auspices of NOAA, MBNMS takes an "ecosystem approach to management." Within NOAA's strategic plan it is stated that management is "adaptive, specified geographically," and "takes into account ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse social objectives" (NOAA, 2005). Toward this approach, MBNMS has constructed a long-term monitoring (Sanctuary Integrated Monitoring Network (see www.mbnms-simon.org) and research program, and numerous research studies have been conducted within the sanctuary (see www.montereybay.noaa.gov/research/techreports for a list of studies dating from 1994). According to MBNMS, these programs employ a multidisciplinary approach, attempting to integrate five broad categories: 1) existing knowledge regarding the protected marine environment, 2) monitoring long-term changes of resources and their environment, 3) experimental studies, 4) modeling, and 5) information management.

MBNMS contains an existing array of closures (see Figures 1-3; Table 4 - Parrish section of this report). Of the 5,322 total square miles within MBNMS, reserves and closures now encompass more than 60% of nearshore rocky habitat, shelf, shelf break, slope, and abyssal regions. With the potential inclusion of the Davidson Seamount, the MBNMS will have an additional 660 square miles of unique deep-water habitat, which will require even more specialized logistics and research. Considering funding and staffing constraints, effectual assessment and management become an enormous task for MBNMS. Numerous logistical considerations must be taken into account while developing reliable research and monitoring regimes in addition to the sanctuary charge of cataloging and monitoring all species within MBNMS. If federal funding is not readily available, other funding sources such as grants and private funding might be attempted. However, a cautionary note applicable to scientific endeavor, private funding may present conflicts of interest due to potential organizational bias and interests from the funding source.

While the research goals and programs of the MBNMS are commendable, pressing research needs should be prioritized and addressed to determine the baseline status of exploited and unexploited resources and their habitats. It appears that no additional closed areas, reserves, or MPAs are required within MBNMS to accomplish

the research and monitoring objectives. These include biological community structure surveys, assessments of density and overall stock size, collection of life-history information for both commercially exploited and unexploited species, as well as, research on movement patterns of adult, juvenile, and larval fish, and collection of fisheries-based data.

RESEARCH CONSTRAINTS

Comparing Marine Protected Areas with Outside Regions

Theoretically, MPAs provide spatially based (pre-defined "control") areas as ecological reference points to which other marine regions can be compared. Such comparisons are often necessary for assessing the overall effectiveness of MPAs. However, caution must be used when attempting to make scientific comparisons between MPAs and outside areas. Specifically, the comparison of biological parameters (e.g. abundance, size, and biomass) for individuals of a species inside MPAs to those in outside regions presents numerous difficulties. There have been only a few studies examining before and after changes within MPAs compared to reference points outside, and overall, data quality is variable and results are mixed (see Micheli *et al.* 2004; Botsford *et al.,* 2006). For example, reserves are often situated in areas of high productivity, biodiversity, and abundance (Bergen and Carr, 2003) whereas nearby regions outside the MPA are usually less productive or may become overfished because the MPA limited access to the productive fishing area. For this reason, it is very difficult to compare changes in ecological considerations such as biodiversity. Movement of fish into and out of MPAs can lead to misinterpretation of fisheries data and the efficacy of MPAs (e.g. CPUE can be increased as adults migrate to fishing areas with increased/concentrated fishing effort; see Parrish, 1999).

There are difficulties in assessing the effects of MPAs when outside areas are strictly regulated. For example, there is no bottom fishing in the entire non-trawl Rockfish Conservation Area (RCA) as well as no trawling in state waters or within the federal essential fish habitat (EFH) designated area and no commercial or recreational non-trawl bottom fishing from 30-150 fathoms. This curtails catch for groundfish inside

or outside of reserve areas in shelf or shelf break habitats. According to these regulations, there is no fishing for bottom fishes in regions inside and around the four deep water MPAs (Soquel Canyon, Portuguese Ledge, Point Lobos, and Big Creek), and in the deeper shelf areas (55-100 meters) of other reserve areas. It will be prohibitively expensive to assess the effectiveness of a large number of MPAs for a wide range of species (e.g. rockfish spp.) when there is no fishery dependent data available. To make up for this lack of data, agency research can be pursued, however ship time is very expensive and available time on established research cruises is difficult to secure. Therefore, the research is not likely to be accomplished.

Species likely to be fished in areas adjacent to MBNMS MPAs are Dungeness crab in shelf waters, spot prawn on the shelf break, and sablefish in waters deeper than 150 fathoms. Because sablefish are highly mobile on a large spatial scale, they would be protected by only very large MPAs and results of research on this species would also be limited by spatial constraints. Thus, perhaps some of the most pressing research needs (those of stock assessment and species movements into and out of MPAs) will be difficult (in some cases impossible) to obtain for species protected by MPAs within MBNMS.

Limitations on Species Caught Within Marine Protected Areas

The quantitative models developed by Hilborn *et al.* (2006) to evaluate California Central Coast MPA design criteria, demonstrated that the benefits of reserve size is highly sensitive to adult mobility of species intended to benefit. They concluded that all of the proposed central coast MPAs would have very little positive impact on increasing populations because of their small size and relatively high adult mobility of predominate marine resources. The 2006 fishery landings for the Monterey Port area include all of the fish landed inside the MBNMS study area (see Table 1 - Parrish section of this report). Epipelagic fishes, which are highly mobile, comprised 96.1% of the catch. These species would likely not benefit at the population level from MPAs within MBNMS nor would potential MPAs provide sufficient area for meaningful research on these species. The species that dominate the lower and middle trophic levels of the California Current are primarily epipelagic, mesopelagic, and bathypelagic species that will not be effectively

protected by MPAs of the size under consideration in California nor within the available area of MBNMS; therefore additional MPAs within the sanctuary would likely be ineffectual.

MBNMS RESEARCH NEEDS

Before-After-Control-Impact (BACI) Analysis

Before-After-Control-Impact (BACI) observational studies are necessary to determine the impacts of potential environmental changes on population abundance, and should be incorporated into MBNMS MPA research planning prior to establishment of MPAs. The BACI approach can be used to assess abundance trends of resources within each MPA (or potential control site), and in adjacent or nearby areas (impacted site) for powerful comparative statistical analysis. The basis of the approach is to evaluate environmental disturbance or anthropogenic effects in an impact location that might cause a different pattern of change (before to after implementation of MPAs) compared to natural change in a control location. This can be detected as a statistical interaction in an analysis of variance (ANOVA) of replicate comparisons. BACI analysis can provide high levels of sensitivity for detecting impacts on marine communities or assemblages. However, in long-term studies, effects due to MPAs may be difficult to separate from those due to other sources. Thus, pairing treatments of control and impact sites requires thorough consideration because notable differences may cause the sites to respond differently to the same occurrence.

If MBNMS MPAs are phased in over time, it will be important to use an experimental design that accounts for time-treatment interaction. Hilborn *et al.* (2006) provided a case specific example of such an interaction, as whether the impact of MPAs, such as recovery of larval sources for juvenile settlement in protected areas, changes over time with changes in ecological conditions or due to protection from offshore fishing effects. To assess this type of time-treatment interactions and account for transient responses to the application of treatments, a staircase design could be used to stagger treatments applied to the experimental units over time (Walters *et al.,* 1988). Using a staircase design, environmentally similar experimental areas are paired and monitored

overtime.

RECOMMENDATION

Before-After-Control-Impact analysis should be applied to MBNMS MPA monitoring surveys.

Biological Community Structure Surveys

Biological community structure surveys should be conducted, designed as a replicate BACI study, to monitor simple indices or trends in biodiversity (species abundance, diversity, percent occurrence) for large numbers of species in various habitats represented within MBNMS. Hilborn *et al.* (2006) noted that transect sampling regimes can be conducted with transects oriented across the strongest spatial gradients to survey across depths and sample many possible sites. Transect sampling can result in precise estimates over very large survey areas, but does not allow for the statistical power that more costly and labor intensive survey methods, such as stratified random sampling surveys can accommodate. Given the extremely large monitoring programs required for MBNMS, the risk of bias involved in transect sampling may be worth the surety of collecting observations at the largest possible number of sites.

It will be useful to map and measure habitat, distribution and abundance of key species, identifying habitat types and delineating habitat boundaries. Habitat features such as substrate, any plants, corals, live-bottom reef habitats, and water quality must be assessed. Methods of obtaining species and habitat information on a large-scale, including technologies such as fixed acoustic arrays (see Kenny *et al.* 2003) and remotely operated vehicles (ROV) can be used to examine habitats, as well as, fish and invertebrate species. Where possible, scientific survey techniques using commercial trawling gear should be used to obtain catch composition and biological information for deeper water species (this has succeeded with the NMFS Cooperative Groundfish Trawl Program).

RESEARCH OBJECTIVE 1.

Survey efforts must be carefully planned and implemented swiftly to ensure baseline information is collected before MBNMS MPAs are established. The Big Creek

(and Punta Gorda) baseline should be resurveyed before any permanent monitoring program is designed. Subsequent to baseline surveys, long-term monitoring regimes should be established at multiple locations. Methodology for this type of work is not well developed for areas beyond diving depth and for species that are not sedentary. In particular, species that aggregate (i.e. bocaccio, chilipepper, and widow rockfishes) are very difficult to quantify with the sampling intensity usually used in scientific surveys.

Density and Overall Stock Size

Stock assessments are needed for both commercially exploited and unexploited species of resources within MBNMS. The status and trends for species of economic importance must be evaluated to ascertain baseline abundance information before MBNMS MPAs are established. Further, the status of many species that have not been exploited needs similar baseline evaluation. At a minimum, stock assessments must be conducted for a few key indicator species inside and outside of MPAs. As discussed above, un-assessed species that may be of concern include those occupying habitats where extensive fishing has occurred in the past. Species in nearshore habitats affected by pollution and/or manmade environmental changes may also have low population abundances, as could cold-water species adversely affected by the warm water regime that has persisted since the late 1970's. These factors should be considered when selecting species for study.

RECOMMENDATION

A set of key indicator species should be compiled for research comparisons. The species should represent commercially exploited and unexploited populations, and sedentary and mobile species.

RESEARCH OBJECTIVE 2.

Stock assessments should be completed for the representative set of key indicator species.

Life-history Information

Studies of life history parameters at varying population densities are needed for fish and invertebrate species of economic importance within MBNMS. MPAs are likely to contain variable fish densities among regions and over time. The life stages most sensitive to density-dependent effects on recruitment and growth, should be determined in an effort to understand if MPAs potentially increase recruitment locally, or through dispersal of pre-recruits to adjacent areas open to fishing.

Life-history information collected from unfished sites (sites within MPAs/no take areas) must be compared to that from fished sites, to assess fisheries vs. environmental effects and to determine density dependent effects on natural history rates between sites. One may expect most density dependent factors (recruitment, growth at age, natural mortality, age at maturity, fecundity at age, natural mortality) to reduce productivity at high population density, but some life history rates, such as fecundity/unit total biomass, may increase in unfished sites due to increased average age.

RESEARCH OBJECTIVE 3.

Life-history information should be collected for all life stages of the representative set of key indicator species to assess density-dependent effects on recruitment and growth.

Movement Patterns

The single most critical need for evaluations of the effectiveness of MPAs is information on the movements of exploited species. It is imperative to monitor potential export of adults, juveniles, larvae, and eggs from existing MBNMS protected areas. Field et al. (2006) emphasized that movement and dispersal of larvae, juveniles, and adults impact both the efficacy of MPAs and fisheries yields. In the case of commercially exploited species, tracking the dispersal of adults is important for the interpretation of fisheries data and understanding fisheries yields. Tagging devices can be used to track movements from MPAs to outlying fishing areas, where marked adults can be captured or observed. Data on dispersal distances and numbers of marked adults captured outside of MPAs should be collected to assess potential spillover effects of MPAs due to natural movements. This can be especially important at MPA boundaries where spillover of

adults may affect fisheries yield. Traditional tags can readily be used for tracking the adults of some species, and now electronic tags with microprocessors, some even with GPS tracking capabilities, are available. In addition, acoustic telemetry tracking has been successful.

Tagging studies on the rockfish species in deeper habitats are likely to face real difficulty due to the problems associated with air bladder and eye inflation when rockfishes are brought to the surface. Also, the Rockfish Conservation Area will prevent tag and recapture studies on the important shelf break species because fishing for these species is presently prohibited over most of the species core habitat and it will therefore be impossible to get enough recoveries to assess movement. It should be noted that while research on the movement of species is very important for assessment of MPAs, MPAs are not needed to carry out research on movement.

Information on larval and juvenile dispersal and recruitment is also important to understanding of the effects of MPAs on fish population dynamics and on fisheries. Biological data for these life stages can be analyzed along with physical information on hydrography, season, and inter-annual climate variation to provide insight to dispersal patterns.

Detection of signature geochemical compounds in otoliths, statoliths, and exoskeletons, as well as, tag and release studies using florescent chemicals in otoliths have also been used to study dispersal patterns in larval fish and in invertebrates (see Miller *et al.,* 2004). Research on genetic differentiation for populations of fish and invertebrates can reveal patterns of gene flow and provide inference about dispersal patterns at varying life-history stages (Sotka *et al.,* 2004).

RESEARCH OBJECTIVE 4.

Tagging and tracking studies should be conducted on the representative set (or subset thereof) of key indicator species. At a minimum, tagging studies should be undertaken to document movements of adults. Documentation of movements at various additional life stages is also advised. Where practical, studies of genetic differentiation may allow inferences of information over broad geographic region. The potential for genetic research on some species should be explored.

Fisheries-Based Information

Fisheries-based data could also be used to indirectly evaluate potential spillover just outside MPA (in outlying fishing areas and at boundaries; but see Field *et al.,* 2006 for a discussion of potential bias). These data should be collected, at a minimum, for few indicator species in the major fisheries. In addition, to achieve some insight into the effects of recreational fishing within MBNMS, the numbers of active fishing licenses, total fishing effort, and spatial distribution of effort should be assessed.

RESEARCH OBJECTIVE 5.

A thorough fisheries assessment for the commercially exploited subset of selected key indicator species should be conducted for MBNMS before MPAs are established.

SUMMARY

Recently twenty-nine California central coast MPAs (effective 21 September, 2007) were incorporated into a state nearshore reserve system. The new federal EFH network of MPAs (effective June 12, 2006) includes three federal MPAs inside the MBNMS (1,435 sp. mi.) and the Davidson Sea Mount (775 sq mi.). More than 60% of the NBNMS study area is now protected by reserves. Therefore, it is a critical time to consider the potential success of any MBNMS MPAs, as well as, ensuring the proper assessment of the system's effectiveness in those endeavors. Within the 4,217 sq. mi. MBNMS study area, reserves and closures occupy a predominance of nearshore rocky habitat, in addition to shelf, shelf break, slope, and abyssal regions. Thus, the existing Sanctuary, and especially with the addition of the Davidson Seamount, encompasses the important habitats in the MBNMS region. Administrators of MBNMS are faced with the already enormous task of prioritizing and implementing research objectives. Baseline physical and biological information on habitats and species should be assessed before MPAs become established. Accommodations that facilitate fisheries resource monitoring and stock assessment should be identified and implemented. Also, there is substantial uncertainty regarding the appropriate size and spacing, implementation and effectiveness of MPAs in general. MBNMS administrators should assess the effectiveness of existing

MPAs and closed areas prior to designating additional MPAs.

The record on funding MPA monitoring and research in California is not good. In 1993 three reserves were enacted in California, two of these had extensive surveys and monitoring in the first year (Punta Gorda), or first couple of years (Big Creek) after the reserves were established. To date, there has been no follow up monitoring, repeat of surveys or analyses on the success of the reserves in protecting individual species or any analysis of ecosystem effects of MPAs (which is far more difficult than assessment of trend of individual species). Based on the number of MPAs in the South/Central phase of the State MLPA process and the Channel Islands process; the expected number of MPAs in California is expected to exceed 100 by the time the MLPA process is completed. In addition an extensive network of reserve areas (EFH) was recently established by the Pacific Fisheries Management Council. It is clear that there will soon be intense competition for funds to study MPAs and other reserves, it is unlikely that funding will be anywhere near the amount necessary to adequately monitor or research the reserves and MPAs expected to be in existence in California by 2010. It is clear that the limiting factor will be funding for monitoring and research, not availability of MPAs.

In conclusion, based upon this examination of MBNMS research needs, three points should be restated regarding research objectives: First, given the extent of the existing MBNMS protected areas, funding and other logistical constraints are likely to limit the ability to implement basic research needs. Second, sufficient baseline information must be collected in a timely fashion at multiple sites (already large in number) before permanent research and monitoring regimes are established. Third, given the uncertainties which surround the designation and management of MPAs, there is a responsibility to assess effectiveness of existing MBNMS protected areas prior to summarily restricting use of more ocean area.

Finally, no additional MPAs are required within MBNMS to accomplish the research and monitoring objectives reviewed and outlined here. These include biological community structure surveys, assessments of density and overall stock size, collection of life-history information for both commercially exploited and unexploited marine resources, research on movement patterns of adult, juvenile, and larval stages of important species, and collection of fisheries-based data.

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March 9, 2008

Dear Richard,

I have gone over the comments of your reviewer regarding the draft of "MPAs and Research Needs within the Monterey Bay National Marine Sanctuary." I note that overall the reviewer found that, "Most of the suggestions for research seem sound, and reflect much of the common themes regarding the needs for evaluating MPAs and using them to evaluate the effects of fishing and other factors on fish populations and the marine ecosystem. The author also brings up a number of good ideas about important complications in the conduct and interpretation of these research programs."

The document, “MPAs and Research Needs within the Monterey Bay National Marine Sanctuary”, is intended as a brief evaluation of the fundamental scientific research required to assess the effectiveness of the MPAs already in place in the Monterey Bay National Marine Sanctuary (MBNMS). As such it is neither positive nor negative regarding the existence and implementation of MPAs. However, as noted in the paper, given the fact that there is already an extensive network of reserves within the MBNMS study area, it is of critical importance to conduct basic scientific research now. It is important to be cautionary in the face of implementing more reserve areas without sound scientific basis. The MBNMS does have the responsibility to assess effectiveness of existing protected areas prior to implementing more reserves.

Sincerely,
Doyle Hanan

A REVIEW OF TRADITIONAL AND ECOSYSTEM-BASED FISHERY MANAGEMENT IN THE MONTEREY BAY NATIONAL MARINE SANCTURARY

Richard H. Parrish

ABSTRACT

The MBNMS study area appears to be heavily protected from overfishing and the many layers of regulations from the different management agencies prevent a large number of exploitable species from being fished at any appreciable level. This is particularly true of species in soft bottom areas of the nearshore and shelf habitats, the shelf break habitat, the deep slope habitat and the rise habitat. In federal waters a small number of species are presently being fished at moderate to optimum exploitation levels and the few species that were overfished in the past are now in rebuilding plans and their habitat has been heavily protected by the Rockfish Conservation Area (RCA). The most recent available landings (2006) show that the ports in or near the MBNMS have had large to extreme declines in the value of their landings over the previous 10 years. These most recent declines are primarily due to increased management measures (e.g., reduced catch limits and the RCA), in response to earlier stock declines, and do not reflect continuing declines of these species, especially the dominant exploited species. Numerous stock assessments show that the populations are responding to these management measures with total groundfish biomass rising substantially since about 1999. Thus management measures made prior to the establishment of the many MPAs in the MBNMS study area is preserving and enhancing ecosystem function and biodiversity. The ports of Santa Cruz, Monterey and Morro Bay are presently in severe decline and the loss of fishing infrastructure is a real threat to the fishing industry in these ports. Further declines in the value of the fisheries in the study area should be expected due to the very extensive areas protected by the federal MPAs, state MPAs and state waters trawl closures since 2006 (i.e. 62% of the total study area). It appears that the several agencies that have designated areas in the MBNMS as MPAs have acted in an un-coordinated manner resulting in the present situation with 64% of the MBNMS study area in MPAs, no analyses of the combined affects of MPAs and previous management actions, and no coherent overall strategy or goal.

INTRODUCTION

This section of the report is centered on the description of the present regulatory mechanisms that protect living marine resources and the present status and trends of these resources in relation to achieving overall ecosystem health, habitat protection, and sustainable resources including fished species. This analysis will show that many of the habitats in the study area have an array of permanent protective regulations in place to protect benthic organisms and the habitats themselves, and effectively prohibit the harvest most of their resident species. A number of species have been heavily exploited in the past are currently in a rebuilding status with most fishing gear excluded from the depleted species core habitat. These exclusions are resulting in greatly reduced landings of other species that share the depleted species' habitat. These spatial closures have not been declared permanent, and are expected to be lifted when the resources sufficiently recover, following the principle of "adaptive management"

promoted by the Pacific Fisheries Management Council (PFMC) and California's Marine Life Management Act (MLMA). The most optimistic version of the stock rebuilding model for bocaccio rockfish, the principal species of concern in central California, suggests that stock could be rebuilt as early as 2022 and the most pessimistic version suggests that the stock will not rebuilt until some time after 2033.

Traditional Fisheries Management

In the past when species were thought to be over exploited traditional fishery management largely relied on methods to reduce the efficiency of fishing gear, to exclude specific fishing gear from areas where the gear was thought to adversely impact other species or fisheries, or to close fishing for part of the year. Traditional management has also included a wide array of size limits, bag limits and restrictions that limit entry to commercial fisheries. In California this has resulted in a very large legacy of regulations that often failed to produce sustainable and profitable fisheries

A large proportion of the most important exploited stocks were harvested at rates that could not be maintained and some populations were driven to low or very low levels; for example Pacific sardine and Pacific mackerel in the 1950s, petrale sole in the 1970s, bocaccio and canary rockfish in the 1980s and lingcod and darkblotched rockfish in the 1990s.

Traditional fisheries management failed to produce sustainable fisheries for a number of species in California. However, there are also instances where the biology and behavior of a species has resulted in traditional fisheries management that produced sustainable fisheries. Dungeness crab and California spiny lobster are examples of invertebrate fisheries where traditional management (closed seasons, size limits, escape ports, and in the case of crab, no landings of females) has resulted in fisheries that have fluctuated have but been sustained under heavy fishing effort for many decades. These two species are captured with traps or pots that do little harm to the animals or the benthic substrate, and as these animals are particularly robust out of the water they can be sized and/or sexed and returned to the sea with little mortality. Some offshore groundfish species (i.e. California halibut and sablefish) can be returned to the sea with little mortality but it is not the case with most of the offshore groundfish species.

Biomass-based Single Species and Ecosystem-based Resource Management

Fortunately traditional fishery management for most of the larger exploitable populations, has evolved in recent decades to include quota-based management system with annual ABCs (acceptable biological catch) and optimum yields being established by control rules that utilize estimates of stock size determined by stock assessments. Stock synthesis population models were developed in the late1970s, and by the early 1980s it was apparent from these analyses that the populations of several important groundfish species had been in downward spirals for several decades. By the early 1980s the Pacific Fisheries Management Council (PMFC) limited the annual harvest of several rockfish species and, by the early 1990s, was actively establishing annual harvest guidelines that sharply scaled back the exploitation rates of the important groundfish species. By the late-1990s rebuilding plans were being developed

for species that had been overfished. The stock assessment process has been subject to a very rigid peer review process, the number of species with approved stock assessments has increased with time, and assessments are updated on a regular basis. Over the last decade allocation of the catch, limited entry and reduction of by-catch have been emphasized. Most groundfish species now have 2-month catch limits that are seasonally and regionally specific, and virtually all California commercial fisheries now have limited entry. Recent improvements in habitat assessments and mapping have fostered the development an extensive network of federal marine protected areas (MPAs) to protect essential fish habitat (EFH) areas and other marine MPAs have been, and are, being developed by the State of California.

Much of the concern with overfishing on the West Coast in the past decade has centered on rockfishes. The effect of PFMC regulations can be seen in the trend of landings of rockfishes in the southern management zone (i.e. south of 40 10' N latitude); landings averaged about 15,000 metric tons in the mid-1980s, about 8,000 tons in the mid-1990s and about 500 metric tons in 2006 (pers. comm. Jan Mason ERL/NMFS/SWFSC). As will be shown later there are now many exploitable species that cannot be harvested at rates large enough to provide an economically viable fishery or depress their populations. Within the study area the number of these species far exceeds the number of species that are fully harvested, over-harvested or depressed

The most recent re-authorization of the Magnuson-Stevens Fishery Conservation Act strengthens its emphasis on ecosystem management. The Pacific Fisheries Management Council (PFMC) had already started to enact ecosystem based management, beginning in 1999 with an ecosystem forage allotment and automatic reductions in harvest rates during periods with unfavorable environmental conditions in the sardine management plan. This was followed by enactment of a network of essential fish habitat areas to preserve unique and diverse habitat areas, reductions in by-catch in groundfish fisheries, exclusion of the swordfish fishery from the feeding grounds of the endangered Pacific leatherback turtle, and the weak stock management utilized in the several Rockfish Conservation Areas. Development of a California Current Ecosystem Fisheries Management Plan (FMP) is now underway by the PFMC.

EFFECT OF REGULATORY CHANGES ON LANDINGS

If recent regulatory actions are in fact contributing to the recovery of fish stocks now, then an obvious consequence would be a near-term reduction in landings (i.e. fishing mortality). Unfortunately, these near-term reductions in landings can be and have been particularly detrimental to the fisheries that depend on these stocks. To assess the effectiveness of these regulations on reducing fishing mortality (and landings) and provide some sense of the impact to the fisheries, I review here the effect of these regulatory changes on landings."

To assess the effects that major changes in regulations had on the fisheries in the MBNMS study area, the most recent available landings (2006) were compared with the landings a decade earlier, prior to the regulatory changes. The major regulatory changes between 1996 and 2006 were greatly reduced quotas for groundfish, the closure of the RCAs, vessel buyouts

to reduce the number of trawlers and the State of California nearshore fishery management plan. It should be noted that the RCA closure also resulted in greatly reduced landings for several important species that were not overfished. For example, in the first full year after the RCA went into effect (2004) the optimum yield of chilipepper rockfish was 2,000 metric tons but coastwide landings were only 58.3 metric tons.

The total landings in the Monterey Port Area (Santa Cruz, Moss Landing and Monterey) increased from 25,774 tons in 1996 to 29,969 tons in 2006 (Table 1). This increase was due to greatly increased catches of two pelagic species, sardine and anchovy. The landings of all other species with landings greater than 100 tons had major declines, and 18 out of 20 species with landings between 10 and 100 tons also declined.

Pelagic species, which are little protected by MPAs, comprised about 96% of the landings in 2006, rising from about 80% in 1996. Shelf break rockfish species, which were most affected by the federal RCA, had enormous declines in landings with 2006 bocaccio, widow and chilipepper landings being only 2% of their 1996 landings. The species most likely to be affected by additional MPAs in federal waters are those dwelling on the continental slope. As a group the landings of slope species declined by a factor of 4, with total 2006 landings of only 806 tons. With pelagic species and slope species removed the landings of all other species declined by more than a factor of 5, from 2,068 tons in 1996 to only 372 tons in 2006.

It is clear that federal and state regulations greatly reduced the landings of the vast majority of demersal and littoral species, with healthy stocks (i.e. chilipepper rockfish, Engish sole and sanddab) having reductions in landings essentially equal to overfished species (i.e. bocaccio, widow rockfish and lingcod).

As will be described later, extensive MPAs have been created in the study area since 2006, and major areas that were open to fishing for demersal and littoral species in 2006 are now closed to fishing for these species. If effective, the State MPAs will markedly lower the landings of the 'everything else' group discussed here; although total landings of these species were only 1.2% (372 tons) of the 2006 landings, many of the species are important due to their high value. Because the shelf break species have already largely been removed from the fishery by the RCA, it is unlikely that the landings from this habitat will be much affected by the recent MPAs; the single exception to this is spot prawn. The extensive trawl closure MPAs may reduce the landings of the slope species even below the very diminished 2006 levels. As will be shown in the later section (Status of Living Resources-Stock Assessment) the reductions in fishing effort and landings during the 1996-2006 period have resulted in rebounding populations of many, but not all, groundfish species.

Table 1. Landings in the Monterey Port Area in 1996 and 2006, and 2006 landings as a percentage of 1996 landings. (species with landings less than 10 tons were omitted).

	1996 Tons	1996 Percent	2006 Tons	2006 Percent	Percent of 1996
TOTAL Landings	25,774		29,969		116%
Total pelagic species	20,482	79.5%	28,812	96.1%	141%
Total slope species	3,228	12.5%	806	2.7%	25%
Total everything else	2,068	8.0%	372	1.2%	18%
Pelagic species					
Sardine	8,805	34.2%	19,523	65.1%	222%
Anchovy	3,917	15.2%	8,416	28.1%	215%
Squid	5,150	20.0%	561	1.9%	11%
Chinook salmon	937	3.6%	37		4%
Mackerel unspec.	877	3.4%	189		22%
Herring	274	1.1%	41		15%
Albacore	238		22		9%
Swordfish	221		19		8%
Opah	20		1		5%
Thresher shark	15		<1		0%
Bluefin tuna	13		<1		0%
Other	14		4		31%
Slope species					
Grenadier	994	3.9%	46		5%
Sole, Dover	849	3.3%	214		25%
Sablefish	773	3.0%	273		35%
Thornyhead longspine	281	1.1%	81		29%
Rockfish, splitnose	160		96		60%
Thornyhead shortspine	83		45		54%
Thornyheads	56		na		na
Rockfish group slope	na		14		na
Rockfish, blackgill	28		17		59%
Rockfish, bank	4		22		573%
Everything else					
Rockfish, chilipepper	674	2.6%	11		2%
Rockfish, widow	174		4		2%
Rockfish, group small	127		0		0%
Rockfish, bocaccio	126		2		2%
Sanddab	124		4		3%
Sole, Petrale	123		94		77%
Sole, English	109		9		8%

Sole, rex	107	12	11%
Lingcod	84	6	8%
Rockfish, unspec	81	2	2%
Croaker white	60	5	9%
California halibut	56	35	63%
Skate unspec	38	8	22%
Rockfish, group red	37	3	7%
Spot prawn	35	31	89%
Rockfish, shortbelly	24	0	0%
Dungeness Crab	17	83	492%
Spiny dogfish	15	8	55%
Rockfish, yellowtail	12	1	8%
Surf smelt	11	0	0%
Other	33	32	96%
Species more than 100 tons	22	6	
Species more than 1% of total landings	11	3	

To assess the affects that changes in regulations have had on the economics of fisheries in the study area the past and near present value of the landings of the five major ports within and adjacent to the MBNMS were compared (Princeton-Halfmoon Bay, Santa Cruz, Moss Landing, Monterey and Morro Bay). The most recent available landings, 2006, were compared to the 1996 landings adjusted to constant 2006 dollars using the consumer price index prepared by the Bureau of Labor Statistics (a 1996 dollar was worth $1.28 2005 dollars).

All five ports had large reductions in the value of their landings from 1996 to 2006, and their total value declined from $31 million in 1996 to $13 million in 2006 (Table 2). Monterey had the largest decline with the 2006 value being only 14.4% of the 1996 value. Santa Cruz and Morro Bay each declined to about 29% of their 1996 values, and Moss Landing declined to 47.7%. The decline at Princeton-Halfmoon Bay was considerably less than the other ports (75.3%); however, two species (Chinook salmon and Dungeness crab) that were unaffected by recent regulations produced 83% of the 2006 landings value. Of particular concern to the economics and sustainability of the fishing infra-structure at the fishing ports, the number of species with sizeable value (i.e. $100K per year) declined very sharply at four of the ports. The most marked reduction was at Monterey (13 to 2 species) but Santa Cruz (5 to 2 species), Princeton-Halfmoon Bay (11 to 5 species) and Morro Bay (15 to 6 species) each lost more than half of their species with value greater than $100K. Moss Landing (14 to 13 species) differed from the other port in that it had little change in the number of high value species. Monterey, Santa Cruz and Princeton-Halfmoon and Morro Bay have become heavily dependent upon the landings of a very small number of species. The lack of species diversity at these ports puts the long-term viability of their fisheries (and fishing communities) in jeopardy.

Landings in the Monterey Port Area have become very heavily dependent on sardine and anchovy (96% by weight in 2006). The landed weight of all other species were less than 4 % of the 2006 landings but 51% of the total value landed.

Table 2. Decadal change in the value ($1000s) and weight (tons) and of landings at ports in or adjacent to the MBNMS study area, (dollars adjusted to constant 2006 dollars).

	Value 1996	Value 2006	2006 as a % of 1996	Species with value > $100,000 1996	2006
Princeton-Halfmoon Bay	$6,354	$4,786	75.3%	11	5
Santa Cruz	2,178	622	28.6%	5	2
Moss Landing	10,233	4,877	47.7%	14	13
Monterey	6,037	868	14.4%	13	2
Morro Bay	6,471	1,906	29.5%	15	6
TOTAL	31,273	13,059	41.8%	23	13

	Tons 1996	Tons 2006	% of 1996 1996
Princeton-Halfmoon Bay	2,656	1,398	52.6%
Santa Cruz	896	147	16.4%
Moss Landing	12,493	29,646	237.3%
Monterey	12,383	179	1.4%
Morro Bay	2,675	434	16.2%
TOTAL	31,102	31,803	102.2%

DESCRIPTION OF CURRENT FISHING REGULATIONS

Assessment of the affects of the large array of regulations and determination of the need for additional protection for individual species, fisheries or habitats is not an easy task and it should be realized that determination of need should be an adaptive process that can easily be altered when additional information becomes available or the environment changes. MPAs of the type being enacted by the State of California and the Pacific Fisheries Management Council (i.e. Essential Fish Habitat Areas (EFHs)) are considered by many to be permanent, and as such they are poor candidates for adaptive management. Due to the relative difficulty in altering MPAs, as well as the large investment of resources and time required for effective monitoring and analysis of MPA effects (i.e. benefits vs. costs), the affects and impacts of this type of resource management should be thoroughly analyzed before MPAs are enacted.

The regulations discussed below are those that apply to the study area (roughly Pigeon Point to Cambria) and they may or may not apply to other areas. To describe the present situation regulations have been divided into three classes (Table 3). The first class includes regulations that alone are unlikely to produce sustainable fisheries or ecosystem function; but may be valuable additions to the other two classes. The second class includes methods that have the potential to produce sustainable fisheries and ecosystem function when several of the methods are combined. The third class includes regulatory methods that can produce sustainable

fisheries and ecosystem function with no other regulations, although optimum management will most likely include methods from the other two classes.

Table 3. Classification of fishing regulations

Methods that alone are unlikely to produce sustainable fisheries
- Closed seasons – indirect control of effort, protection of spawners
- Specific gear regulations – mesh sizes, number of hooks, escape ports
- Specific species regulations – size limits, bag limits, protection of spawners

Methods with the potential in combination to produce sustainable fisheries
- Limited entry – direct control of fishing effort
- SSS management – size, sex and season control in some invertebrate fisheries (i.e. Dungeness crab, lobster)
- Area-based fishing gear closures
- Marine Protected Areas

Methods likely to produce sustainable fisheries
- Biomass-based quotas or harvest guidelines – direct control of annual catch.

These methods should be complimented by non-fishery management regulations that are designed to conserve ecosystem qualities (i.e. control of pollution, sedimentation, shoreline development and other environmental hazards).

METHODS UNLIKELY TO PRODUCE SUSTAINABLE FISHERIES

Closed Seasons

Closed seasons are an easy, but blunt, way to reduce fishing effort and they have been commonly used in California fisheries. Often the closures are designed to occur during the spawning season or seasons when the market quality of the species is low (i.e. crab or lobster molting seasons). Closed seasons, varying in different regions, have been a major management tool in the salmon fishery. In recent years fishing effort has been geographically directed away from regions that have reduced salmon runs by having open seasons only in areas with healthy runs. Effort reduction in recreational fisheries is not practical with limited entry, therefore closed seasons are used to reduce fishing effort; for example recreational fishing for groundfish is now closed in the MBNMS from December to May. Closed seasons are often undesirable in commercial fisheries because of their adverse affects on marketing and they are seldom used unless economically desirable (i.e. in the herring fishery where the economics is based on the seasonal harvest of eggs).

Specific gear regulations

A wide range of regulations limiting the dimensions, designs and use of particular fishing gear are used to regulate the take of individual species or species groups. They have been used to prevent harvest of small and/or immature animals, to reduce the efficiency of fishers, to reduce catch rates, to reduce bycatch, to reduce damage to the habitat and to limit the use of specific gear types. In California any fishing gear that is not specifically allowed is illegal.

Beach seines, Danish seines and Scottish seines are illegal as are a wide range of fish traps, dredges and several types of trawl nets. In addition, as will be discussed later, many gear types have area or time/area closures that prevent their use in specific areas or depth zones.

This type of regulation can greatly assist by reducing bycatch (i.e. mesh size limitations), by preventing capture of immature or sub-legal sizes of targeted species (i.e. escape ports in crab pots and lobster traps) and by reducing damage to the habitat (exclusion of large rollers on trawl nets). Most of the fisheries in the MBNMS have gear regulations that were designed to prevent the take of non-target species and these are often among the most important regulations affecting the take of fishes and invertebrates. However, regulations that concern the design of fishing gear have not proven to be sufficient by themselves to achieve sustainable fisheries for the majority of target species and enactment of other types of regulations will usually be required to achieve a sustainable fishery.

Species-specific regulations

Species-specific regulations have been enacted for many reasons over the history of California's fisheries. Sport fisheries are particularly rich, or encumbered, with this type of regulations: including species-specific size limits, bag limits, closed seasons, and allowable fishing gear. The purpose of nearly all of these regulations is to reduce the take of fish by recreational fishers without seriously reducing the number of fishers. This type of regulation is not as common in commercial fisheries; however, some species have been removed from commercial exploitation (i.e. kelp bass), some species cannot be landed by fishing boats using specific fishing gear (i.e. salmon, Dungeness crab and rock crabs cannot be landed by trawlers) and some fishing gear is tightly regulated to insure that it primarily catches the target species (halibut trawls, drift gillnets for swordfish, gillnets for California halibut and white seabass). Species-specific annual catch limits have become a major management tool and are discussed later.

METHODS WITH THE POTENTIAL TO PRODUCE SUSTAINABLE FISHERIES

Limited entry – direct control of fishing effort

Limited entry is a regulation that is only used for commercial fisheries as it is considered undesirable to place any limits on who can fish recreationally. Theoretically, sustainable fisheries could be achieved if the number of fishers, or more commonly the number of fishing boats, were limited to the number that could not catch more than the maximum sustained yield of individual species. In practice it has proved nearly impossible to reduce the number of fishing boats to the level where it would not be possible to overfish most species. There are many reasons for this including the fact that most fishing boats catch more than one species and many fish in more than one fishery. This factor alone makes it very unlikely that the number of fishing boats could be correctly set for a wide range of species. Limited entry can be used to reduce the number of fishing boats to the number that could produce a profit from a fishery and limited entry, based roughly on this premise, now occurs in the majority of California's fisheries. However, it does not appear that most of the existing limited entry

fisheries are set low enough to result in sustainable fisheries without inclusion of additional strong management measures. The trap fishery for spot prawn may be the single exception.

SSS management – size, sex and season regulations

Management based on regulation of the size limits, closed seasons and no landings of females, the so called size-season-sex (SSS) management, has proven successful in maintaining productive and profitable fisheries for certain crustaceans (i.e. Dungeness crab and California Lobster in the Pacific Coast EEZ). In each case the fishing gear is pots or traps and the configuration of the gear, (including escape ports for under-sized animals) is highly evolved to produce a fishery where sub-legal or female animals are seldom damaged by the fishing operation and if caught they can be returned to the sea with minimal mortality. The minimum size limit is usually set so that most animals will reproduce one or more years before they become large enough to be retained and landed. These fisheries have remained biologically productive in spite of the build up of very large number of fishing boats engaged in the fisheries. It is possible that this productivity has been at least partially maintained by the reduction in the population sizes of the fishes that prey on the juvenile crabs and lobsters.

Area-based Gear Regulations

Area based closures for specific types of fishing gear have been used for fishery management for many decades. This type of closure is relatively easy to enforce and it allows targeting of protection to specific areas where conflicts occur while allowing fishing gear to be used in other areas. It should be noted that these types of regulations have become quite complex and there has been a general increase in the areas and gears regulated over time. The difficulty with area-based gear regulations is that there is a tendency to make total exclusions rather than measured exclusions. For example, trawling the bottom of the ocean has often been compared to plowing a field. Both cause physical alteration of the substrate and alter biological communities. The effects of both are highly dependent upon the methods used and the characteristics of the habitat and both constitute a trade off between habitat alteration and food production and most people would agree that their use should be regulated. The State of California has prohibited all trawling in state waters north of Point Arguello. Following the analogy with farming, on a policy level what are the chances that all plowing will be prohibited in California?

Fishing gear that is very effective at catching the target species has at times been considered damaging (because it can cause depletion of the species); however, for the purposes of this discussion efficiency by itself is not considered to be damaging, although the total catch may need to be regulated to prevent overfishing. For the purposes of this discussion, fishing gear is considered to be damaging if it causes mechanical alteration of the substrate or takes individuals of non-target species (bycatch) that are either not brought on board the fishing boat or discarded after being brought on board. Based on these criteria I have divided common fishing gear into several general classes based on my opinion of what the likely damage the gear type can cause. The design of fishing gear is very important in reducing undesirable bycatch and physical alteration of the substrate; this is the reason that trawl gear occurs in all three classes.

Most Damaging Gear Types:

- Dredges - mechanical damage and bycatch
- Small-mesh trawls - mechanical damage and bycatch
- Trawls with large rollers - mechanical damage and bycatch
- Large-mesh trawls on hard bottom - mechanical damage and bycatch
- Set gillnets - bycatch

Intermediate gear types:

- Large-mesh trawls on soft bottom – mechanical damage and bycatch
- Danish seines – mechanical damage and bycatch
- Drift gill-nets – bycatch
- Pelagic long-lines – bycatch
- Beach seines - bycatch

Least damaging gear types:

- Hook and line
- Vertical longlines
- Bottom longlines
- Traps and pots
- Surface seines (i.e. purse-seines and lamparas)
- Mid-water trawls
- "Light touch" trawls on soft bottom (i.e. California halibut trawls)

Under California regulations fishing gear that is not declared legal for a particular area or species is by definition illegal. This has created numerous artifacts, for example, shrimp trawling with small mesh trawls was allowed for many years whereas beach seines and Danish seines were illegal.

Bottom and mid-water trawls

Trawl gear has been the principal fishing method used in the MBNMS for taking bottom fishes, and the five species presently listed by the Pacific Fisheries Management Council as having been overfished were primarily harvested with trawl nets. Bottom trawling necessarily disturbs the bottom, although the amount of disturbance varies with the type of trawl gear and the bottom substrate. Trawl gear has the potential to take significant numbers of non-targeted species, the young of targeted species, and it can alter bottom sediments and biogenic benthic habitats. Bottom trawling can also damage, or cause the loss of, other fixed fishing gear such as crab pots. Mid-water trawling has much less potential for associated alteration or damage to the habitat because it is designed to fish off of the bottom.

The potential adverse affects of bottom trawling have been known for a long period of time and trawling has been prohibited within 3 nautical miles of most of the coast of California and mesh size has had a minimum of 4 1/2 inches for at least 6 decades. The local exception to this is that a deep-water portion of state waters, between Yankee Point and Point Sur was open to trawling outside of 1 mile for about 3 decades prior to 2004. On October 1 2006

trawling was stopped in all state waters in the MBNMS (state waters are normally 3 nautical miles from the nearest point of land, including offshore rocks, but in Monterey Bay they extend up to 12 nautical miles from shore).

When stock assessments showed that a number of bottom fish stocks were overfished the Pacific Fisheries Management Council (PFMC) created the Rockfish Conservation Areas (2003) that prevents trawling, other commercial bottom fish fisheries and sport fishing for bottomfishes within a complicated and changing area associated with the depth distribution of various overfished rockfish species. The RCA is a long-term spatial closure and it is discussed later under marine protected areas

The PFMC, in response to litigation, developed the Essential Fish Habitat Program resulting in placement of numerous no trawling Essential Fish Habitat (EFH) areas and a lesser number of no bottom contact EFH areas along the coasts of California, Oregon and Washington. The EFH areas went into effect on June 12, 2006. The MBNMS study area contains a very large area in EFH areas with no trawling (discussed later under marine protected areas). In addition, the PFMC prohibited trawling in waters deeper than 700 fathoms and shallower than 3500 fathoms for the entire California to Washington area.

More recent federal regulations prohibited large rollers on trawl footropes to prevent trawlers from trawling on higher profile bottom areas to prevent damage to biogenic habitats associated with rough bottom while allowing trawling on low profile, smoother bottom.

The study area has not been an active area for shrimp or prawn trawling and presently there is no trawling allowed for invertebrates in the area.

Mid-water trawls are not currently being used in the study area and with the exception of the foreign (mostly Russian) fishery for Pacific whiting in the mid 1960s to mid 1970s and a small amount of use for chilipepper and widow rockfish they have not been used extensively in the MBNMS.

Gill and trammel nets

Gill and trammel nets are entanglement nets and for regulatory purposes they are divided into set nets and drift nets depending upon if they are attached (set) to the bottom or drifting with the currents. In the study area set nets have primarily been used for shore or bottom fishes (gill nets for rockfishes, lingcod, white croaker and surf perch; and trammel nets for California halibut and white seabass and lingcod). Drift gillnets are primarily used in the offshore waters of the study area to take highly migratory species (primarily swordfish).

Gill nets began to be used extensively in the study area for nearshore and shelf rockfishes in the early 1970s and the problem of bycatch of protected species (birds and marine mammals) resulted in this gear being largely prohibited within nearshore waters of the study area by 2000.

Gillnet restrictions within MBNMS study area:

* Between Point Reyes and Point Arguello gillnets and trammel nets may not be used in waters less than 60 fathoms (110 m) (Title 14, sec 104.1) except that gillnets less than 3 1/2 inches can be used from Yankee Point to Point Sal (F&G code sec 8664.5 f)

Other F&G Code restrictions superceded by the above title 14 regulation but still on books.

* Between Pillar Point and Waddel Creek gillnets cannot be used in waters less than 60 fathoms (110 m) (F&G code 8664.8)
* Between Waddel Creek and Yankee Point gillnets cannot be used in waters less than 30 fathoms (55 m) (F&G code 8664.5 a)
* Between Yankee Point and Point Sal gillnets cannot be used in waters less than 30 fathoms (55 m) (F&G code 8664.5 b)
* gillnets can be used for taking rockfishes and lingcod in waters deeper than:
  40 fathoms (73 m) from Pigeon Point to Point Santa Cruz (F&G code 8693 b).
  100 fathoms (183 m) from Santa Cruz Point to the Point Sur lighthouse (F&G code 8692 a)
  75 fathoms (137 m) from Point Sur lighthouse to Pfeiffer Point. (F&G code 8692 b)
  40 fathoms (73 m) from Piedras Blancas to Point Sal. (F&G code 8693 b)
* Set gillnets and trammel nets with a minimum 8 1/2' mesh can be used to take California halibut and they can only be used between the shore and the 30 fathom contour; they cannot be used to take rockfishes or lingcod (sec. 8625).

The total additional affect of the other regulations listed above is that gillnets cannot be used to take rockfishes and lingcod in waters between 60 fathoms and 100 fathoms (110-183 m) between Santa Cruz Point to the Point Sur Lighthouse and between 60 and 75 fathoms (110-137 m) between Point Sur Lighthouse and Pfeiffer Point.

Minimum mesh size for rockfish and lingcod is 4 1/8 inches between Point Reyes and Pigeon Point, 5 1/2 inches (sec 8693) between Pigeon Point and Point Santa Cruz and 4 1/8 inches elsewhere.

Under federal RCA regulations recreational and commercial, non-trawl bottom fishing (which includes gillnets) is prohibited in waters between 30 - 150 fathoms (55-274 m.) from 40 10' to 34 27' North latitude.

Therefore in the study area set gillnets cannot presently be use between the shore and 150 fathoms (274 m), with the exception that 3 1/2 inch gillnets can be used between 0 and 30-fathoms from Yankee Point to Point Sal. In central California 3 1/2 inch gillnets have been used to take herring and white croaker; presently no set gillnets or trammel nets are being fished in the Monterey Bay area (pers. com. Joe Pennisi, Monterey) and landings of white croaker (fishing gear unknown) totaled only 6 tons in the Monterey and Morro Bay Port Areas.

Drift gillnets with a minimum mesh size of 14 inches can be used in California to take highly migratory species (i.e. swordfish and thresher sharks). The area that drift gillnets can be used in has set seasons under State of California regulations (sec 8575)

February 1 - April 30	No drift gillnets in California
May 1 - August 14	No drift gillnets within 75 nm of the mainland
August 15 - January 31	No drift gillnets within 12 nm of mainland

Under federal regulations drift gillnets cannot be used in the Pacific Leatherback Conservation Area during the period of August 15 to November 15. The conservation area is bound on the south by a line from Point Sur to a location west of Point Arguello (34 27' N : 123 35' W) then due west to 129 W. The northern boundary is a line from the coast to 129 W along 45 N latitude (in Oregon).

Beach and demersal seines

Beach seines are illegal in California; pole seines (20 feet long) can be used to take surf smelt; however, these nets are not used in water much deeper than 1 meter. Demersal seines (i.e. Danish and Scottish seines) are illegal off of California; however, there has been some interest in experimental permits for the use of this type of gear.

Surface seines

Surface seines are commonly used for capture of pelagic fishes or squid, and in California waters purse-seines and lampara nets are used to catch coastal pelagic fishes (sardine, anchovy, jack mackerel and Pacific mackerel) and market squid. Small amounts of non-target species are taken in the coastal pelagics fishery, however, the majority are other coastal pelagics (i.e. sardine caught when fishing for mackerel), lightly exploited species (i.e. jack smelt, sand-dabs) and generally they are landed rather than being discarded bycatch. Marine protected areas are not thought to be effective in protecting pelagic species due to their great mobility; a great deal of attention was made in development of boundaries of the State of California marine reserves and conservation areas to allow surface fisheries to be used in areas deeper than 50 meters. Therefore State Marine Reserves and most State Marine Conservation Areas are the only areas where surface seines cannot be used in the MBNMS.

Purse-seines are also the major fishing gear used to capture tunas but this fishery does not occur in the MBNMS.

Traps and pots

Fish traps and pots are generally legal in California, the design of the gear is usually narrowly described in State of California regulations and the fisheries require a limited entry permit. Different types of traps and pots are used to capture crabs, spot prawns, nearshore fishes and sablefish and trapping for hagfish occurred in the past and this may re-develop in the future. Bycatch with traps and pots is generally relatively small in comparison to other types of fishing gear and some of the bycatch is somewhat artificial, in that the bycatch is of exploited

species which cannot be landed due to lack of limited entry permits and/or gear specific regulations preventing their sale. The trap and pot fisheries in the MBNMS are relatively low volume and high value fisheries that have become some of the areas major fisheries based on the value of their landings. Trap and pot fisheries of the type carried out in the MBNMS are often considered to be among the most ecologically benign fisheries.

Hook and line

Salmon can only be taken by hook and line gear, mostly pole and line and trolling gear. Hook and line gear, both recreational and commercial, are now the primarily gear used to catch bottom and shore fishes in the shallower habitats of the study area. Many types of gear are used including hand lines, pole and line, vertical longlines, bottom longlines and trolling gear. Presently recreational fishers cannot use hook and line gear to take groundfishes in waters deeper than 30 fathoms and commercial fishers cannot use hook and line gear to take groundfish in waters deeper than 30 fathoms and shallower than 150 fathoms. Bottom longlines have been used to take sablefish and other groundfishes for decades and this gear is still used to take sablefish in waters deeper than 150 fathoms.

Commercial hook and line fisheries are also relatively low volume and high value fisheries. Hook and line gear is often relatively inefficient for harvesting many species of fish; however, the large number of commercial and recreational fishers that use this type of gear make it capable of producing overfishing for some important species. In the study area, if no other regulations were in existence and no other fishing gear utilized, probably salmon, California halibut, 'reef' fishes and possibly sablefish could be overfished with hook and line gear but the majority of species dwelling on soft bottom and small species generally could not be overfished due to their low catchablity with hook and line gear. The major attention given to nearshore hard bottom habitats in the recent MLPA process was partially due to the perception that shallow hard-bottom habitats were vulnerable to hook and line fisheries.

Drift longlines are used extensively elsewhere in the world to take highly migratory species. This fishing gear has not been allowed off of California.

Marine Protected Areas

Both federal and State of California fishery management agencies have very recently created extensive marine protected areas in the MBNMS study area. The federal and state definitions of what constitutes a MPA are very similar; with a single exception, the State of California does not consider an area to be a MPA unless it has a name. The federal essential fish habitat areas, which prohibit trawling and have area names, qualify as MPAs under both federal and state guidelines. However, the recent state regulation that prohibits trawling in state waters makes state waters an MPA under federal guidelines but it does not make the area an MPA under state guidelines because it is not a "named area". For the purposes of this report I have not considered area-based gear closures with boundaries defined by depth contours, such as the several gillnet area closures discussed previously described, as MPAs; although under the federal definition these areas might be considered MPAs. I decided that considering multiple, and often overlapping, gear-based area closures to be MPAs would introduce too

much complexity. However, due to the importance of trawl fisheries, I have considered area-based trawl closures with geographically defined boundaries as MPAs (i.e. the EFH and state waters trawl closures). The distinction of geographically defined boundaries was important for the GIS analysis carried out by MBNMS personnel.

State Marine Protected Areas

The State of California south-central MPA network consisting of 29 marine reserves and conservation areas became affective on September 21, 2007. The entire MBNMS study area nearshore habitat and the majority of the shelf habitat are within state waters (Figure 1). However, the network covers all state waters between Pigeon Point and Point Conception so the habitat summaries for the MPA network cover a larger area than the state waters portion of the study area and cannot be used directly to assess closed areas in the study area. All of the State MPAs prohibit commercial fishing for bottomfishes; however, some allow recreational fishing for bottomfishes. The calculations of areas discussed later only include the State MPAs that prohibit all fishing for bottomfishes and they also exclude the estuarine MPAs.

Federal Essential Fish Habitat Areas (EFH areas)

Following litigation and extensive essential fish habitat analyses the PFMC established a network of EFH marine protected areas that went into effect on June 12, 2006 (Figure 1). The network extends along the entire U.S. west coast and it was designed specifically to protect habitats that are considered to be essential fish habitat. The network is primarily intended to provide ecosystem protection and it's value for management of exploited species is of secondary importance. The network includes areas where no trawling is allowed, where no bottom contact of fishing gear is allowed and areas where no bottom contact gear is allowed within an off-bottom buffer (i.e. Davidson Seamount). The MBNMS study area has extensive EFH no trawl areas but no EFH no contact areas. The Davidson Seamount EFH (775.5 sq. mi.) lies offshore of the MBNMS.
Three EFH no trawl areas lie partially or entirely within the MBNMS study area:

Monterey Bay/Canyon	831.3 sq. mi.	831.3 inside study area
Point Sur Deep	84.4 sq. mi.	84.4 inside study area
Big Sur Coast/Port San Luis	3,991.8 sq. mi.	519.3 inside study area
TOTAL of 3	4,907.5 sq. mi.	1,435.0 inside study area

Federal Rockfish Conservation Areas

The Federal Rockfish Conservation Areas (RCAs) were enacted in 2003 as part of the rebuilding plan for overfished groundfishes (Figure 1). These areas prohibit fishing for groundfishes and they prohibit any fishing gear that is likely to catch groundfishes, but they do not apply to pelagic fisheries for salmon, coastal pelagics, highly migratory species or invertebrates taken in traps or pots. The RCAs extend along the entire west coast but they vary in the depths protected depending upon the species that are overfished in individual regions and they vary in depth depending upon fishing gear types. In the MBNMS the

original recreational and non-trawl commercial RCA closure approximated the area between the 20 fathom and 150 fathoms contours (37–274 m). Presently the recreational RCA extends from 30 fathoms (55 m) to 200 miles offshore from June to November and from the shoreline to 200 miles from December to May. The present RCA for commercial non-trawl fishers is from 30 to 150 fathoms (55-274 m). The original trawl closure (January 2003) was from 50 to 150 fathoms (91-274 m). The trawl closure has varied seasonally and has undergone considerable changes with time to allow harvest of healthy flatfish stocks while still protecting depressed rockfish species. The present trawl RCA in the MBNMS (Figure 1) extends from 100 to 150 fathoms (183-274 m) and it does not change seasonally. The two types of closures in the RCA overlap in the no trawl closure area, making this area a no-bottomfishing area. In addition, where the non-trawl RCA is within State waters, where trawling is not allowed, the area is also a no bottomfishing area.

Other Area-based Trawl Closures

Trawling for groundfish has been illegal in California within 3 miles of most of the mainland for many decades. However, trawling was allowed outside of 1 mile from shore in the area between Yankee Point and Point Sur until recently. Trawling for shrimp and prawns is not allowed inside of 3 miles in the MBNMS. Starting on October 1 2006, trawling was not allowed in any State waters (Figure 1). State waters is defined as 3 miles offshore from the nearest point of land (including offshore rocks) for most of the State. Monterey Bay is less than 24 miles from headland to headland therefore State waters extends to 3 miles offshore of a line between the north and south ends of the bay. In the center of the bay this is as much as 12 miles offshore (Figure 1).

Federal regulations enacted along with the EFH closures, in June 2006, prohibit all trawling between 700 (1280 m) and 3500 fathoms (6400 m), the expected limit of any future fishery along the entire length of Washington, Oregon and California (Figure 1).

When combined the many types of areas closed to trawling dominate the ocean off of central California, occupying 64% of the area of the MBNMS study area (Figure 2). The areas where trawling in the study area is allowed include three areas on the upper and lower slope and one large and two small areas on the inner shelf break and outer shelf (i.e. between State waters and the RCA).

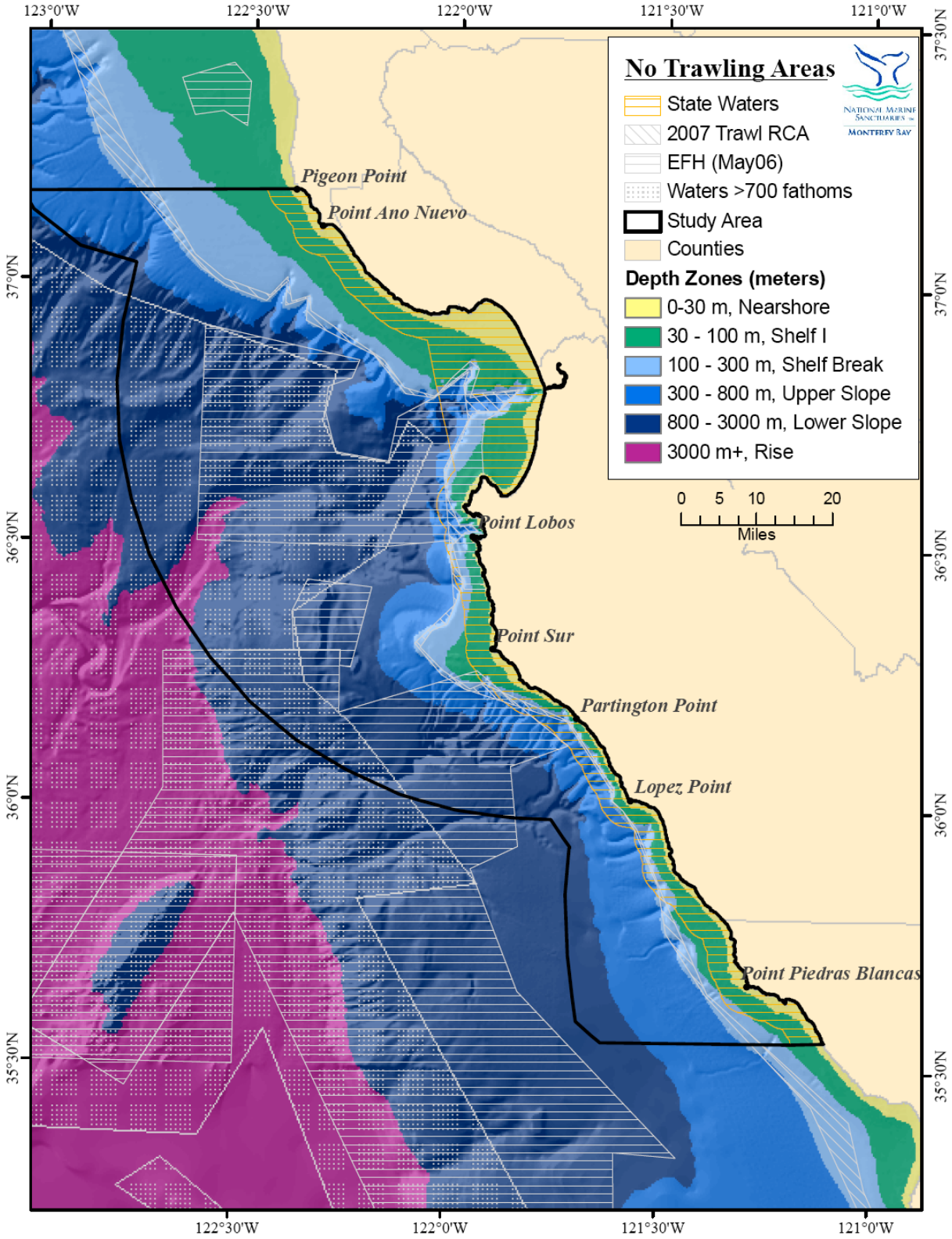

Figure 1. Marine Protected Areas in the MBNMS. (Figure provided by MBNMS.)

Overview of area-based regulations by depth zone

Epipelagic, mesopelagic, bathypelagic, migratory and highly mobile species are poorly protected by MPAs of the size likely to be placed in the MBNMS study area, therefore protection levels are assessed primarily for benthic, resident and low to moderate mobility species. Trawling was the principal fishing gear used in the fisheries of the several overfished groundfish species off of California, and this gear can cause alterations in bottom habitats; therefore, this gear type is the most important to be assessed. Gillnet, trap, pot and hook and line fisheries also have the potential to cause overfishing of some resident species and therefore a second class of protection, no fishing for bottom fishes is evaluated. The information on areas closed by depth zone was derived from the MBNMS GIS database and was provided by Sophie De Beukelaer (MBNMS).

The MBNMS MPA stakeholder group divided the habitats of the MBNMS study area into 6 depth zones (Table 4) that differ from the habitats definitions and depth zones used in the State of California MLPA process. Each of the 6 depth zones could be divided into hard and soft bottom habitat areas if adequate habitat mapping were available. The adjacent Davidson Seamount contains only the two deeper zones; due to its importance in protection of the central California deep waters habitats calculations for this area are also listed.

Trawling in the study area is prohibited in five different types of area closures and there is considerable overlap between the areas:

- Trawling is prohibited in all State of California Waters
- Trawling is prohibited in all State of California MPAs
- Trawling is prohibited in all Federal EFH areas
- Trawling is prohibited in waters deeper than 100 fathoms and shallower than -150 fathoms (183-274 m) in the trawl Rockfish Conservation Zone
- Trawling is prohibited in waters deeper than 700 fathoms and shallower than 3500 fathoms (1280-6400 m) in the entire EEZ.
- Trawling is also prohibited in the Davidson Seamount Area

When combined the many sources of no trawling areas dominate the ocean off of central California (Figure 2). The areas where trawling in the study area is allowed include 3 areas on the upper and lower slope and one large and 2 very small areas on the inner shelf break and outer shelf (i.e. between state waters and the RCA).

Trawling is presently extremely tightly regulated in the study area; 64% of the study area is closed to trawling (Table 4, Figure 2). Trawling is presently prohibited in 99% of the nearshore habitat and 74% of the shelf habitat. Trawling is prohibited in 37% of the shelf break and 22% of the upper slope habitats. Nearly all of the lower slope (81%) and rise area (100%) is closed to trawling. Except for the shelf break habitat, which will go from 37% to 23%, the percent area closed to trawling will remain essentially unchanged when the Rockfish Conservation Area is eventually opened to fishing.

All fishing for bottomfishes is prohibited in the trawl RCA, in the portion of the non-trawl RCA that lies within State waters and in the majority of the State of California MPAs (Table 4 Figure 3). There is no commercial fishing for groundfishes in any of the State MPAs; however, some of the MPAs allow recreational fishing for groundfishes. The MPAs that allow fishing for bottom fishing by recreational fishers (and the estuarine MPAs) were not included in the calculations presented in figure 4. Presently there is no fishing for bottomfishes in 12% of the study area and this will go to 3% when the RCA is eventually re-opened to fishing. In addition, 100% of the Davidson Seamount is closed to all take of sea life living on or near the bottom. The three shallower depth zones have 18-48% of their area closed to bottomfishing, 7% of the upper slope is closed and essentially none of the deeper zones are closed to bottomfishing in the study area. However, the adjacent Davidson Seamount has very large areas within the lower slope and rise habitats that are closed to bottomfishing. When the Rockfish Conservation Area is again opened to fishing the only areas in the study area that will have no fishing for bottomfishes will be the State of California MPAs. The nearshore (17%) will remain virtually unchanged; however, the shelf area will decline from 48% to 12% the shelf break area will decline from 36% to 5% and the upper slope will decline from 7% to 2% when the RCA is eventually re-opened to fishing.

Table 4. Area and percentage of area by depth zone with no trawling and no take of bottomfish. The percentage that will occur when the Rockfish Conservation Area is opened to fishing is indicated by –RCA. (Data provided by MBNMS).

	Depth Range		Area	No Trawling			No Bottomfish Take		
	meters	fathoms	sq. mi.	sq. mi.	RCA	-RCA	sq. mi.	RCA	-RCA
MBNMS									
Nearshore	0-30	0-16	164.7	163.6	99%	99%	28.18	18%	17%
Shelf	30-100	16-55	542.4	398.8	74%	73%	65.32	48%	12%
Shelf break	100-300	55-164	399.6	148.8	37%	23%	90.00	36%	5%
Upper slope	300-800	164-437	897.4	193.8	22%	20%	62.80	7%	2%
Lower slope	800-3000	437-1640	2141.2	1729.2	81%	81%	1.21	0%	0%
Rise	3000+	1640+	70.3	70.3	100%	100%	0.00	0%	0%
TOTAL			4215.7	2704.4	64%	62%	247.51	12%	3%
Davidson Seamount									
Lower slope	800-3000	437-1640	113.5	113.5		100%	113.5		100%
Rise	3000+	1640+	662.0	662.0		100%	662.0		100%
TOTAL			775.5	775.5		100%	775.5		100%

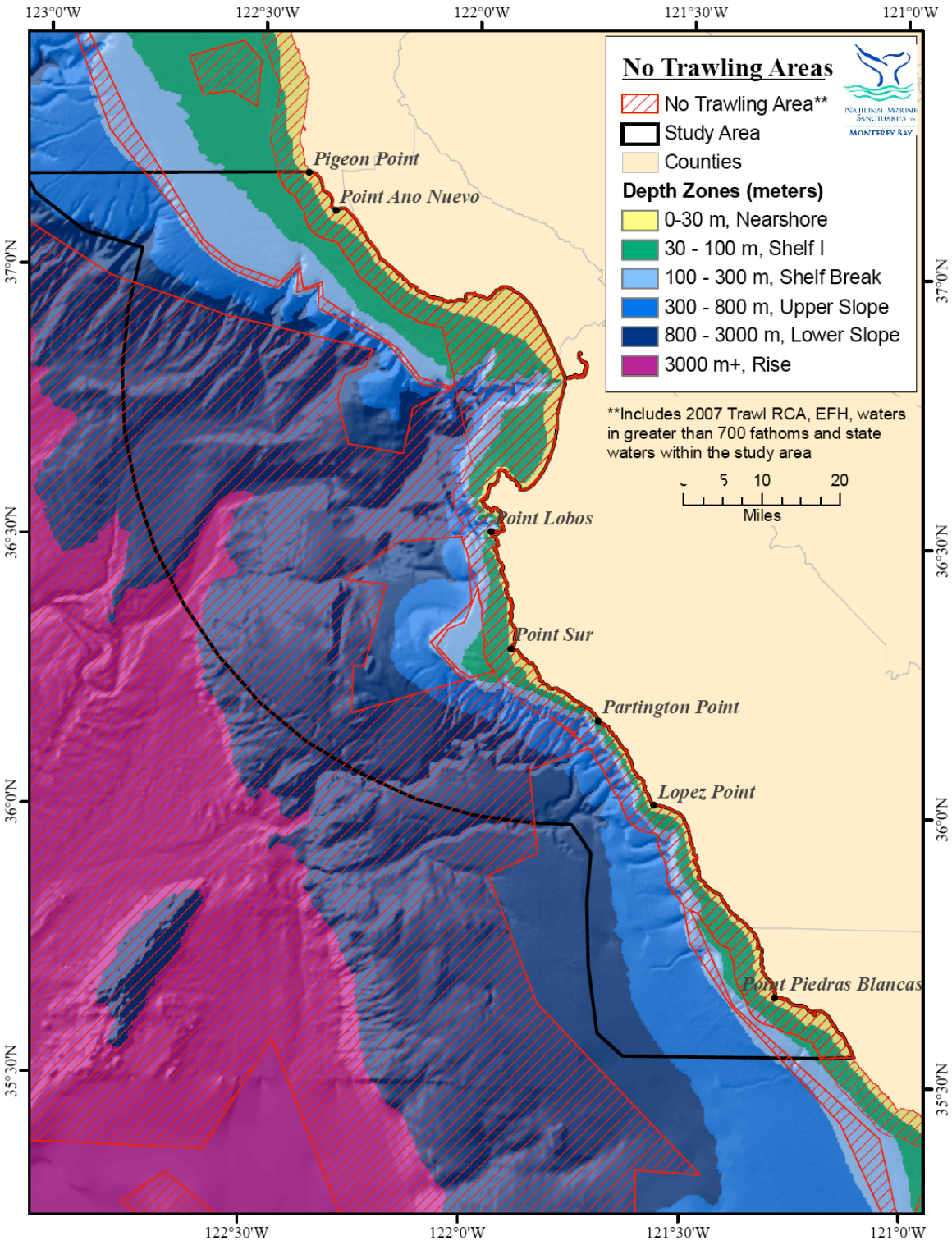

Figure 2 No trawling areas in the Monterey Bay National Marine Sanctuary (Figure provided by the MBNMS).

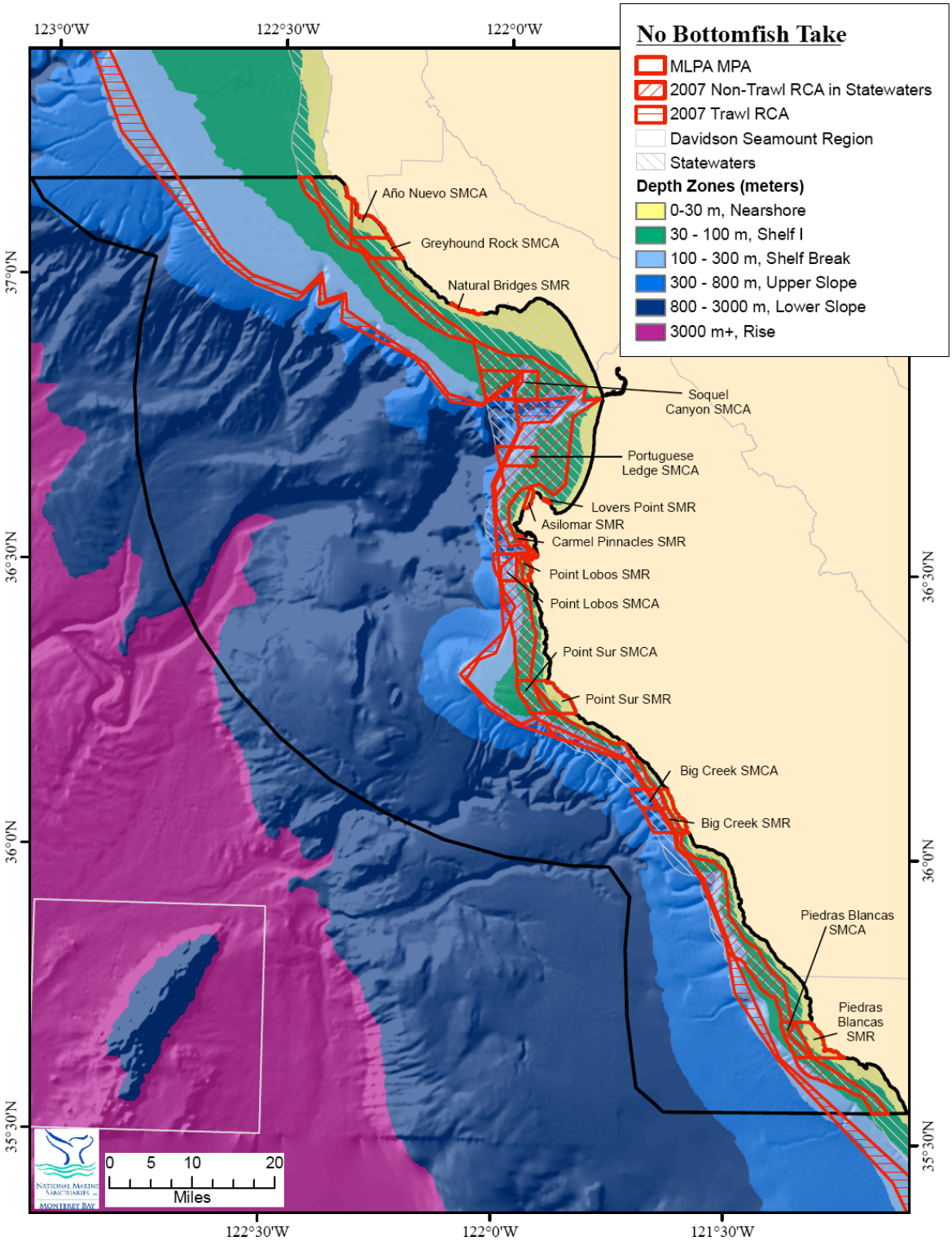

Figure 3. No bottomfish take areas in the MBNMS (Figure provided by the MBNMS).

It should be noted that the vast majority of bottomfishes that have been caught on the shelf, shelf break, upper slope and lower slope habitats were taken by trawl gear. In addition simplifying the area closures into only two categories, no trawling and no fishing for bottomfishes, covers up much of the complexity of area based closures for other commercial and recreational fishing gear types. All of the other gear types used to take bottomfishes are tightly regulated and the regulations include extensive area closures. For example, non-trawl commercial fishers cannot fish for bottomfishes in waters deeper than 30 fathoms (54 m.) and shallower than 150 fathoms (274 m) under the RCA. This is the majority of both the nearshore and shelf habitats. Recreational fishers cannot fish for bottomfish in waters deeper than 30 fathoms under the RCA. Note that the RCA area closed to recreational and non-trawl commercial fishers is much larger than that closed to trawling (i.e. the area in Table 4). Many efficient fishing gears are completely illegal in California (i.e. beach seines and Danish seines). In addition, the study area has a very complicated set of depth regulations which prevent the use of gillnets in waters between the shore and as deep as 100 fathoms (183 m) and these regulations will remain in effect after the RCA is re-opened. Also the Davidson Seamount area offshore of the MBNMS, adds a very large area in the lower slope and rise habitats where no take of bottom organisms is allowed.

METHODS LIKELY TO PRODUCE SUSTAINABLE FISHERIES

Biomass-based Quotas

Over the last two decades the management of the fisheries in the EEZ of California, Oregon and Washington has had very significant changes in the principal methods used to protect the resources. As information on the populations of exploited fishes has increased population assessments using stock synthesis models have been used to estimate the population sizes, exploitation rates and productivity of a wide range of important commercial species. It should be noted that these species represent the majority of the biomass of exploited species in the California Current System. These models have been used to calculate the expected size of an unfished population, and this allows estimation of the relative size, or depletion, of the exploited species. With the development of this information, management centered on establishing annual quotas designed to maintain populations at or near the levels that would produce maximum sustainable yield and maximum productivity, and allocation of the available yield among different user groups.

Over the last decade, area-based fishing regulations including area-based annual quotas and monthly or bi-monthly species (and species groups) trip limits have become standard management for most species managed by the PFMC (Appendix 1 : 2007-8 trip limits). The PFMC is actively involved in adaptive management and is constantly changing regulations to insure that annual quotas are based on current stock assessments, that annual quotas are not exceeded, that trip limits spread the available quotas over the geographical range of the species and the most advantageous seasonal distribution of landings and to reduce the bycatch of overfished species. The stock assessments revealed the low productivity of most west coast groundfish species, and this prompted the PFMC to reduce the number of fishing vessels chasing the fish so that the fishery would remain profitable with reduced catch levels.

Presently there is a NOAA mandate for ecosystem-based management, and it is expected that as information, analyses and ecosystem models become available further changes in management will occur. At this stage it is impossible to predict the basis of future ecosystem based management; however it is likely that trophic level and regional scale spatial considerations will be of major importance.

Overfishing has been a major factor in the determination of our present regulatory strategies. The PFMC uses the following definitions to describe overfishing and overfished:

> Overfishing occurs when the catch exceeds the fishing mortality rate needed to produce the maximum sustained yield F_{MSY} on a continual basis. The default F MSY proxy used for setting acceptable biological catches (ABCs) is $F_{45\%}$ for other groundfish such as lingcod and sablefish. $F_{50\%}$ is the default value for rockfishes and $F_{40\%}$ is the default for flatfishes.
>
> A stock is overfished if its current biomass is less than 25% of the unfished biomass level or if the current biomass is less than 50% of the biomass that would produce the maximum sustainable yield (MSY)

Thus overfishing depends on the annual harvest rate that produces MSY, and the overfished status depends on the relative size of the population in relation to the biomass that produces MSY. However, in practice overfishing has depended on the annual rate that produces 50%, 45% or 40% of the annual fecundity of the average fish in an unfished population and the overfished status has depended on a population falling below 25% of its unfished level.

Presently the PFMC manages groundfish fisheries with annual quotas based on a control rule where stock assessments are available. Quotas for the rest of the stocks are set at some fraction of historical average catch, often on a species group basis. The control rule uses a base harvest rate which is defined as the fishing mortality rate (F_{MSY}) or exploitation rate (E_{MSY}) that produces the maximum sustain yield; in practice the above MSY proxies are used. The exploitation rate is the percentage of the population that is taken by the fishery. This base exploitation rate is altered when the biomass drops below two population thresholds. The first threshold is the biomass that produces MSY; where this level is not known the proxy is 40% of the expected average unfished spawning biomass (this is now called the 40% depletion level). When a species stock assessment shows that the biomass is less than the 40% threshold, the exploitation rate is decreased linearly going from (E_{MSY}) at 40% of the unfished biomass to E=0.0 at 10% of the unfished biomass. The second threshold is the population level that defines an overfished species (i.e. in practice 25% of unfished biomass) and falling below this threshold triggers management into a rebuilding mode where fishing rates must be sharply reduced to allow rapid population rebuilding. Note that when a population is at 25% of its unfished biomass the exploitation rate would be exactly half of the (E_{MSY}) rate. For example if the exploitation rate that produces the proxy maximum sustained yield is 5% (i.e. E=0.05) the exploitation rate would be 2.5% when the population was at the 25% overfishing threshold.

When a species declines below the overfished threshold the PFMC has taken drastic measures to reduce the catch of that species both from fisheries targeting the species and fisheries which may take the species as bycatch. This has included closing down all groundfish fisheries over most of the core habitat of the overfished species (i.e. the RCA and the Cowcod closures in Southern California).

STATUS OF LIVING RESOURCES - STOCK ASSESSMENT

Generally speaking quantitative stock assessments are most accurate for groundfish species that have both relatively large populations and a history of commercial exploitation; and they are generally lacking for species without a history of commercial landings, nearshore species and species with small populations. There are many exploited species, including those taken in recreational fisheries, for which we do not have population assessments and only one population assessment is available for an unexploited species. Un-assessed species that are most likely to be at low population levels include species that live in habitats where extensive fishing (especially trawling) has occurred in the past, in nearshore habitats possibly affected by pollution (or other man induced environmental changes) and cold water species adversely affected by the warm water regime that has largely persisted since 1976-77.

The groundfish stock assessments used in this report are the most recent available assessments (August 2007) available from the Pacific Fisheries Management Commission's website. Regional assessments that do not include the central California area (i.e. cowcod), and species that are not common in central California (i.e. Pacific Ocean perch) were not included. Where several regional assessments were available the assessment covering the central California area was used (i.e. lingcod). The great majority of species for which quantitative information is available are presently being harvested at less than maximum sustainable levels and presently there is no overfishing occurring on PFMC managed stocks. This was not the case in the 1980s and early 1990s.

The term depletion has recently been used to describe the status of a population in relation to its unfished level. For example, a species that has a depletion of 40 % has a population that is 40% of the estimated average size of the unfished population. For some species the population size at the start of exploitation (i.e. the virgin population level) is taken to be the unfished biomass used to establish depletion. However, increasingly the unfished biomass is calculated within the species stock assessment model. The population fluctuations of the unexploited shortbelly rockfish provide a good example of the problem of establishing the unfished population level (Figure 4). The species was virtually unfished for the entire 1950-2005 time-period; therefore the average population size for the entire period would be the best estimate of the unfished biomass. If the beginning biomass (381,000 mt) were used to determine the species' unfished biomass the 2005 "depletion" would be 16.8%. Therefore, the stock would have to be classified as overfished and a rebuilding plan would have to be established; despite the fact that it has essentially not been fished.

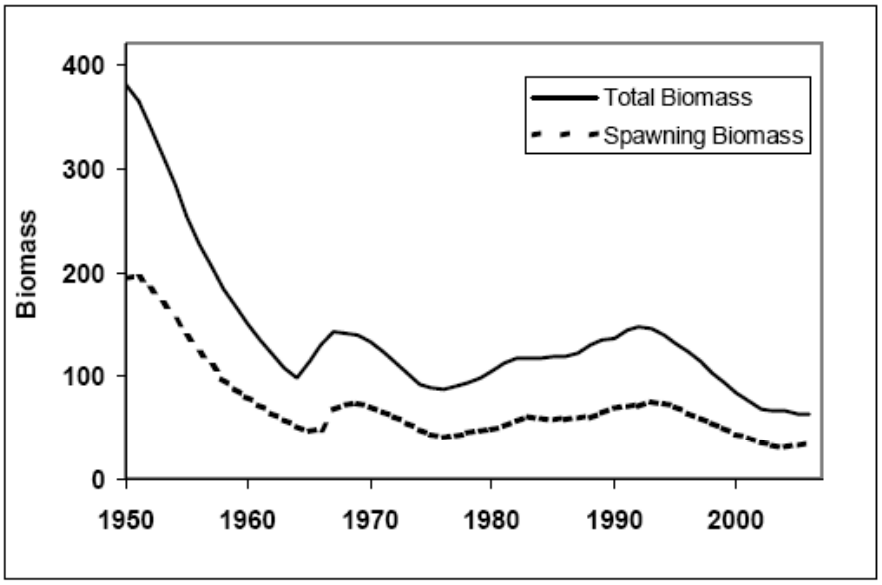

Figure 4. Population estimates of shortbelly rockfish in thousands of metric tons.
Figure from 2007 stock assessment (John Field, Edward Dick and Alec MacCall)

Stock assessments are available for 23 species in the central California area; to simplify the complex array that would result from trying to visualize the fluctuations of 23 species, the population levels relative to the individual species' unfished population levels (i.e. depletions) are listed at 10 year intervals starting in 1965. (Table 5). Several stock assessments do not go back as far as 1965 and the most recent year in the individual assessments is placed in the 2005 column. The definition of an overfished species used by the PFMC is a depletion of 25%; any stock falling to below this level requires sharply reduced exploitation rates and a rebuilding plan

Table 5. Depletion as a percentage of unfished biomass at ten-year intervals.
(Stocks below the 25% overfished threshold are in bold type)

	Year of assessment	1965	1975	1985	1995	2005*
Bank rockfish	2000	NA %	NA %	61.7%	52.2 %	45.1 %
Black rockfish	2003	84.7	70.2	38.7	41.2	54.8
Blackgill rockfish	2005	96.6	91.2	78.8	51.5	52.3
Bocaccio	2005	52.6	42.8	**18.0**	**7.1**	**11.6**
Cabezon (north)	2005	81.4	78.4	54.3	41.0	52.2
Canary rockfish	2005	55.9	46.1	**24.0**	**6.9**	**5.7**
Chilipepper	1998	NA	85.0	47.5	53.1	51.5
Darkblotched rockfish	2005	89.2	52.7	50.0	**18.6**	33.6
Dover sole	2005	62.1	63.4	50.8	42.0	62.8

English sole	2007	46.0	48.0	26.0	27.0	116.0
Gopher	2005	95.3	60.6	68.4	100.1	100.0
Lingcod (south)	2005	98.0	76.0	33.0	**12.0**	**24.0**
Longnose skate	2007	83.0	84.0	71.0	75.0	66.0
Longspine thornyhead	2005	100.0	99.8	98.7	82.7	71.6
Petrale sole (south)	2004	31.0	**19.0**	**7.0**	**8.0**	29.0
Sablefish	2005	57.3	59.9	45.5	34.1	27.9
Sablefish	2007	87.1	55.8	61.1	41.0	38.3
Shortbelly rockfish	2005	95.0	89.0	118.0	144.0	67.0
Shortspine thornyhead	2005	96.3	89.2	80.1	64.8	62.7
Starry flounder (south)	2005	NA	48.0	71.0	39.0	62.0
Whiting	2006	NA	118.5	120.1	38.6	30.9
Widow rockfish	2007	94.5	95.0	49.5	37.1	35.8
Yelloweye rockfish	2005	91.4	82.5	55.1	29.4	**23.0**
AVERAGE		79.2	71.3	58.0	45.9	49.6

(* 2005 or the most recent year available)

The west coast trawl fishery began prior to 1900 primarily as a fishery for flatfish, after about 1950 technological improvements, increased knowledge of the behavior of rockfishes and probably the decline in flatfish populations resulted in the trawl fishery concentrating more on rockfishes. The development of the fishery for other species (i.e. thornyheads, Pacific whiting, sablefish ect.) was more gradual. This pattern is seen when the stock assessment information is grouped into flatfishes, rockfishes and other species (Figure 5). The flatfish group was fished to below 50% of their unfished level by 1965 and the group declined to well below the 40% level by 1995; the group then rebounded to the 67% level following the introduction of restrictive quotas in the mid-1990s. The rockfish and other species groups were at quite high population levels in 1965. The rockfish group declined faster than the other species group and by 2005 both groups had population levels between 40-50% of the unfished level. While group levels are well within management guidelines individual species in each of the three groups had depletion levels that fell below the 40% target threshold. Presently the canary rockfish, bocaccio, yelloweye rockfishes and lingcod (in the southern assessment area) are below the 25% level (Table 5) and widow rockfish is in a rebuilding plan with biomass expected to reach the target level (40% depletion) in 2009. Due to the coastwide increase in its population lingcod has recently been removed from the overfished status; however, most of the recent increase in the lingcod has occurred in the north (64% depletion) and its status in the southern assessment area is considerably less (depletion 24%). Although the cowcod assessment does not include the area north of Point Conception, this species occurs in the MBNMS and it's population level in southern California is only 7.1% of the unfished level. Rebuilding plans with greatly reduced exploitation rates are currently in place for canary, bocaccio, cowcod, widow and yelloweye rockfishes.

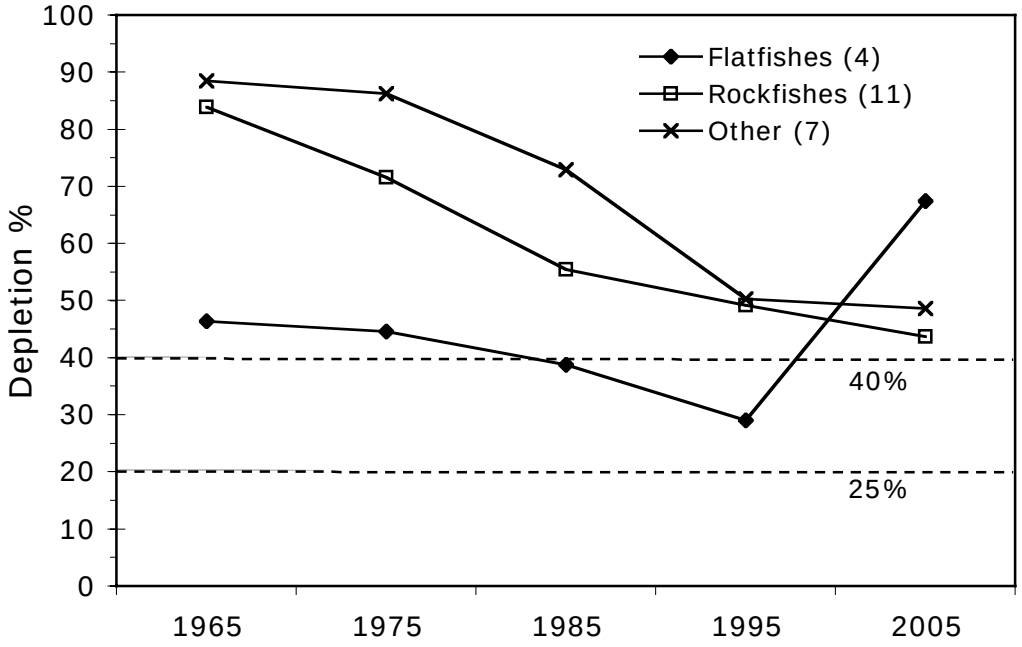

Figure 5. Summary of biomass trends at 10-year intervals of taxonomic groups of bottomfishes, depletion refers to the biomass of the species group in relation to its unfished (100%) state.

The stock assessment models showed that some of the groundfish stocks have relatively stable population growth rates (i.e. surplus production rates) that are in the 2-4% per year range. Some of the more productive stocks have average rates in the 6-12% range; however, most of the higher productivity species appear to have highly volatile, environmental-dependent rates with some years having negative growth rates and other years occasionally producing rates that are far above the average for the species. In other words the stocks that have stable production are relatively unproductive and the stocks with high productivity are relative unstable. Sablefish is an example of a stable, low productivity species and Pacific whiting is an example of species with high productivity, unstable production (Figure 6).

Shortbelly rockfish, the single unexploited species with a stock assessment, is a good example of a species whose population fluctuations have been primarily determined by environmental variation (Figure 4). Shortbelly rockfish had a total biomass of about 381,000 metric tons (mt) in 1950; by 1958 the population had fallen to less than half of the 1950 level and it to date it has not again attained the 1958 level. Between 1960 and the present the biomass has slowly fluctuated between 150,000 and 64,000 mt with minimum biomass occurring in 2005 (the last year of the assessment. Note that the foreign fleet that fished whiting off of Washington, Oregon and central California took small amounts of shortbelly rockfish from the mid-1960 to the mid-1970s (i.e. about 1% of the population per year and 6% in 1967).

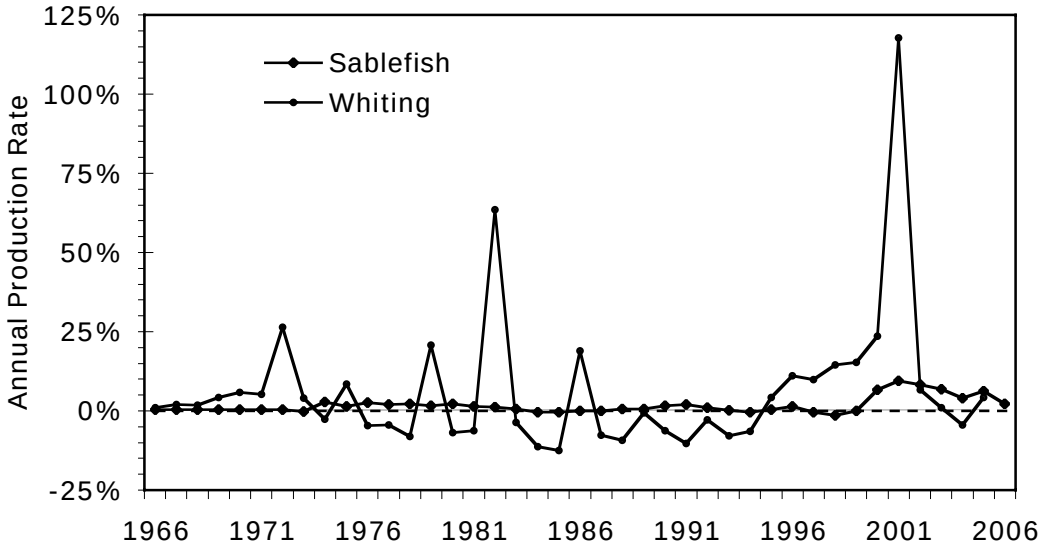

Figure 6. Annual production rates of sablefish and Pacific whiting. Data derived from the 2007 sablefish (Michael Schirripa) and 2006 whiting(Thomas Helser. Ian Stewart, Guy Fleisher and Steve Martell) stock assessments

Stock assessments show some variability in estimates as the models evolve. To demonstrate the type of variation that occurs, estimates of depletion levels from two sablefish stock assessments are listed in Table 5. The depletion estimate for the last year of the 2005 assessment (i.e. 2004) is 27.91% the corresponding estimate from the 2007 assessment is 34.2%.

OVERVIEW OF THE TOTAL AFFECT OF REGULATIONS ON FISHERIES

Sustainable fisheries require two components: (1) that there will be plenty of fish around in the future to sustain the fishery, and (2) that the fishing gear has to be sufficiently efficient that it is economical to fish a particular species. Ecosystem management adds two additional components: (3) that there should be plenty of non-fished species around, and (4) that physical habitat alteration should be minimized. If fisheries are to continue the tradeoffs between these four, often contradictory, components have to be evaluated. For example some hook and line fisheries have low by-catch rates and near zero habitat damage, but hook and line fisheries are not economically feasible for many species. In contrast, trawling on hard bottom, with large rollers, may be the economical superior mode of fishing for some species, but this type of trawling has large habitat impacts. The overview below suggests that there has been little attention paid to evaluation of the tradeoffs between four components. I note that the evaluation that follows is primarily focused on only half of the story; a description present fisheries regulations and the effect of the regulations on fisheries.

Nearshore (0-30 m or 0-16 fathoms) soft bottom habitat could be efficiently harvested with beach seines, demersal seines, various types of trawls, gillnets, and crab pots. The shelf (30-

100 m or 16-55 fathoms) soft bottom habitat has essentially the same array of effective gear types except for beach seines. Very few of the resident soft bottom species can be effectively fished with hook and line gear. Nearly all of the effective fishing gear for this habitat has been prohibited in the MBNMS area. Only crab pots, small mesh gillnets (that cannot be used to take rockfishes or lingcod) in the area between Yankee Point and Point Sal, and trawl gear (in 27% of the shelf habitat) are allowed. Therefore economically sustainable fisheries are impossible in the MBNMS for the vast majority of nearshore and shelf bottomfishes that dwell on soft bottom (i.e. surf perches, soles, flounders, turbots, skates, osmerid and antherinid smelts and white croaker).

Nearshore and shelf hard bottom habitats could be efficiently fished with gillnets, fish traps, various types of hook and line gear and low relief hard bottom could be trawled with some types of trawl gear. Gillnets and trawls are presently illegal over the entire nearshore habitat and the great majority of the shelf habitat; but other types of gear are adequate to achieve and exceed sustainable fisheries for many of the resident fishes in these habitats. Presently these other gear types cannot be used in the non-trawl RCA (54-274 m or 30-150 fathoms) so presently the hard bottom shelf habitat from 54-100 m is virtually unfished for bottomfishes.

When the non-trawl Rockfish Conservation Area is re-opened to fishing the shelf area in the MBNMS will remain closed to gillnetting as gillnets generally cannot be used in water shallower than 60 fathoms (109 m) between Point Reyes and Point Arguello. However, between Yankee Point and Point Sal gillnets less than 3 1/2 inches can be used; but rockfish and lingcod cannot be taken. All commercial fishing and recreational fishing for groundfish will remain prohibited in the State MPAs (17% of the nearshore and 12% of the shelf). The principal reasons for prohibition of gillnets in shallower water was their bycatch of protected species (marine birds and to a lesser degree marine mammals). This bycatch would not be expected in the shelf-break habitat due to increased depth; as past gillnetting was concentrated in the nearshore and shelf habitats it is presently unknown if this gear could be effectively used in the shelf-break or deeper habitats. Presently there is essentially no gillnet fishery in the MBNMS study area although it is legal fishing gear at depths deeper than the RCA.

The strong contrast between the potential exploitation levels in the hard and soft bottom habitats is the principal reason that the State of California MLPA process emphasized protection on nearshore and shelf hard bottom habitats and why they developed no MPAs specifically for soft bottom nearshore or shelf habitats. Presently there is no fishing for bottomfishes in 18% of the nearshore and 48% of the shelf habitats. When the RCA is re-opened to fishing 17% of the nearshore and 12% of the shelf habitats will have no fishing for bottomfish (i.e. the State MPAs): however, the percentage of hard bottom habitat protected by the State MPAs is about twice that of the soft bottom habitat. Trawling is presently prohibited in 99 % of the nearshore habitat and 74% of the shelf habitat in the study area; this will remain virtually unchanged when the RCA is re-opened.

Shelf break (100-300 m or 55-164 fathoms) fisheries have at times been the most significant fisheries in the MBNMS, the otter trawl fishery has traditionally dominated the fisheries exploiting this very rich habitat and most of the species that have been overfished on the west coast are trawl groundfish species with high concentrations of biomass at shelf break depths.

Including the RCA, which is a long-term but temporary closure, 37% of this habitat has recently been closed to trawling and when the RCA is reopened 23% of this area will remain closed to trawling. Presently all fishing for bottomfishes is prohibited in 36% of the shelf break habitat; this will decline to 5% when the RCA re-opens. In keeping with its traditional importance this habitat has the largest number of species with stock assessments and when the RCA is reopened the principal protection of this habitat will be provided by PMFC trip limits, PMFC EFH areas, State no trawl areas, State MPAs, limited entry and a complicated series of State of California area closures to gillnets.

The upper slope habitat (300-800 m or 164-437 fathoms) extends from the shelf break habitat to the approximate depth of the oxygen minimum (i.e. dissolved oxygen below about 0.5 mL/L). The great majority of shelf break species have individuals that go deeper than 300 meters, but their abundance drops off quickly below this depth. Essentially diversity drops off rapidly as the depth increases and the oxygen level decreases. At 400 meters depth (219 fathoms) dissolved oxygen varies between about 0.7 to 1.5 mL/L and few fishes or invertebrates are able to tolerate oxygen concentrations this low. On average oxygen levels drop below 1 mL/L at a depth of about 475 meters (260 fathoms) in the study area and it remains below this level to about 1500 meters (820 fathoms). The upper slope habitat has a few rockfish species (i.e. splitnose, bank and blackgill) whose core habitat is on the shallow edge of the upper slope but these species are not abundant below about 450 meters (246 fathoms). The fisheries of the upper slope are primarily dependent upon 4 species that are able to exist at the low oxygen levels existing over the habitat (Dover sole, shortspine thornyhead, longspine thornyhead and sablefish also known as the DTS group). In the MBNMS these four species, and the three rockfish species, are primarily caught with trawls but sablefish, which is a high mobility species, and to a lesser extent blackgill rockfish are also caught with bottom longlines and traps. Presently 22% of the upper slope habitat is closed to trawling and this will go to 20% when the RCA re-opens. Fishing for bottomfishes is prohibited in 7% of this habitat and this will decline to 2% when the RCA is reopened. Stock assessments are presently made for Dover sole, sablefish, shortspine thornyhead, longspine thornyhead and blackgill rockfish.

The lower slope (800 to 3000 m or 437 to 1640 fathoms) habitat occupies more than 50% of the MBNMS area. The fisheries in the lower slope have been dominated by the same DTS group that dominates the landings from the upper slope. In addition, a number of species of grenadiers can be effectively fished with the same longline gear used to fish sablefish and significant landings were made in the MBNMS in 1996. Grenadiers are uncommon in the oxygen minimum zone; therefore they are less common on the shallower portion of the lower slope habitat. Presently trawling is not allowed in 81% of the study area's lower slope; therefore, it could be said that the only species that could be expected to achieve economically sustainable fisheries in this habitat are sablefish, grenadier and possibly blackgill rockfish. However, the DTS species dominate both the upper and lower slope habitats so from a biological perspective the separation of the slope into two habitats at the oxygen minimum (i.e. 800 m) is not particularly helpful. Note that there is also a large area (113 sq mi) of lower slope habitat in the Davidson Seamount and fishing for bottomfishes is prohibited in this area.

The upper and lower slope habitats, due to their low diversity fauna and fisheries, are a good example of the combined effects of PFMC regulatory actions. There were no trawl or other closures in effect in the study area slope habitats during the 1996 to 2005 period; however, there were extensive reductions in annual quotas, limited entry was introduced and there were several vessel buyouts reducing the number of trawlers operating in the study area. These factors reduced the 2006 landings of the slope species to 1/4 of the 1996 landings (Table 1). It should be noted that since 2006 trawling has been prohibited in 23% of the study area upper slope habitat.

No bottomfishing occurs in the study area rise habitat (3000+ m or 1640+ fathoms) and trawling is not permitted in 100% of this area. There is only 70.3 sq. miles of this habitat in the study area; however, the Davidson Seamount Closure contains 662 sq miles of this habitat and no bottomfishing is allowed on any of this area.

Unfortunately the various MPAs and other area based trawl closures were developed independently by the different management agencies and no attempt was made to integrate, co-ordinate or evaluate the combined effects of the many area closures. The lack of co-ordination has resulted in considerable overlap between the protected areas with some areas being protected by a federal EFH area, a State MPA and a State no-trawling area. Adaptive management with this type of layering of regulations will be extremely difficult.

This lack of co-ordination will also greatly hinder research to evaluate the effects of MPAs. For example, the great majority of groundfish taken in the shelf, shelf break and slope habitats have been taken by trawl gear and some species, especially flatfishes, are taken in only very minor quantities by other fishing gear. The alongshore areas adjacent to all of the State MPAs are closed to trawling, and due to the combination of the RCA and the State of California trawl closure at present all of the area in state waters between 30 and 150 fathoms are no bottomfish take areas. With the area outside of a State MPA as protected as the area inside of the MPA how can the effect of the MPA possibly be evaluated?

The lack of co-ordination and evaluation of the combined effects of different types of regulations is also apparent when the Pacific Council's quota/bimonthly catch limit management is compared with MPA based management. For example the sablefish population (a species with high mobility and a low exploitation rate, an average of only 3.0% per year from 1950-2006) has continued to decline due to the fact that it is an extremely unproductive stock (its surplus production averaged only 1.4% per year from 1950-2006). The 2007 sablefish bimonthly catch limit for limited fixed gear vessels is 5,000 pounds (Appendix A). The enactment of the State MPAs and federal EFH areas did not alter this allocation. Therefore, unless the total closed area is so large that a vessel cannot catch its allocation the same amount of sablefish will be landed by a Monterey Bay vessel after the MPAs were enacted as was landed before they were enacted. The MPAs primary affect on sablefish will be to cause a relative increase in sablefish density inside the MPAs and a relative decrease outside the MPAs; there will be very little net difference in the density of sablefish in the entire study area. Note that this is not the case for species that are not managed by catch limits (i.e. the spot prawn or Dungeness crab).

Presently there are no known species in the federal water portion of the study area that are being exploited at rates greater than the calculated maximum sustainable yield (MSY) for the species. Note that population assessments are only available for exploited species with a history of significant landings, a taxonomic based proxy F_{MSY} is used for many species, and that rates are generally not available for nearshore species. Within the study area there are a small number of species in each depth zone that are currently being exploited at rates above about half their MSY rate (Table 6).

Table 6. Species with exploitation rates in the federal portion of the MBNMS study area estimated to be in excess of about half the species MSY rate (note there are no current biomass estimates for anchovy, squid, Chinook salmon, Dungeness crab, California halibut or spot prawn).

Pelagic Species	Shelf Species	Shelf Break Species	Upper Slope Species	Lower Slope Species
Sardine	Petrale sole	Petrale sole	Petrale sole	
Anchovy	California halibut	Sablefish	Sablefish	Sablefish
Squid	Dungeness crab	Spot prawn	Dover sole	Dover sole
Chinook salmon			Thornyheads	Thornyheads
			Splitnose rockfish	
			Blackgill rockfish	
			Bank rockfish	

In summary the MBNMS study area appears to be heavily protected from overfishing and the many layers of regulations from the different management agencies prevent a large number of exploitable species from being fished at any appreciable level. This is particularly true of species in soft bottom areas of the nearshore and shelf habitats, the shelf break habitat, the deep slope habitat and the rise habitat. In federal waters a small number of species are presently being fished at moderate or higher exploitation levels and the species that were overfished in the past are now in rebuilding plans and their habitat has been heavily protected by the RCA. The most recent available landings (2006) show that the ports in or near the MBNMS have had large to extreme declines in the value of their landings over the previous 10 years. These declines were primarily due to increased management measures, particularly reduced catch limits and the RCA, and not due to declines in the populations of the dominant exploited species. Numerous stock assessments show that the populations are responding to these management measures with total groundfish biomass rising substantially since about 1999. Thus management measures made prior to the establishment of the many MPAs in the MBNMS study area is preserving and enhancing ecosystem function and biodiversity. The ports of Santa Cruz, Monterey and Morro Bay are presently in severe decline and the loss of fishing infrastructure is a real threat to the fishing industry in these ports. Further declines in the value of the fisheries in the MBNMS should be expected as the very extensive areas that are now protected by the federal EFHs, State MPAs and state waters trawl closures were open to fishing in 2006. It appears that the several agencies that have designated areas in the MBNMS as MPAs have acted in an un-coordinated manner resulting in the present situation with 74% of the shelf and 64% of the MBNMS study area in no trawling MPAs, little

deepwater habitat (other than the Davidson Seamount Area) in no bottomfishing MPAs, no analyses of the combined affects of MPAs and previous management actions and no coherent overall strategy for ecosystem management.

Appendix A. Pacific Fishery Management Council's groundfish trip limits for 2007-8.

Table 3 (South) to Part 660, Subpart G -- 2007-2008 Trip Limits for Limited Entry Trawl Gear South of 40°10' N. Lat.

Other Limits and Requirements Apply -- Read § 660.301 - § 660.399 before using this table 032007

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[6/]:						
	40°10' - 38° N. lat.	100 fm - modified 200 fm [7/]	100 fm - 150 fm				100 fm - modified 200 fm [7/]
	38° - 34°27' N. lat.	100 fm - 150 fm					
	South of 34°27' N. lat.	100 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands					
	All trawl gear (large footrope, selective flatfish trawl, and small footrope trawl gear) is permitted seaward of the RCA. Large footrope trawl gear is prohibited shoreward of the RCA. Midwater trawl gear is permitted only for vessels participating in the primary whiting season.						
	See § 660.370 and § 660.381 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
1	**Minor slope rockfish[2/] & Darkblotched rockfish**						
2	40°10' - 38° N. lat.	15,000 lb/ 2 months			10,000 lb/ 2 months		15,000 lb/ 2 months
3	South of 38° N. lat.	40,000 lb/ 2 months					
4	**Splitnose**						
5	40°10' - 38° N. lat.	15,000 lb/ 2 months			10,000 lb/ 2 months		15,000 lb/ 2 months
6	South of 38° N. lat.	40,000 lb/ 2 months					
7	**DTS complex**						
8	Sablefish	14,000 lb/ 2 months					
9	Longspine thornyhead	22,000 lb/ 2 months					
10	Shortspine thornyhead	7,500 lb/ 2 months					
11	Dover sole	70,000 lb/ 2 months			80,000 lb/ 2 months		
12	**Flatfish** (except Dover sole)						
13	Other flatfish[3/], English sole, & starry flounder						
14	40°10' - 38° N. lat.	110,000 lb/ 2 months	Other flatfish, English sole, starry flounder & Petrale sole: 110,000 lb/ 2 months, no more than 30,000 lb/ 2 months of which may be petrale sole.	Other flatfish, English sole, starry flounder, arrowtooth flounder & Petrale sole: 110,000 lb/ 2 months, no more than 25,000 lb/ 2 months of which may be petrale sole.			110,000 lb/ 2 months (including arrowtooth)
15	South of 38° N. lat.						
16	Petrale sole	50,000 lb/ 2 months					50,000 lb/ 2 months
17	Arrowtooth flounder						
18	40°10' - 38° N. lat.	10,000 lb/ 2 months		Arrowtooth included within other flatfish limits - - see above			
19	South of 38° N. lat.						
20	**Whiting**						
21	midwater trawl	Before the primary whiting season: CLOSED. -- During the primary season: mid-water trawl permitted in the RCA. See §660.373 for season and trip limit details. -- After the primary whiting season: CLOSED.					
22	large & small footrope gear	Before the primary whiting season: 20,000 lb/trip. -- During the primary season: 10,000 lb/trip. -- After the primary whiting season: 10,000 lb/trip.					

TABLE 3 (South)

*** Effective August 1, 2007 ***

Table 3 (South). Continued

23	**Minor shelf rockfish[1/], Chilipepper, Shortbelly, Widow, & Yelloweye rockfish**				
24	large footrope or midwater trawl for Minor shelf rockfish & Shortbelly	300 lb/ month			
25	large footrope or midwater trawl for Chilipepper	2,000 lb/ 2 months	12,000 lb/ 2 months	8,000 lb/ 2 months	
26	large footrope or midwater trawl for Widow & Yelloweye	CLOSED			
27	small footrope trawl for Minor Shelf, Shortbelly, Widow & Yelloweye	300 lb/ month			
28	small footrope trawl for Chilipepper	500 lb/ month		800 lb/ month	
29	**Bocaccio**				
30	large footrope or midwater trawl	300 lb/ 2 months			
31	small footrope trawl	CLOSED			
32	**Canary rockfish**				
33	large footrope or midwater trawl				
34	small footrope trawl	100 lb/ month			
35	**Cowcod**				
36	**Minor nearshore rockfish & Black rockfish**				
37	large footrope or midwater trawl				
38	small footrope trawl				
39	**Lingcod[4/]**				
40	large footrope or midwater trawl	1,200 lb/ 2 months	4,000 lb/ 2 months		
41	small footrope trawl		1,200 lb/ 2 months		
42	**Pacific cod**	30,000 lb/ 2 months	70,000 lb/ 2 months		30,000 lb/ 2 months
43	**Spiny dogfish**	200,000 lb/ 2 months	150,000 lb/ 2 months	100,000 lb/ 2 months	
44	**Other Fish[5/] & Cabezon**				

TABLE 3 (South) con't

1/ Yellowtail is included in the trip limits for minor shelf rockfish.
2/ POP is included in the trip limits for minor slope rockfish
3/ "Other flatfish" are defined at § 660.302 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.
4/ The minimum size limit for lingcod is 24 inches (61 cm) total length.
5/ Other fish are defined at § 660.302 and include sharks, skates, ratfish, morids, grenadiers, and kelp greenling.
6/ The Rockfish Conservation Area is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat/long coordinates set out at §§ 660.391-660.394.
7/ The "modified 200 fm" line is modified to exclude certain petrale sole areas from the RCA.
To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

*** Effective August 1, 2007 ***

Table 4 (South) to Part 660, Subpart G -- 2007-2008 Trip Limits for Limited Entry Fixed Gear South of 40°10' N. Lat.

Other Limits and Requirements Apply -- Read § 660.301 - § 660.399 before using this table 062007

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[5/]:						
	40°10' - 34°27' N. lat.	30 fm - 150 fm					
	South of 34°27' N. lat.	60 fm - 150 fm (also applies around islands)					
	See § 660.370 and § 660.382 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
1	**Minor slope rockfish[2/] & Darkblotched rockfish**	40,000 lb/ 2 months					
2	**Splitnose**	40,000 lb/ 2 months					
3	**Sablefish**						
4	40°10' - 36° N. lat.	300 lb/ day, or 1 landing per week of up to 1,000 lb, not to exceed 5,000 lb/ 2 months					
5	South of 36° N. lat.	350 lb/ day, or 1 landing per week of up to 1,050 lb					
6	**Longspine thornyhead**	10,000 lb / 2 months					
7	**Shortspine thornyhead**						
	40°10' - 34°27' N. lat.	2,000 lb/ 2 months					
	South of 34°27' N. lat.	2,000 lb/ 2 months			3,000 lb/ 2 months	2,000 lb/ 2 months	
8	**Dover sole**	5,000 lb/ month South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches) point to shank, and up to two 1 lb (0.45 kg) weights per line are not subject to the RCAs.					
9	**Arrowtooth flounder**						
10	**Petrale sole**						
11	**English sole**						
12	**Starry flounder**						
13	**Other flatfish[1/]**						
14	**Whiting**	10,000 lb/ trip					
15	**Minor shelf rockfish[2/], Shortbelly, Widow rockfish, and after August 31, Bocaccio**						
16	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED	200 lb/ 2 months		500 lb/ 2 months (including Bocaccio)	
	South of 34°27' N. lat.	3,000 lb/ 2 months		3,000 lb/ 2 months			
18	**Chilipepper rockfish**	2,000 lb/ 2 months, this opportunity only available seaward of the nontrawl RCA					
19	**Canary rockfish**	CLOSED					
20	**Yelloweye rockfish**	CLOSED					
21	**Cowcod**	CLOSED					
22	**Bocaccio**						
23	40°10' - 34°27' N. lat.	200 lb/ 2 months	CLOSED	100 lb/ 2 months	300 lb/ 2 months	Bocaccio included under Minor shelf rockfish, shortbelly, & widow limits -- See above	
24	South of 34°27' N. lat.	300 lb/ 2 months		300 lb/ 2 months			

TABLE 4 (South)

*** Effective August 1, 2007 ***

Table 4 (South). Continued

25	**Minor nearshore rockfish & Black rockfish**							
26	Shallow nearshore	600 lb/ 2 months	CLOSED	800 lb/ 2 months	900 lb/ 2 months	800 lb/ 2 months	600 lb/ 2 months	
27	Deeper nearshore							
28	40°10' - 34°27' N. lat.	700 lb/ 2 months	CLOSED	700 lb/ 2 months		600 lb/ 2 months	700 lb/ 2 months	
29	South of 34°27' N. lat.	500 lb/ 2 months		600 lb/ 2 months				
30	California scorpionfish	600 lb/ 2 months	CLOSED	600 lb/ 2 months	800 lb/ 2 months		600 lb/ 2 months	
31	**Lingcod**[3/]	CLOSED		800 lb/ 2 months			400 lb/ month	CLOSED
32	**Pacific cod**	1,000 lb/ 2 months						
33	**Spiny dogfish**	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months			
34	**Other fish**[4/] **& Cabezon**	Not limited						

TABLE 4 (South)

1/ "Other flatfish" are defined at § 660.302 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.
2/ POP is included in the trip limits for minor slope rockfish. Yellowtail is included in the trip limits for minor shelf rockfish.
3/ The minimum size limit for lingcod is 24 inches (61 cm) total length.
4/ "Other fish" are defined at § 660.302 and include sharks, skates, ratfish, morids, grenadiers, and kelp greenling.
5/ The Rockfish Conservation Area is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat/long coordinates set out at §§ 660.391-660.394, except that the 20-fm depth contour off California is defined by the depth contour and not coordinates.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

*** Effective August 1, 2007 ***

Table 5 (South) to Part 660, Subpart G -- 2007-2008 Trip Limits for Open Access Gears South of 40°10' N. Lat.

Other Limits and Requirements Apply -- Read § 660.301 - § 660.399 before using this table 062007

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[6/]: 40°10' - 34°27' N. lat.	30 fm - 150 fm					
	South of 34°27' N. lat.	60 fm - 150 fm (also applies around islands)					
	See § 660.370 and § 660.383 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
1	**Minor slope rockfish[1/] & Darkblotched rockfish**						
2	40°10' - 38° N. lat.	Per trip, no more than 25% of weight of the sablefish landed					
3	South of 38° N. lat.	10,000 lb/ 2 months					
4	**Splitnose**	200 lb/ month					
5	**Sablefish**						
6	40°10' - 36° N. lat.	300 lb/ day, or 1 landing per week of up to 700 lb, not to exceed 2,100 lb/ 2 months					
7	South of 36° N. lat.	300 lb/ day, or 1 landing per week of up to 700 lb				350 lb/ day, or 1 landing per week of up to 1,050 lb	
8	**Thornyheads**						
9	40°10' - 34°27' N. lat.	CLOSED					
10	South of 34°27' N. lat.	50 lb/ day, no more than 1,000 lb/ 2 months					
11	**Dover sole**	3,000 lb/month, no more than 300 lb of which may be species other than Pacific sanddabs. South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches) point to shank, and up to two 1 lb (0.45 kg) weights per line are not subject to the RCAs.					
12	**Arrowtooth flounder**						
13	**Petrale sole**						
14	**English sole**						
15	**Starry flounder**						
16	**Other flatfish[3/]**						
17	**Whiting**	300 lb/ month					
18	**Minor shelf rockfish[1/], Shortbelly, Widow & Chilipepper rockfish**						
19	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED	200 lb/ 2 months		300 lb/ 2 months	
20	South of 34°27' N. lat.	750 lb/ 2 months		750 lb/ 2 months			
21	**Canary rockfish**	CLOSED					
22	**Yelloweye rockfish**	CLOSED					
23	**Cowcod**	CLOSED					
24	**Bocaccio**						
		200 lb/ 2					

TABLE 5 (South)

Ecosystem consequences of MPAs for the Monterey Bay National Marine Sanctuary

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Revised from Review March 2008

Introduction and objectives

The purpose of this paper is to evaluate the ecosystem benefits of closing portions of the Monterey Bay National Marine Sanctuary (MBNMS) to fishing by declaring further areas as Marine Protected Areas (MPAs). The MBNMS was established under the National Marine Sanctuaries Act and in order to determine if closing areas to fishing will produce benefits we must examine the objectives of the MBNMS.

The following quote is taken from the "findings of the Act."

> 4) a Federal program which establishes areas of the marine environment which have special conservation, recreational, ecological, historical, cultural, archeological, scientific, educational, or esthetic qualities as national marine sanctuaries managed as the National Marine Sanctuary System will -
> (A) improve the conservation, understanding, management, and wise and sustainable use of marine resources;
> (B) enhance public awareness, understanding, and appreciation of the marine environment; and
> (C) maintain for future generations the habitat, and ecological services, of the natural assemblage of living resources that inhabit these areas.

It should be noted that "management and sustainable use of marine resources" appear prominently. Further, the purposes of the Act are specified as:

> b) Purposes and policies
> The purposes and policies of this chapter are
> (1) to identify and designate as national marine sanctuaries areas of the marine environment which are of special national significance and to manage these areas as the National Marine Sanctuary System;
> (2) to provide authority for comprehensive and coordinated conservation and management of these marine areas, and activities affecting them, in a manner which complements existing regulatory authorities;
> (3) to maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations, and ecological processes;
> (4) to enhance public awareness, understanding, appreciation, and wise and sustainable use of the marine environment, and the natural, historical, cultural, and archeological resources of the National Marine Sanctuary System;
> (5) to support, promote, and coordinate scientific research on, and long-term monitoring of, the resources of these marine areas;
> (6) to facilitate to the extent compatible with the primary objective of resource protection, all public and private uses of the resources of these marine areas not prohibited pursuant to other authorities;
> (7) to develop and implement coordinated plans for the protection and management of these areas with appropriate Federal agencies, State and local

governments, Native American tribes and organizations, international organizations, and other public and private interests concerned with the continuing health and resilience of these marine areas;
(8) to create models of, and incentives for, ways to conserve and manage these areas, including the application of innovative management techniques; and
(9) to cooperate with global programs encouraging conservation of marine resources.

Of particular interest are item (2) which suggests the actions of the MBNMS should "complement existing regulatory authorities", in this case the Pacific Fisheries Management Council, and item (6) suggesting that the MBNMS should facilitate public and private use of the resources. There are potential conflicts with item (3) where one interpretation would be that "natural biological communities" would imply communities unaffected by human action including harvesting. Our interpretation is that the term "natural" can best be interpreted as "naturally functioning" and "protect" would imply to protect from non-sustainable human use. Given that establishment of sanctuaries did not include elimination of harvesting, this appears to us to be strong evidence that the act has not been interpreted as requiring ecosystems be maintained in their unexploited state.

Rather we would interpret the current suggestions for the need for no-take areas to arise from the concern that the existing regulatory system has failed to maintain the resources in a sustainable condition, and what is needed is no-take areas to complement existing regulations to achieve sustainable exploitation. We will see in the section below that there is a wide-spread perception that exploitation as currently practiced has not been sustainable, but we will present data later to show that this perception is misguided, and that achieving sustainable use to meet objectives (2) and (6) does not require additional no-take areas.

The history, structure and status of the ecosystem

History

The Monterey Bay National Marine Sanctuary (MBNMS) consists of 5,322 square miles along the central California coast that is imbedded in the California Current Ecosystem. This ecosystem has historically been severely impacted by human exploitation. The first documented impact of Europeans was intensive harvesting of sea otters and fur seals for their pelts and elephant seals for oil in the early 19th century. In the mid 19th century, coastal whaling began, seal lion exploitation continued and seabirds were harvested for eggs. At the end of the 19th century elephant seals were commercially extinct, sea lions depleted, and salmon fisheries were developing as canning technology provided distant markets. In the early 20th century finfish markets opened with the advent of refrigerated rail transport. In the mid 20th century a very large canning industry for sardines was developed, producing for a time one of the largest fisheries in the world. Small-scale fisheries primarily for salmon, crab and shrimp have been prominent features of the ecosystem through the 20th century. In the 2nd half of the 20th century, foreign factory trawlers began to intensively exploit groundfish, and local fisheries exploited

shellfish.

In many ways the history of the California Current Ecosystem is typical of 19th and 20th century fisheries, the fisheries were largely unregulated, and market forces allowed most stocks to depleted to a point where they were not economically viable. As new markets or technologies developed there were profits to be made in new fisheries, and these fisheries developed, overexploited the stocks and commercially collapsed. Figure 1 shows the history of removals from this ecosystem (Field and Francis 2006).

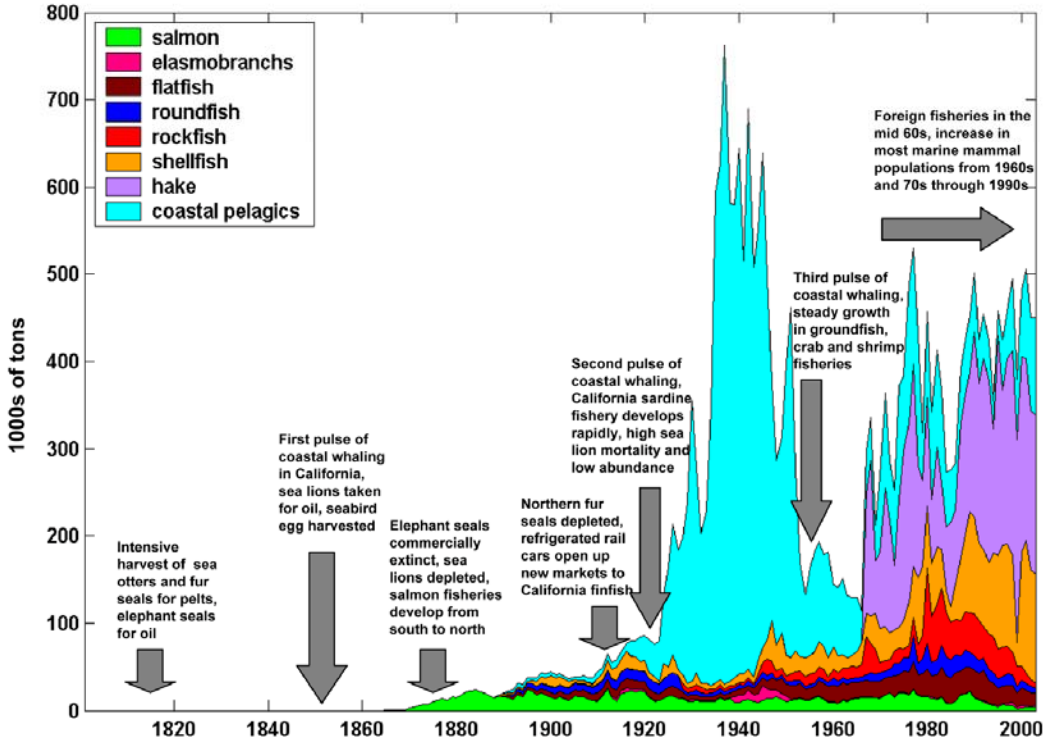

Figure 1. History of removals from the California current ecosystem (Field and Francis 2006).

This history has led to a generally pessimistic view of the state of this ecosystem. The following quote reflects the most common perception of the California Current.

> In the California Current, many fish populations and the communities that depend upon them are in a state of crisis. Many long-lived, slow-growing groundfish have become severely depleted due to overharvesting, and obligatory rebuilding plans suggest that some stocks could take many decades to recover. The condition of several stocks is so poor that the Pacific Fisheries Management Council (PFMC) found it necessary in 2003 to close the majority of the continental shelf to most fishing, an action that has resulted in dramatic

> impacts to fishermen and fishing-dependent communities. Salmon crises, driven by a complex combination of natural and anthropogenic factors, have been ongoing in the Pacific Northwest for decades, although recent changes in ocean conditions have boosted production in some regions to record levels. Fisheries for highly variable coastal pelagic populations could be entering a new phase as well, as some stocks may have recently entered into a period of low productivity. (Field et al. 2006)

As we will see in the sections below, there is general consensus that the salmon crisis and concern about the pelagics are largely unrelated to fisheries harvesting. For salmon the primary concerns are freshwater habitat and survival. For the pelagics the driving forces are natural changes. No one suggests that any no-take areas in the MBNMS could have any impact on the salmon or pelagics. The primary concern about fishing has focused on a range of groundfish stocks, primarily rockfish. We will see in the section below, and in an earlier section of this report, that the management actions have already been taken to rebuild these species, that the groundfish community as a whole has not been overfished, and that further no-take areas in the MBNMS would not make a significant contribution to rebuilding of overfished stocks.

Structure of the ecosystem

The structure of the California Current Ecosystem is shown in Figure 2 below (from Field and Francis 2006). The size of the boxes and the width of the bars connecting various boxes are scaled to the log of the standing biomass and biomass flow, respectively. Colors represent alternative pathways, with those derived from euphausiid shown in blue. Data on abundance trends are available for the major species that are of commercial value. The notable exceptions where there are no estimates of abundance trends are the major mesopelagics and “benthic fish”, none of which are significantly exploited.

For the commercially important fish species Figure 3 shows the estimated average unfished biomass. The ecosystem is dominated by Pacific whiting (hake), sardine, jack mackerel, anchovy and pacific mackerel. The groundfish constitute only 12% of the unfished biomass, and yet that is where almost all the concern about fishing impacts on ecosystem function has been directed. The overfished stocks mentioned in the earlier quote include the species shown in Table 1. Since they were declared overfished most of these stocks have increased significantly, and now canary, lingcod and widow rockfish are well above the level at which stocks are declared overfished, but not yet rebuild to the target levels. For cowcod and yelloweye the stock assessment models predict rebuilding, but with the large scale fisheries closures there are now no ongoing time series to inform the assessments of trends in abundance.

These overfished stocks constitute only 3% of the unfished biomass of the system, and the three stocks that are well below target levels, bocaccio, cowcod, darkblotched and yelloweye only constitute 0.3% of the unfished biomass. So concern about overfishing must concentrate on the specific habitats where these species were particularly important instead of a general concern about the ecosystem as a whole.

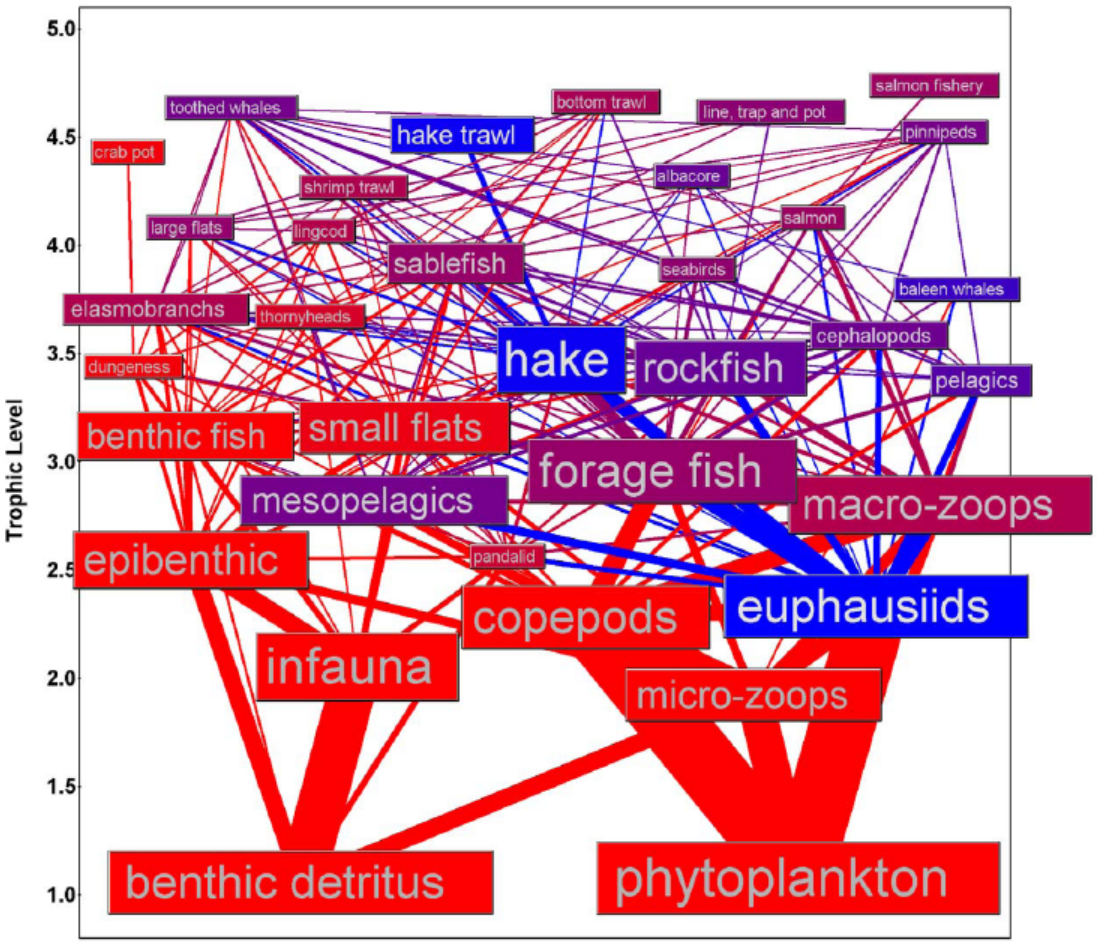

Figure 2. Trophic structure of the California Current ecosystem.

Table 1. Current status of stocks declared overfished.

Stock	Year declared overfished	Current status
Bocaccio	1999	11.0%
Canary	2000	38.0%
Cowcod	2000	17.0%
Darkblotched	2000	17.0%
Lingcod S.	1999	31.0%
POP	1999	23.4%
Widow	2001	31.0%
Yelloweye	2002	17.7%

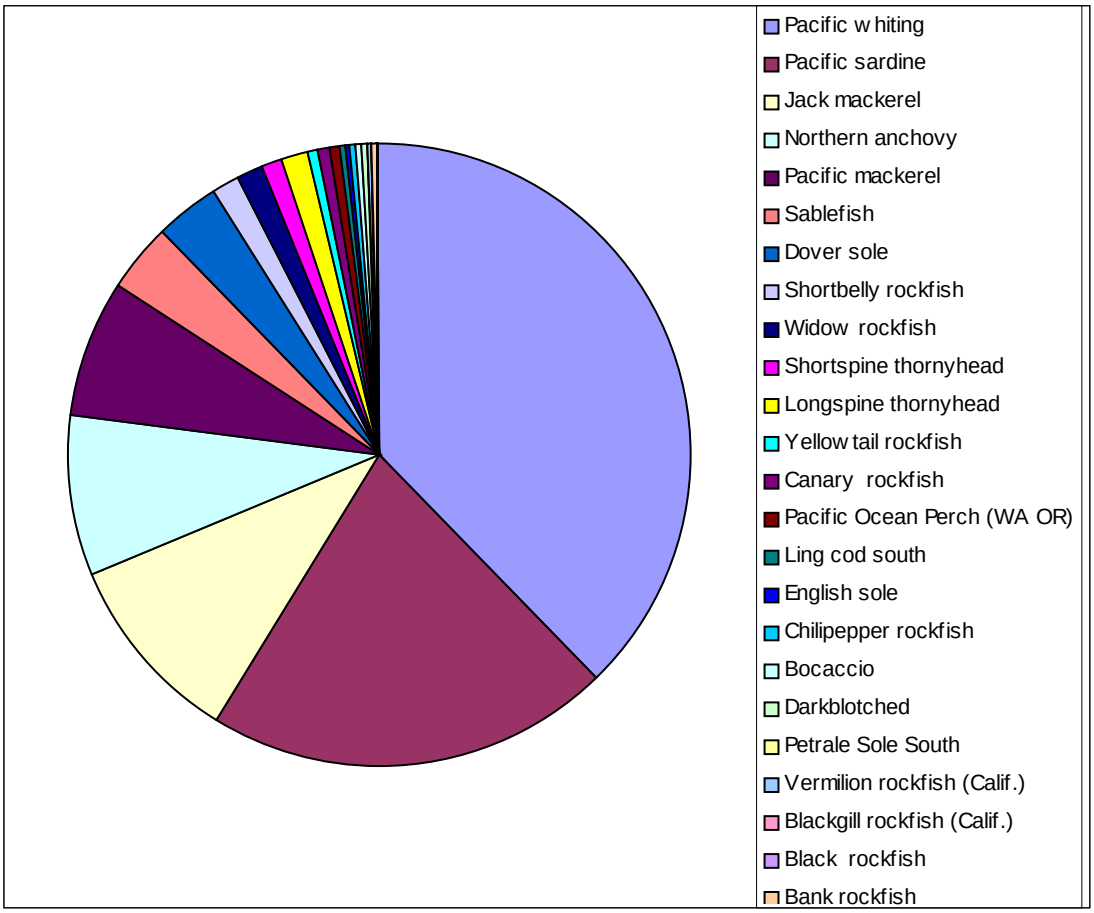

Figure 3. Distribution of unfished stock sizes for major pelagic and groundfish species in the California Current ecosystem

Our understanding of long term trends and status of elements of the ecosystem is highly variable. The history of several of the most abundant stocks, sardines, anchovy and hake have been reconstructed from scale records in anoxic sediments and some of these data are shown below.

When these data were first published they caused a minor revolution in the world of fisheries, which had largely accepted a theoretical framework in which it is assumed that in the absence of fishing the marine communities were in a general equilibrium, and one would expect, at any time, to find all stocks at their "carrying capacity." The fact that the California sardine has apparently regularly had periods of very low abundance, prior to any industrial fishing, was a great surprise to most fishery scientists. While some of this variability is due to changes in the spatial distribution of these stocks (Parrish et al. 1989), there is a broader range of evidence that pelagics show high natural variability in several major current systems (Cushing 1982, Jacobson et al. 2001) The key pelagics in the California Current Ecosystem are the sardine, anchovy, mackerel and jack mackerel. These species have been shown to fluctuate dramatically in a number of ecosystems (Lluch-Belda et al. 1989, Lehodey et al. 2006.)

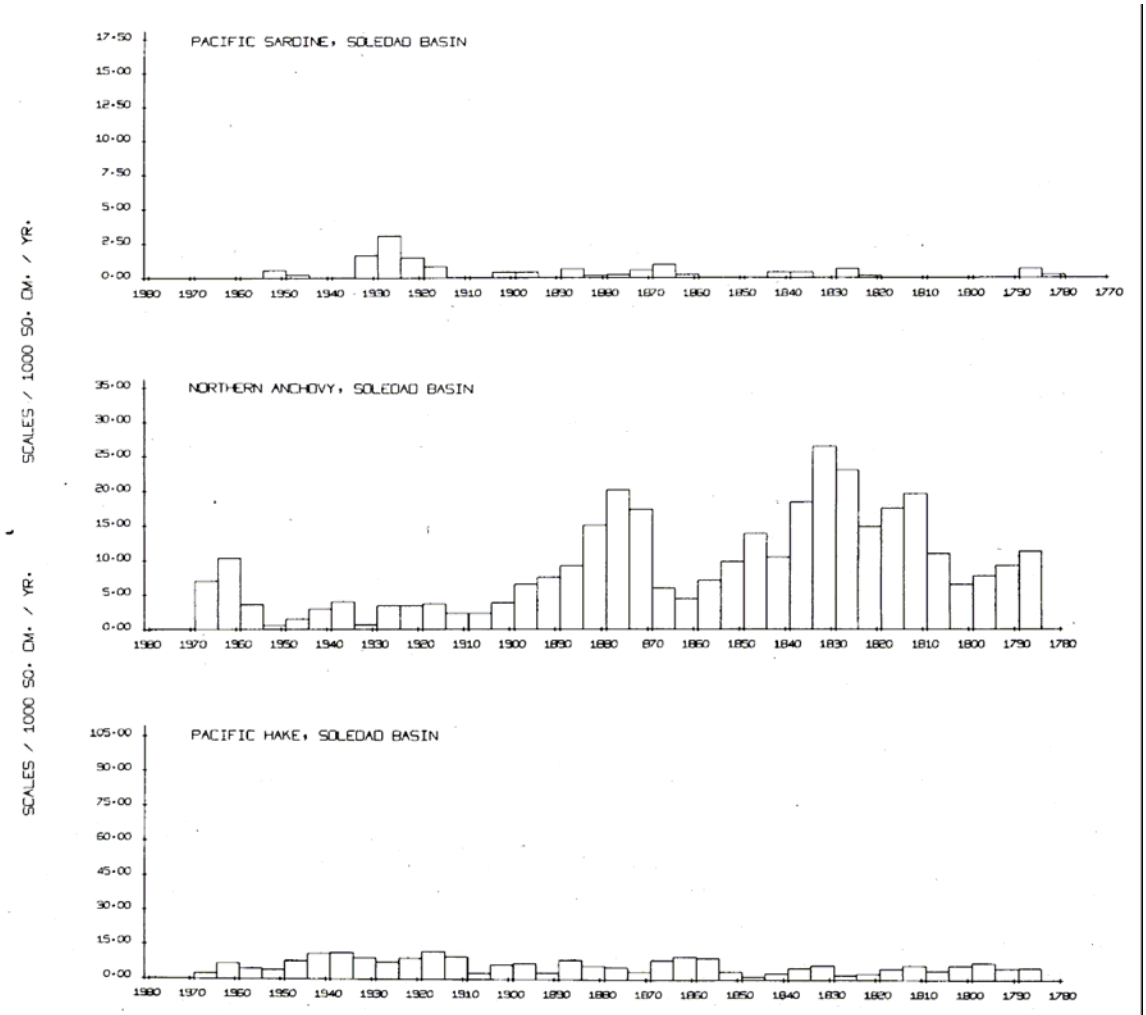

FIGURE 5b.—Histogram plot of the scale deposition rate of the Pacific sardine, the northern anchovy, and the Pacific hake in sediment of the Soledad Basin from about 1780 to 1969.

Figure 4. History of abundance of sardine, anchovy and hake reconstructed from scales deposited in anoxic sediments (by Soutar and Isaacs 1974). Note that the x axis is time and runs backwards, with recent years to the left and the past to the right.

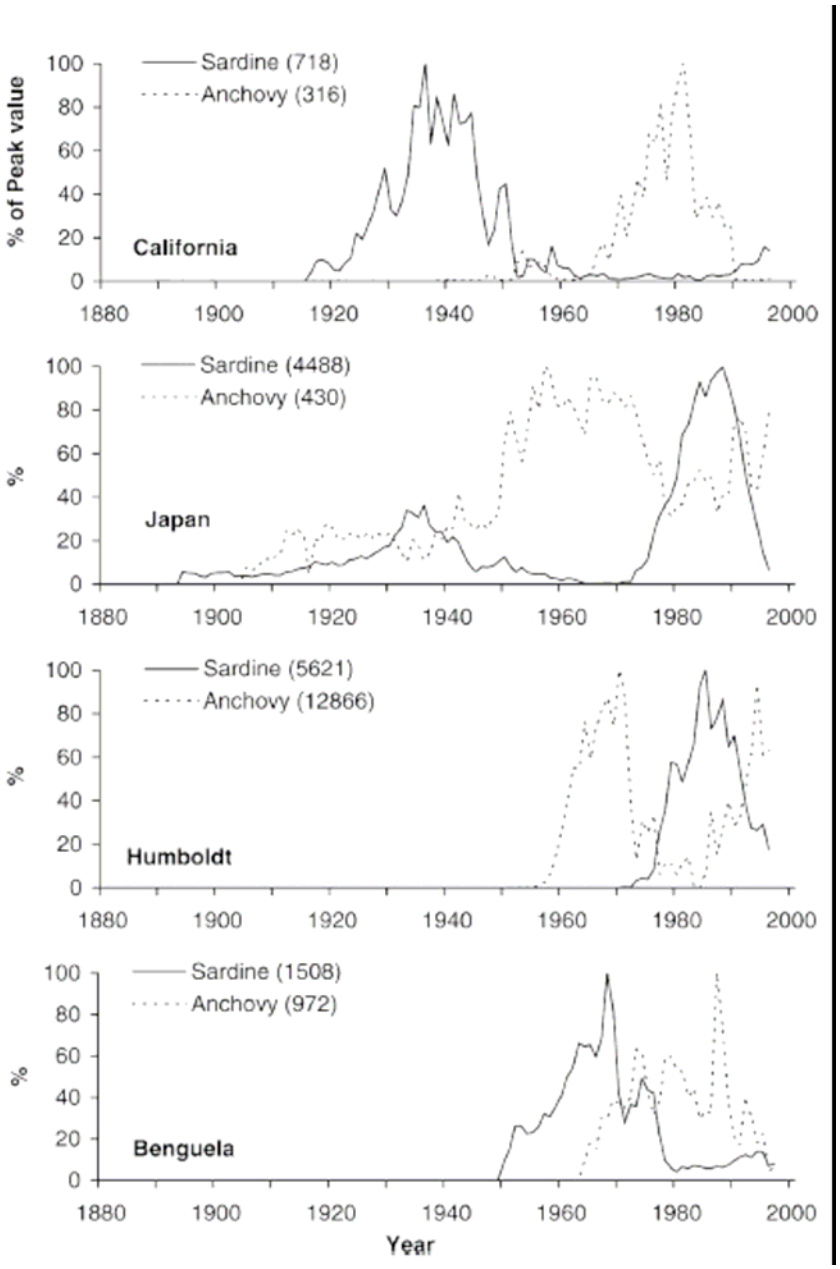

Figure 5. History of pelagic catches in some different ecosystems from Lehodey et al. 2006. Note that catch is likely not a good index of abundance changes for these stocks; peak catches reflect economic development of the fisheries rather than pulses of abundance, but there likely were anchovy increases following each of the sardine collapses.

Other than the scale records, our other primary data source are catches, and abundance reconstructions from stock assessments, based on catch, size and age distribution, and indices of abundance. Figure 6 shows the estimated total biomass of the most significant groundfish species since 1950, scaled to an estimated 2.4 million tons in 1950. We can see that the period 1950 to the late 1990s was one of declining

biomass. In the last few years, primarily due to federal limitations on fishing, the biomass has been trending upwards. At the low point the groundfish biomass reached slightly less than 50% of hypothetical unfished value.

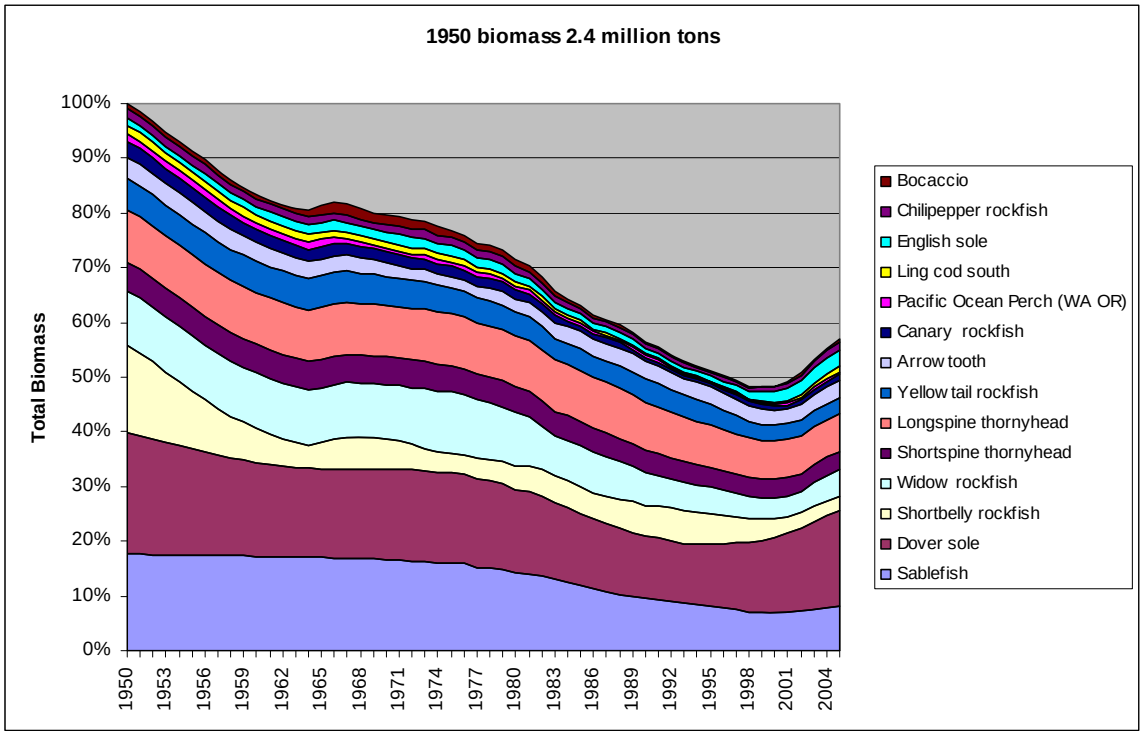

Figure 6. Trends in abundance of groundfish stocks off the west coast of the U.S.

The marine mammal populations in the ecosystem are generally rebuilding, often at near the maximum potential rate of increase. This is shown in Figure 7.

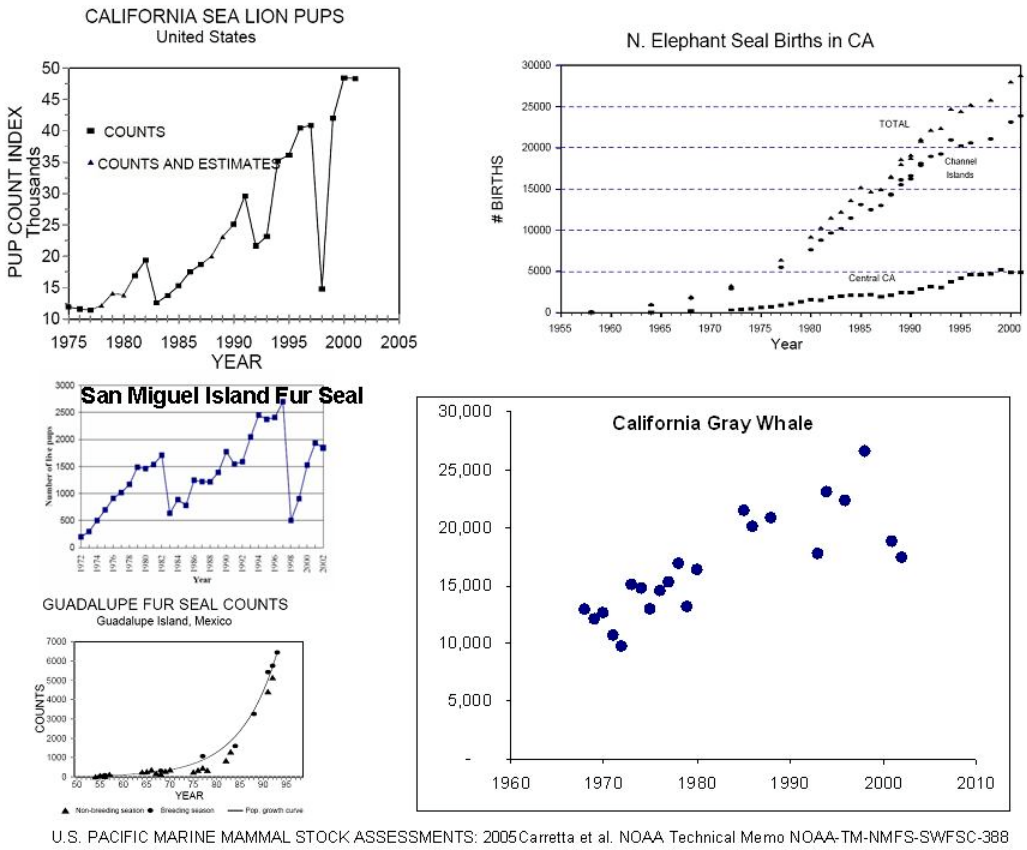

Figure 7. Trends in abundance of some marine mammals in the California current ecosystem

Thus we see that the key elements of the ecosystem that have historically impacted by fishing are recovering under sustainable, conservative management.

Elements of concern in the ecosystem: are protected areas part of the solution?

There are several elements of the ecosystem that have been the focus of concern. Several stocks of salmon are listed under the ESA, and have been the focus of considerable public attention. Because most of the concern of these stocks is about their freshwater life history, and in the marine ecosystem salmon are quite mobile, there is no impact of any proposed MPAs on salmon population dynamics.

Marine mammal populations are generally on the rebound within the ecosystem as a whole and often increasing at rates near their maximum rate of increase. It is difficult to understand how MPAs within the MBNMS would provide significant benefits to marine mammals. Indeed, fisheries have provided enhanced foraging opportunities for species like California sea lions, providing easily caught prey in the form of hooked fish with restricted movement and discards

As discussed in the quote from Field et al (2006) earlier there is concern that the pelagic ecosystem may be entering a new phase of low productivity. This is thought to be driven by physical changes in the ecosystem, and because the pelagic fish are also quite mobile, there are no arguments that additional MPAs within MBNMS would affect pelagics.

The one element of the ecosystem that would be affected by MPAs including those created under the MLPA, is the inshore sedentary fishes, particularly rockfish, and several of the overfished rockfish are in this category.. The status of these species was discussed in the Parrish section of this report, and ecosystem impacts are considered in the next section. Because further no-take areas within the MBNMS would encompass only the federal waters, little shallow rocky habitat would be included because of the closeness of the continental shelf to the coast.

It may be that there are special habitats within MBNMS that deserve special protection. Such areas would be characterized by unique ecological communities that are not represented in protected areas elsewhere. Our understanding is that the Davidson Seamount may be such an area that will be included in the MBNMS, and if brought into the MBNMS it would be protected as both a no-bottom contact gear and no extractive use under the PFMC EFH classification. Other areas may exist and would need to be identified and considered on a case by case basis. None of the proposals we have seen have identified such areas, but rather have generally repeated the mantra that fisheries management has failed and new closed areas are needed. If such areas are identified, it would be appropriate to carefully define what types of exploitation would impact the unique features. For instance, it is likely that it would be characteristics of the benthic ecosystem that were judged unique, and pelagic fishing might be compatible with protection of the benthic communities.

Impacts of MPAs within MBNMS

Model evaluation of effect of MPAs

The key scientific question regarding potential implementation of further fisheries closures within MBNMS is what will be the consequences to the ecosystem and the fisheries. How will the abundance of the various elements of the ecosystem change, and how much of the catch would be lost? There are two possible approaches to this question, reliance on empirical data from closures elsewhere, and use of models to evaluate expected consequences using best current scientific information. The NOAA Strategic Plan discusses the role of models as mandated by NOAA.

There is reasonably limited empirical data that is taken from this region. There are a few small areas that have been closed to fishing for a long time; the Channel Islands MPAs have only been in effect for a few years, and the Central Coast MPAs, including those within the MBNMS have just been implemented. Drawing on experience around the world it would be expected that heavily exploited species that are sedentary would be expected to increase in abundance inside of the protected areas. We would not expect

major changes in abundance in unfished species or those who have movement rates high relative to the size of the protected areas.

We have constructed a spatially explicit simulation model of the ecosystem using the software "EcoSpace" drawing on the non-spatially explicit version of "EcoSim" constructed by Field et al. (2006). Figure 8 shows the key elements in this model, which is essentially the Field et al. model with some groups omitted or aggregated and with age-structured (multstanza) population models added for key inshore species. The abalone, nearshore rockfish and lingcod represent the inshore stocks that could potentially benefit from protected areas. While many of these species have been addressed both in the section on single species management, and in the State's MLPA program, we explore the impact of closed areas through trophic connections. Thornyhead, shortbelly rockfish and widow rockfish are all too mobile and have habitat preferences for deeper water so that there is no realistic expectation of any impact of protected areas.

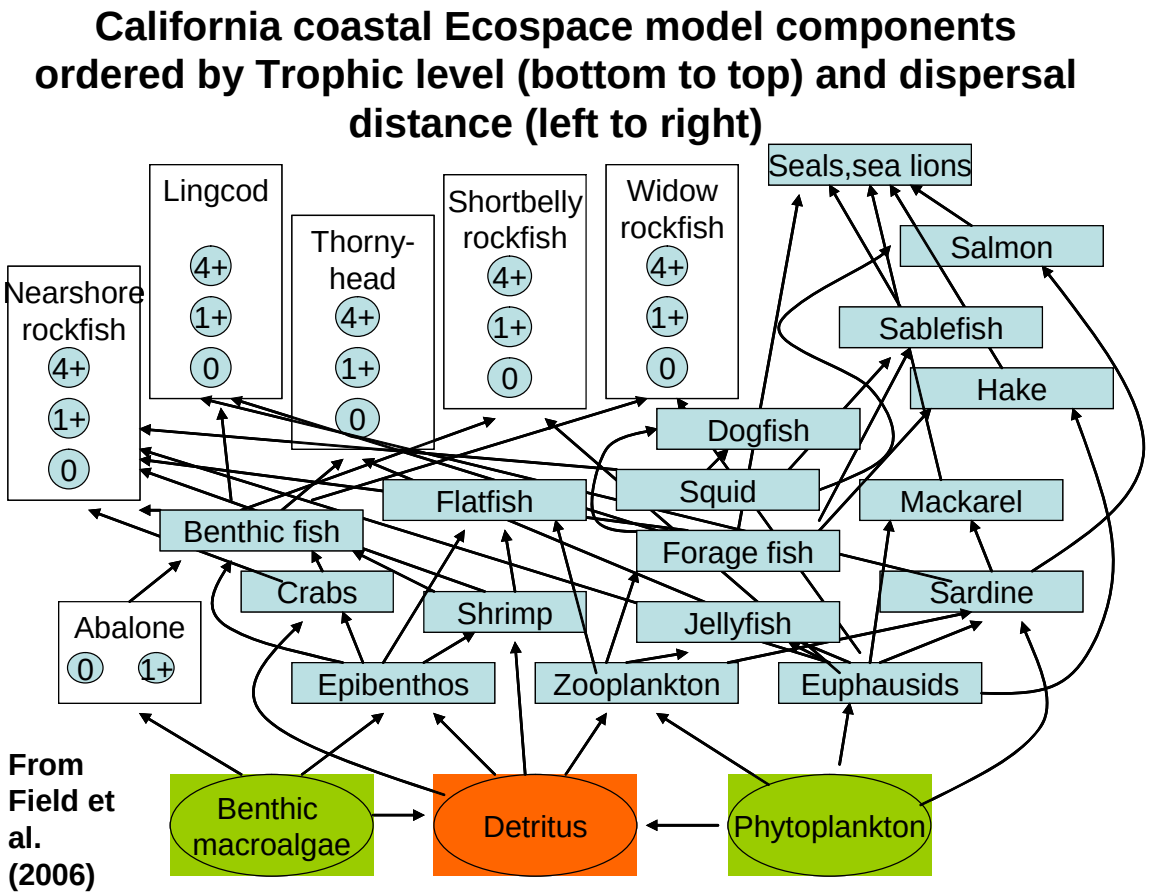

Figure 8. Key elements in the EcoSpace model. Boxes with circles inside represent populations where Ecospace biomass dynamics equations are replaced by monthly age-structured population dynamics accounting (growth, survival, recruitment).

The key elements of the Ecospace model are:

- Ecospace replicates the food web structure in each model grid cell. 2 x 2 mi. cells, out to 500m depth (shelf edge), although the trophic structure considers the entire ecosystem including thornyheads which are predominantly found on the slope.

- Each cell has a habitat "type" (shallow rocky, deep rocky, shallow mud/sand, deep mud/sand, estuary), species use one or more types

- Dispersal and ontogenetic habitat shifts among cells

- Spatial variation in productivity

- Spatial movement of fishing efforts dependent on total profitability

- Cells designated as MPAs can be selectively open to some fisheries

For the species represented by multi-stanza age structured population models, each stanza (range of ages) can be assigned distinctive:

- Total mortality rate Z, varying with stanza-specific predation rates

- Prey and habitat preferences (diet composition, distribution)

- Behavioral tactics: respond to changes in food availability by changing growth rate and/or activity and associated predation risk Total mortality rate Z, varying with stanza-specific predation rates

- Prey and habitat preferences (diet composition, distribution)

- Behavioral tactics: respond to changes in food availability by changing growth rate and/or activity and associated predation risk

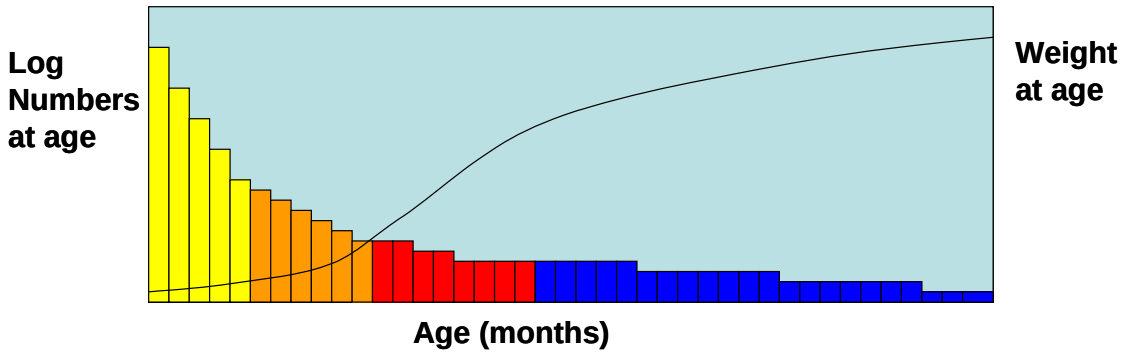

Figure 9. Representative age structured abundance and growth pattern of a Ecospace component represented by multi-stanza submodel. Colors represent different stanzas for a typical rockfish..

Total fishing effort is provided to Ecospace as a forcing time series or scenario. At each simulated time step, this total effort is allocated over model grid cells using a "gravity" model (logit choice model with log utility for total profitability), where each cell's proportion of the total effort is its total profitability per unit effort (sum of biomass densities x catchabilities x prices) divided by the sum of such profitabilities over all cells. Cells that are designated as MPAs are set to have zero profitability. In the demonstration scenarios, we deliberately decreased total fishing effort after 2006 in order to account for regulations (e.g. trip limits, reduced TACs) intended to reduce impact of effort shifts inshore following implementation of RCAs. Without such reductions, the gravity effort allocation model predicts massive increases in inshore effort, which has not apparently occurred at least as evidenced by changes in catches of inshore species. Note that the model includes all major fisheries (hake, crab, etc. in addition to rockfish). Fishing efforts for these species were treated as constant over time, but were subject to spatial reallocation under RCA/MPA policies, the same as for targeted fishing for rockfish.

The complete Ecosim/Ecospace model used in this analysis, with all parameters, including spatial habitat maps and assumed MPA cells, is available on request from the authors as an Ecopath database (California.mdb). The Ecopath 5 or 6 software is required to access this database. Note that model users can easily test effects of alternative parameter values (e.g. spatial movement distances, trophic interactions) and policies (MPA locations) by running the model interactively using the Ecopath software.

Using the non-spatial Ecosim model, predictions are fit to historical assessment data (Figure 10) to insure trophic interaction, growth, and survival parameters imply realistic response to changes in fishing mortality.

For reconstruction of the historical pattern up to 2006, we used the estimated historical effort rates that led to the stock declines through the late 1990s and then the stabilization in the last decade. The Ecospace model considers effort and species specific vulnerabilities to effort. As areas are closed effort shifts and the species are differentially impacted. For instance, when the rockfish conservation areas are put in place in recent years, some effort moves inshore. In the model runs when MPA's are put in place, this causes some effort to move offshore.

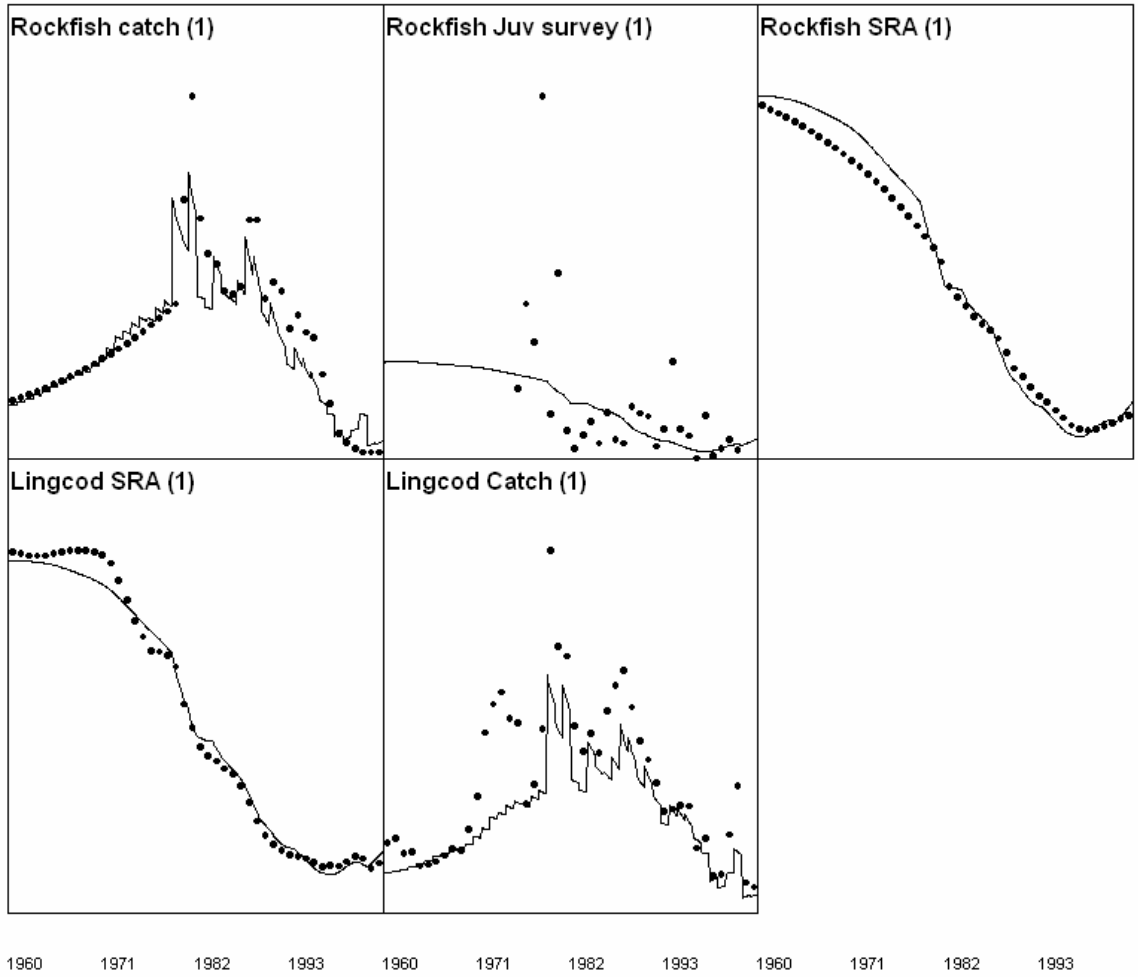

Figure 10. Model fits to historical catch and survey data with each dot representing data and each line representing the model fit. The five panels are rockfish catch (top left), rockfish juveniles (top middle), rockfish adult abundance (top right), lingcod abundance (bottom left), and lingcod catch (bottom middle).

To consider the trends in the future we then ran two scenarios/ First, that effort remains low as is currently the case, or that effort rebuilds to the high levels that led to the declines of the past. Within each of these effort scenarios we explored 4 cases, (1) no protected areas, (2) RCA's only as implemented by the PFMC, (3) RCAs plus 20% of habitat in MPA's and (4) RCAs plus 50% in MPA.s These overall results for specific indicator groups are shown in Table 2. As more protected areas are added, the sedentary and inshore lingcod and nearshore rockfish increase. The more mobile widow, shortbelly and thornyheads decrease because more effort moves to the deeper waters.

Shortbelly was treated as having low fishing mortality rate over the whole simulation, with some depletion coming from incidental fishing impacts (as measured by historical catches; the species has not been "unfished"). We assume catchabiltiy and value of the species will not change into the future. The modeled declines are due to

incidental fishing, not to changes in trophic interactions

These runs are for the spatial arrangement of proposed North Central coast MPAs, but the trophic structure of the ecosystem is the same and we use this model to explore how the trophic connections would interact with protected areas.

Table 2. Biomass ratios (2026/2006) predicted by Ecospace for California North Central Coast model

	Efforts remain at 2005 (low) levels				Efforts rebuild to 1980 (high) levels			
Indicator Group	**No protected areas**	**RCAs only**	**RCAs plus 20% MPA**	**RCAs plus 50% MPA**	**No protected areas**	**RCAs only**	**RCAs plus 20% MPA**	**RCAs plus 50% MPA**
Lingcod	**1.34**	**1.15**	**1.27**	**1.47**	**0.79**	**0.60**	**0.82**	**1.09**
Thornyhead	**1.87**	**2.37**	**2.47**	**2.46**	**1.11**	**2.00**	**2.12**	**2.18**
Shortbelly rockfish	**1.23**	**1.44**	**1.42**	**1.27**	**0.97**	**1.26**	**1.26**	**1.23**
Nearshore rockfish	**1.73**	**1.53**	**1.66**	**1.83**	**1.03**	**0.94**	**1.15**	**1.37**
Widow rockfish	**3.42**	**4.16**	**4.06**	**3.55**	**1.85**	**3.26**	**3.21**	**3.10**

The key overall results are

- Slow recovery of long lived species under all policies
- Negative impact of RCAs on inshore species (lingcod, nearshore rockfish) as effort is shifted from deeper waters to inshore areas that remain open
- High inshore protection does not guarantee higher protection for offshore species (shortbelly, widow rockfish)
- Even low dispersal rates coupled with high fishing mortality outside MPAs will result in high enough cumulative mortality to prevent natural population age structure.

Hopes by some biologists that MPAs could lead to the restoration of near unfished age structure are unrealistic given the movement of these species. The age structure will be much more "natural" if the fisheries effort regulations of the PFMC succeed, than if MPAs are implemented and fisheries exploitation rates return to where they were in the 1980s.

MPAs will either not reseed adjacent areas (self-seeding), or else suffer impaired recruitment due to lack of larval sources from outside MPAs (unless fisheries outside are managed effectively). MPAs simply will not ensure against management failure.

Another way to look at these results is shown in Figure 11 in which the Y axis is total biomass cumulative across elements of the ecosystem, showing all of the commercially fished species. In this scenario the projections are for current low levels of fishing effort with no protection from new MPAs. We can see that with these fishing mortality rates (very low) the overfished components of the ecosystem are expected to rebuild over the next 40 years.

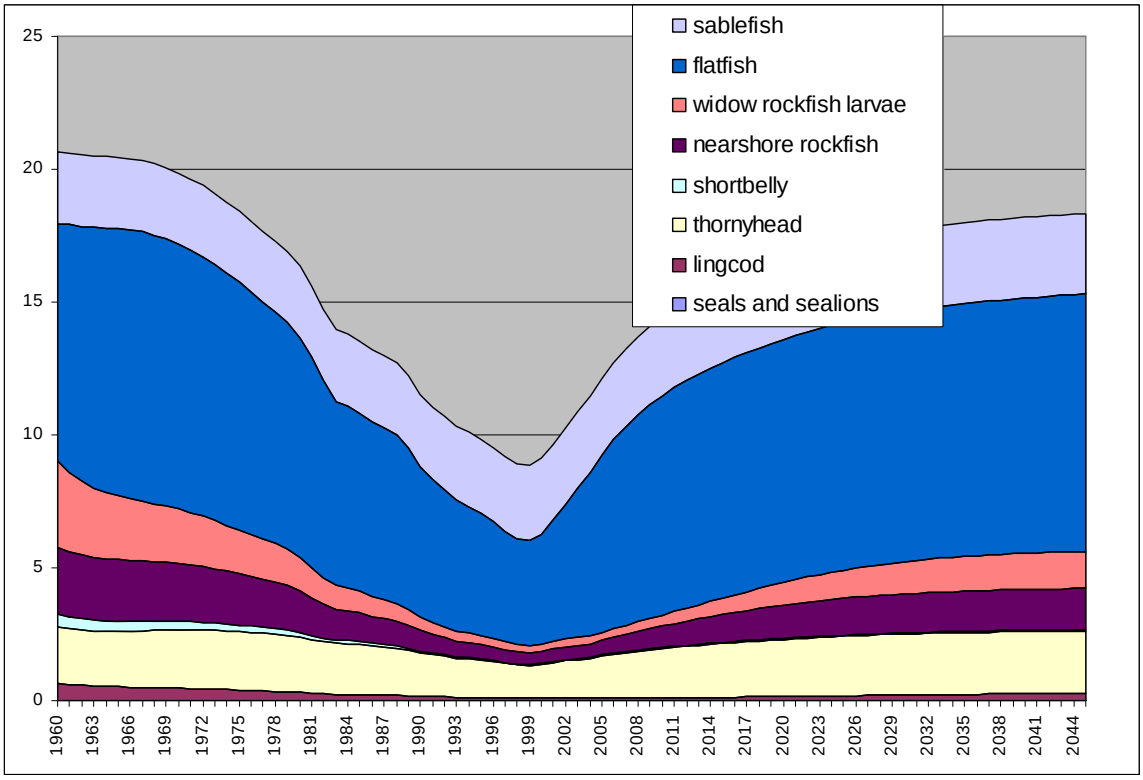

Figure 11. Projected biomass under the assumptions that fishing mortality remains low in the future and no MPAs are added.

In contrast, Figure 12 shows what happens if fishing mortality rates in the future increase again to the levels they were in the 1980s, and no MPA protection is implemented. We see the recovery that occurred between 2000 and 2008, but then some declines after that. We see continued decline of the move vulnerable rockfish stocks, and the situation staying generally similar to what it was like around 2000.

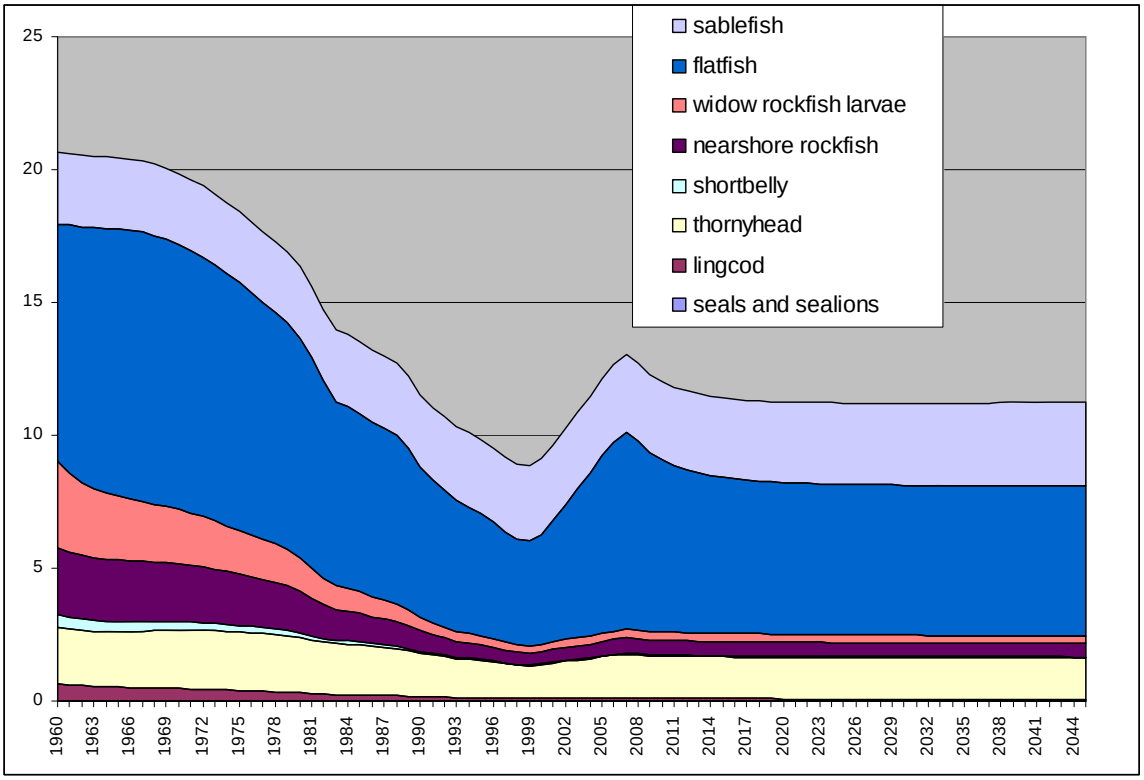

Figure 12. Projected future biomass under the assumption that fishing mortality returns to the high levels in the 1980s with no significant additional protection.

In Figure 13 we explored a scenario in which RCA's were in place over the entire period, MPAs put in after 2006, and fishing effort increases after 2006. We see that by 2006 the ecosystem would not have been as depleted by 2006 as in the previous two scenarios in which the RCA protection was not in place prior to the 2000's. Ecospace predicts that RCAs would have substantially prevented historical overfishing, hence will likely do so in the future if they are maintained However, in the future the results would be in between the two previous scenarios. The RCAs and MPAs are not as effective at rebuilding stock size as was maintaining low fishing effort as seen in Figure 11.

Returning to Table 2 we see that the dominant driver of the abundance of key species of the ecosystem is the fishing effort, and that conservation of the ecosystem depends primarily on regulation of catches and effort. The effects of additional MPAs are small differences in abundance compared to the impact of the effort level or the RCAs.

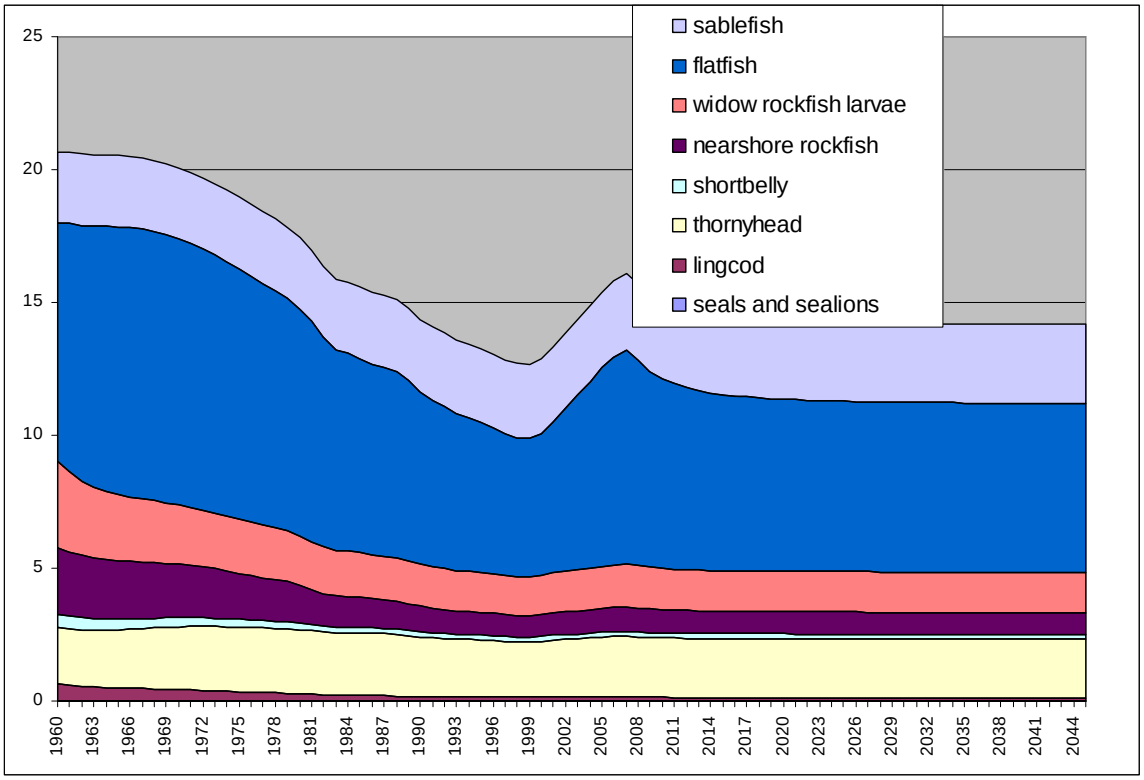

Figure 13. Projected future biomass under the assumption that fishing mortality after 2006 returns to the high levels in the 1980s but rockfish conservation areas and 20% MPAs are implemented. This scenario examines the consequences of RCAs having been in place beginning in 1960 and this accounts for the difference in the trajectory up to 2006. Additional MPAs were added at 2006 in inshore cells, to represent MPA configurations suggested in initial planning for MLPA implementation. These simulated inshore MPA cells were located so as to protect about 30% of the hard bottom habitat. It was not necessary to add offshore MPA cells (extend MLPA closures offshore, since such cells are assumed to already be in RCAs.

Conclusion from results of ecosystem modelling

The simulations show that the impacts of protected areas is confined to the benthic communities and specifically to the sedentary species within the benthic communities. Recognizing that the pelagic components of the community are highly mobile, neither any proposed MPAs or RCAs affect the pelagic community, nor the lower trophic levels in any significant way. Thus evaluation of the potential impact of MPAs within the MBNMFS is really an evaluation of the population dynamics of some individual, sedentary species because the species that are mobile, or dominantly deeper will be unaffected by MPA proposals.

The ecosystem model also shows that it is critical to coordinate state and federal

management policies that may impact onshore-offshore distributions of fishing effort and differentially protect species that spend parts of their life cycles in State vs Federal waters (e.g. young fish in inshore nursery areas, older fish offshore in Federal waters). Lack of coordination could result in rapid depletion of inshore species/life stages if all the offshore effort were to shift inshore.

One of the main factors that could cause the Ecospace model predictions to fail is often called "vampires in the basement", namely large changes in abundance of species not included in the model, due to fisheries and to interactions with modeled species. A particular concern is that smaller species of rockfish might increase substantially in areas where larger species have been depleted, which could lead to reduced survival and recruitment of juveniles of the larger species. Such apparent depensation is not common in historical data sets on stock and recruitment (Walters and Kitchell, 2001), but is a significant management risk.

One might argue that protected areas are needed to preserve the "structure and functioning" of the ecosystem. However, when we recognize that the stocks that have been overfished are now under very restrictive fishing regulations and that the groundfish community as a whole is now at nearly 60% of the unfished biomass, the only concern can be towards the habitats where the overfished species are important (shelf break and rocky reef) if the existing fisheries regulations and existing areas closed to fishing somehow fail to lead to recovery. We found no complex predator-prey interactions leading to highly non-linear dynamics over the range of exploitation rates that have occurred in the past.

Summary

The MBNMS ecosystem is a rich and diverse one that has been seriously impacted by fishing. Present fisheries management policies are extremely conservative, and should allow rebuilding of heavily impacted species over the next few decades. Potential fisheries production in the system is concentrated in mobile, pelagic species like sardine and hake. Sedentary species, mainly rockfishes, have high natural biomass but low production, so they were able to contribute substantially to overall fishery yields only by depleting stock sizes; on a sustainable basis, the sedentary species represent only a small proportion of total ecosystem production and potential yield.

MBNMS MPAs will not offer significant protection from potential future fishery management for any of the mobile species that represent most of the ecosystem biomass and production, since the area of protection is small compared to the dispersal-migration ranges of such species. However, protected areas could offer significant protection to a variety of inshore, sedentary species that have been historically impacted severely by fishing. If federal and state management policies are not coordinated, continued protection of offshore waters may lead to inshore shifts in fishing activity that could severely impact inshore species and threaten sources of larval seeding and recruitment within any inshore protected areas and sanctuaries. In such a scenario, fishing pressure increases dramatically inshore as offshore areas are closed. Since the RCAs and EFH

closures have been in effect for several years, such an inshore shift in fishing effort should have already occurred. We have seen no data that suggests such a shift has occurred, but data on fishing effort has been limited.

Our primary conclusion is that the marine ecosystem in Central California is in intact and naturally functioning, and elements that have historically suffered from overexploitation, the marine mammals and some groundfish, are recovering under current management systems. Ongoing concern about salmon and possible changes in the pelagic ecosystem are not primarily the results of overexploitation, and there is no evidence that no-take areas, in the MBNMS or elsewhere would contribute to the recovery of salmon or increase in pelagic fish productivity.

In the last few decades the only "overfishing" issue has been in several species of rockfish, and in response to the decline of these species enormous changes in the management system have been implemented. These measures include the reductions in TAC for rockfish, the rockfish conservation areas, the areas closed to trawling under EFH, and the inclusion and protected of the Davidson Seamount.

We can then ask if additional no-take areas within MBNMS would contribute to the objectives of the National Marine Sanctuaries Act, especially: "(3) to maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations, and ecological processes; " The evidence from the trends in population abundance is that the overfished populations and the groundfish community is indeed recovering and the modeling shows no significant contribution to the rebuilding of these species from additional no-take areas.

One of the findings of the Act is the need to "(C) maintain for future generations the habitat, and ecological services, of the natural assemblage of living resources that inhabit these areas." Again the data points to the existing management system achieving this objective.

There is a clear tradeoff between the harvest of fish and the total area allocated to no-take reserves and the total abundance of the species in the protected areas. As the total area allocated to no-take protected areas increases, catch will decline and abundance in the no-take areas, and total abundance, will generally increase. Since primary objectives of the Act include "wise use" and production of "goods and services," since there is a management system that is protecting these ecosystems from overexploitation, further protected areas within the MBNMS would decrease the "wise use" and "goods and services" without enhancing the objective of "maintain for future generations the habitat, and ecological services, of the natural assemblage of living resources that inhabit these areas."

One argument for no-take areas is they provide insurance against management failure (Sladek-Nowlis and Roberts 1999). There is now an extensive network of no-take areas implemented within State waters in the Central California coast. Any additional areas within the MBNMS would constitute a reasonably small contribution to these

nearshore ecosystems. For the species in deeper water, the area of the MBNMS is insignificant in relation to the total area, and with large areas closed to trawling under the EFH provisions of the Magnuson-Stevens act, we cannot see how additional closures within the MBNMS would provide a significant buffer.

One of the basic principles of population dynamics is that there is a tradeoff between the biomass of the population being harvested and the sustainable yield so long as the stock is not overexploited. This principle is true for a population being harvested uniformly in space, or where protected areas are in place. If we want a larger standing stock of fish we have to accept lower sustainable harvest. Where managers choose to operate along this tradeoff is not a scientific question -- science can only provide the tradeoff between abundance and sustainable yield. Society could choose to protect the species (or ecosystem) almost completely, as has happened in the US for most marine mammals, or society could choose to attempt to produce near maximum sustainable yield as has happened in the US for most fish stocks under the Magnuson-Stevens act.

What science can provide is guidance on ecosystem consequences. Models such as we used earlier can be used to see what is different in ecosystems at different levels of exploitation. What ecosystem benefits would be obtained by putting in protected areas? The key difference is that some particularly sedentary species would be at higher abundance, the ecosystem would not function differently, it would not be "healthier." Science can also provide guidance on how to achieve higher abundance if that is a societal objective. One thing that is different with protected areas when catch is well regulated is that abundance is higher inside reserves, and lower outside. The same levels of abundance can be achieved with catch regulations which would provide a more uniform distribution of abundance.

Finally we must caution that there are potentially negative ecosystem impacts of no-take areas. The primary impact of closing areas to fishing is to redirect fishing effort to other sites. If more areas are closed to fishing, the pressure in remaining open sites will increase. This would be especially true in the MBNMS close to the major point of Monterey. These areas would be under increasing fishing pressure and this could have negative ecological consequences on the remaining fishing areas.

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STATE AND FEDERAL LAWS, REGULATIONS, AND PROGRAMS OTHER THAN THOSE OF THE STATE DEPARTMENT OF FISH & GAME AND PACIFIC FISHERY MANAGEMENT COUNCIL THAT CONTRIBUTE TO THE PROTECTION OF MARINE RESOURCES

Prepared by National Marine Sanctuary Program Staff

The two summaries of laws, regulations, and programs found below were compiled by the staff of the MBNMS and the NMS Program. Although a request was made for some type of analysis that would discuss the degree to which these laws, regulations and programs contributed to the MBNMS meeting its goals, none could be provided at this time.

MONTEREY BAY NATIONAL MARINE SANCTUARY GOALS, REGULATIONS, AND PROGRAMS

Prepared by Huff McGonigal, MBNMS

The National Marine Sanctuaries Act states that the National Marine Sanctuary Program shall "maintain for future generations the habitat and ecological services of the natural assemblage of living resources that inhabit Sanctuaries and "while the need to control the effects of particular activities has led to enactment of resource-specific legislation, these laws cannot in all cases provide a coordinated and comprehensive approach to the conservation and management of the marine environment". As such, the Monterey Bay National Marine Sanctuary subscribes to a broad and comprehensive management approach that is in keeping with the NMSA's primary objective of resource protection. This approach differs from the various national and local agencies and laws directed at managing single or limited numbers of species or specific human activities within the ocean. Ecosystem-based management serves as a framework for addressing long-term protection of a wide range of living and non-living marine resources, while allowing multiple uses of the Sanctuary that are compatible with resource protection. The following is a summary of the programs and strategies at the MBNMS that contribute to achieving these goals.

Goals

The Monterey Bay National Marine Sanctuary's program goals are to:

1. Enhance resource protection, through comprehensive and coordinated conservation and management tailored to the specific resources that complements existing regulatory

authorities

2. Support, promote and coordinate scientific research on, and monitoring of, the site specific marine resources to improve management decision-making

3. Enhance public awareness, understanding, and wise use of the marine environment
through public interpretive and recreational programs

4. Facilitate, to the extent compatible with the primary objective of resource protection, multiple uses of these marine areas not prohibited pursuant to other authorities

Four program areas generally divide the administration of the MBNMS: research and monitoring, resource protection, education and outreach, and program operations. Following is a description of these areas and accomplishments since MBNMS designation.

Research and Monitoring

The research and monitoring program's focus is on science for resource management: determining information gaps; developing collaborative studies to improve understanding of issues; and interpreting research for decision makers. Much of the credit for the research in the MBNMS belongs to the world-renowned and extremely collaborative research community in central California. For example, approximately twenty research institutions are represented on the MBNMS Research Activity Panel, which wrote the first-ever MBNMS Research Plan. Many members also contributed text and bibliography files to a web-based Site Characterization that summarizes existing information on the MBNMS's natural resources. In turn, the MBNMS identified the need for research to address specific resource management issues and provided a method for applying scientific results to public policy. This resulted in several multi-million dollar efforts to map MBNMS habitats, monitor nearshore ecosystems, and model ocean circulation.

Through MBNMS funding, writing issue reviews, building collaborations, providing research platforms, and obtaining grants, the research and monitoring program achieved notable success in:

Monitoring beach-cast seabirds and marine mammals, seabirds, marine mammals, and krill in Monterey Bay; gray whale migrations; kelp canopies; rocky shores; and water quality in Elkhorn Slough

Characterizing pinniped rookeries; seafloor habitats in the nearshore, offshore, and in formerly restricted military zones; and even management issues such as marine zoning regulation and kelp harvesting

Providing extensive information in technical reports available on the web; at symposia coordinated with the MBNMS Education Program and local governments; and through numerous technical advisory committees

Studying tidal erosion in Elkhorn Slough; distribution of introduced species; sea lion
deaths caused by harmful algal blooms; fishery impacts from trawling and gillnet bycatch; coastal erosion; impacts of ship groundings and oil spills; and human use effects in kelp forest and rocky shore systems

As public and resource management needs are clarified through MBNMS advisory groups and in coordination with the MBNMS resource protection program, it becomes evident more research and monitoring is needed than has been completed. Habitat mapping has improved since 1992, yet most of the habitats and distribution and abundance of key species have not been mapped or measured. Moreover, little data exists on how human activities are changing the MBNMS ecosystem through time. The MBNMS initiated its ecosystem monitoring program, the Sanctuary Integrated Monitoring Network (SIMoN), in 1999 with grant funding awarded in 2001. After hiring staff and developing the infrastructure, the website for SIMoN was launched in 2003 which provides the public, decision makers and the research community with monitoring data and an integrated view of data collecting efforts.

Resource Protection

A key resource protection goal for the MBNMS was achieved at the time of designation; protection from oil and gas development. The creation of MBNMS in 1992 was the culmination of more than 15 years of public support and efforts of government officials and environmental groups. In 1983, the Reagan Administration removed Monterey Bay from the list of active sanctuary candidates. Many viewed this as an attempt to prepare the area for oil drilling. In 1988, with the backing and activism of environmental organizations and local governments, former Congressman Leon Panetta pushed through legislation requiring sanctuary designation no later than December 31, 1989. While this congressional mandate got the designation process back on track, it was repeatedly delayed due to the continuing controversy over proposed oil and gas activities. The public's overwhelming support for sanctuary designation finally provided results. A comprehensive ban on offshore oil and gas activities was eventually supported by the Bush Administration and included by NOAA in the final MBNMS regulations.

A key objective of the management plan is to ensure that human activities in the MBNMS do not adversely affect natural resources, including habitats. This is accomplished through a variety of approaches, including collaborative planning efforts to prevent and reduce human impacts, regulations, permits, and

enforcement efforts. Management efforts also involve helping to educate the public and MBNMS users about how they can minimize or eliminate harmful behavior. The resource protection program also administers the Conservation Working Group (CWG), which was originally formed to focus the knowledge and talent of local, regional, and national conservation groups on the designation process for the Monterey Bay National Marine Sanctuary. The CWG now works to serve as a forum for conservation issues, identify resource protection needs, and provide advice, views, and factual information on resource protection, Sanctuary management, and other issues in response to requests from staff, the SAC and associated working groups, and other appropriate parties.

The MBNMS's long coastline, including four harbors and several urban areas, create multiple, complex threats to a healthy coastal ecosystem. A key goal is to actively prevent damage to the resources, thereby avoiding crisis situations apparent elsewhere in the country. The resource protection program accomplished many important objectives such as:

- A Water Quality Protection Program developed and partially implemented three plans to improve or protect water quality (related to urban runoff, harbors and marinas, and agriculture and rural lands) as well as plans to strengthen coordinated regional water quality monitoring by government agencies and citizen groups, and a Memorandum of Agreement with the state designed to protect Sanctuary Water Quality from permitted discharge

- Strategies, now approved at the international level, to move large commercial ships farther offshore and use north-south transit lanes to reduce threats of spills from vessel traffic such as container ships, bulk product carriers, and tankers

- Participation in research and a long-range management plan for Highway 1 reducing impacts from landslide repair and disposal activities

- Establishment of an Interpretive Enforcement Program, including a NOAA Office of Law Enforcement officer assigned to focus exclusively on MBNMS enforcement issues

- Development of a cooperative enforcement agreement with state agencies

- A hazardous material/emergency response program for events such as spills and vessel groundings

- Collaborative educational products and outreach on resource protection issues such as water quality, motorized personalized watercraft (MPWCs), boating, and vessel traffic

- Development of a permit program to review planned activities that may harm

MBNMS resources and to issue permits or other authorizations with conditions to minimize impacts

– Coordinated review of projects, plans and permits of other agencies to minimize impacts

- A prohibition on all oil and gas development

- Prohibitions aimed at minimizing disturbance of the seabed, protecting wildlife, and preserving cultural resources

Education and Outreach

The MBNMS's education and outreach efforts help connect people to the marine environment. The Education program's goal is to promote public understanding of our national marine Sanctuaries and empower citizens with the knowledge necessary to make informed decisions leading to the responsible stewardship of aquatic ecosystems. Partnerships and collaboration have played a key role in the development and implementation of the MBNMS's educational efforts. The MBNMS Education Panel, comprised of marine educators representing twenty organizations and schools, is a prime example of how the MBNMS works with the regional community to shape the MBNMS's educational focus.

The Education and Outreach Program has accomplished or has underway some important objectives of the management plan, such as:

- Increasing public awareness of our Sanctuaries through a variety of techniques, including:

  – Public lectures and forums and the annual MBNMS Currents Symposium

  – Anniversary celebrations and a variety of public events

  – Interpretive signs and displays at state parks, beaches, and interpretive facilities

  – Educational products and materials including books, brochures, posters, maps, newsletters, annual reports, videos, and an extensive web site

  – Operation of MBNMS's Team Ocean Conservation Education Action Network (OCEAN) and support of volunteer programs, including Bay Net, Save Our Shores, and Friends of the Elephant Seal

  – Providing education to address specific issues that may threaten MBNMS resources by:
    - Developing a variety of water quality programs and products to

address urban runoff
    - Providing public outreach to promote stewardship of endangered species, fragile
    - Habitats like tidepools, and protected species such as marine mammals
    - Developing and distributing educational materials on shipping lanes to mariners

- Providing educational opportunities for teachers and students by:
    - Developing school curricula
    - Organizing teacher workshops
    - Providing shipboard and submersible “teacher-in-the-sea” opportunities
    - Coordinating teacher-led intertidal monitoring programs for high school students
    - Supporting the development of Camp SEA (Science, Education, and Adventure) Lab, a residential marine science program

REGULATIONS AND LEGISLATION AFFECTING THE MARINE ENVIRONMENT IN THE MBNMS

Prepared by the NMS Program Staff

REGULATIONS AND LEGISLATION

ECOSYSTEM PROTECTION

MONTEREY BAY NATIONAL MARINE SANCTUARY

The Monterey Bay National Marine Sanctuary (MBNMS), designated in 1992, is a Federally protected marine area offshore of California's central coast. Stretching from Marin to Cambria, the MBNMS encompasses a shoreline length of 276 miles and 5,322 square miles of ocean, extending an average distance of 30 miles from shore. At its deepest point, the MBNMS reaches down 10,663 feet (more than two miles). It is our nation's eleventh Marine Sanctuary and its largest- larger than Yosemite or Yellowstone National Parks.

The MBNMS was established for the purpose of resource protection, research, education and public use. Its natural resources include our nation's largest kelp forest, one of North America's largest underwater canyons and the closest-to-shore deep ocean environment in the continental United States. It is home to one of the most diverse marine ecosystems in the world, including 33 species of marine mammals, 94 species of seabirds, 345 species of fishes, and numerous invertebrates and plants. This remarkably productive marine environment is

fringed by spectacular coastal scenery, including sandy beaches, rocky cliffs, rolling hills and steep mountains.

There are a variety of potential resource threats and opportunities within the Sanctuary due to the sensitivity of habitats and species in the region, the long stretch of adjacent populated coastline, and the multiple uses of the marine environment. Sanctuary research and monitoring programs evaluate the status and health of marine species, habitats and ecosystems, provide critical information to resource managers, and coordinate activities with the array of world-class research institutions in the region. Resource protection activities use a variety of means to reduce or prevent detrimental human impacts, including collaborative planning efforts, regulations and permits, emergency response activities, enforcement and education. Education and outreach is used as a critical element in enhancing understanding and stewardship of this national treasure, ranging from public events and interactive teacher workshops to extensive written materials. Building partnerships and strong involvement of the public is a key element in all of these efforts, and includes ongoing participation of a diverse Sanctuary Advisory Council.

MARINE LIFE PROTECTION ACT

The Marine Life Protection Act (MLPA) was signed into law in 1999 and directs the state to redesign California's system of marine protected areas (MPAs) to increase its coherence and effectiveness in protecting the state's marine life and habitats, marine ecosystems, and marine natural heritage, as well as to improve recreational, educational and study opportunities provided by marine ecosystems. The purpose of the MLPA is to improve the array of MPAs existing in California waters through the adoption of a Marine Life Protection Program and a comprehensive master plan.

The MLPA states that marine life reserves (defined as no-take areas) are essential elements of an MPA system because they protect habitat and ecosystems, conserve biological diversity, provide a sanctuary for fish and other sea life, enhance recreational and educational opportunities, provide a reference point against which scientists can measure changes elsewhere in the marine environment, and may help rebuild depleted fisheries. Six goals for the MLPA are:

1. To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.
2. To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.
3. To improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and to manage these uses in a manner consistent with protecting biodiversity.

4. To protect marine natural heritage, including protection of representative and unique marine life habitats in California waters for their intrinsic value.
5. To ensure that California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines.
6. To ensure that the state's MPAs are designed and managed, to the extent possible, as a network.

WATER QUALITY

The water quality of the sanctuaries is regulated by a number of statutes and government agencies. These serve to protect the marine environment from the various point and nonpoint sources of marine pollution. Regulations applicable to the various types of cruise ship discharges are described above in the affected environment discussion of cruise ship discharges.

Federal Water Pollution Control Act, commonly known as the Clean Water Act, 33 U.S.C. § 1251 et seq.

The CWA was passed in 1972 by Congress, and amended in 1987. Under CWA Section 402 (33 U.S.C. § 1342), any discharge of a pollutant from a point source (e.g., a municipal or industrial facility) to the navigable waters of the United States or beyond must obtain an NPDES permit, which requires compliance with technology- and water quality-based treatment standards. Two sections of the CWA deal specifically with discharges to marine and ocean waters. Under CWA Section 403 (33 U.S.C. § 1343), any discharge to the territorial seas or beyond also must comply with the Ocean Discharge Criteria established under CWA Section 403. CWA Section 312 (33 U.S.C. § 1322) contains regulations protecting human health and the aquatic environment from disease-causing microorganisms that may be present in sewage from boats. An MSD is equipment on board a vessel designed to receive, retain, treat, control, or discharge sewage, and any process to treat such sewage. Pursuant to Section 312 of the CWA, all recreational boats with installed toilet facilities must have an operable MSD on board. Vessels 20 meters (65 feet) and under may use a Type I, II, or III MSD. Vessels over 20 meters (65 feet) must install a Type II or III MSD. All installed MSDs must be Coast Guard-certified. Coast Guard-certified devices are so labeled except for some holding tanks, which are certified by definition under Section 312 of the CWA (33 U.S.C. § 1322).

Title I of the Marine Protection, Research, and Sanctuaries Act, also known as the Ocean
Dumping Act, 33 U.S.C. §§ 1401-1445

The Marine Protection, Research, and Sanctuaries Act (MPRSA) regulates the dumping of wastes into marine waters. It is the primary federal environmental statute governing transportation of dredged material for the purpose of disposal into ocean waters, while CWA Section 404 governs the discharge of dredged or fill material into waters of the US. In 1983, a global ban on the dumping of

radioactive wastes was implemented. The MPRSA and the CWA regulate materials that are disposed of into the marine environment, and only sediments determined to be nontoxic by USEPA standards may be disposed of into the marine environment. The USEPA and the USACE share responsibility for managing the disposal of dredged materials (Chin and Ota 2001).

Oil Pollution Control Act, 33 U.S.C. § 2701 et seq.
The Oil Pollution Control Act of 1990 requires extensive planning for oil spills from tank vessels and onshore and offshore facilities and places strict liability on parties responsible for oil spills.

Act to Prevent Pollution from Ships, 33 U.S.C. § 1901 et seq.
The discharge of solid wastes is regulated under the APPS, as amended by the Marine Plastic Pollution Research and Control Act of 1987, and the CWA. The APPS regulates the disposal of plastics and garbage for the United States Annex V of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78). Under these regulations the disposal of plastics is prohibited in all waters, and other garbage, including paper, glass, rags, metal, and similar materials, is prohibited within 22 km (twelve nm; 14 miles) from shore (unless macerated). Under the current regulations, disposal of much of the solid waste generated by vessels is allowed in areas within the marine sanctuaries beyond 22 km from the shore (NOAA 2003c, 2003d, 2003e).

Coastal Zone Management Act, 16 U.S.C. §§ 1451-1466
The Coastal Zone Management Act (CZMA) provides incentives for coastal states to develop and implement coastal area management programs. It is significant with regards to water pollution abatement, particularly concerning nonpoint source pollution.

Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§ 9601 - 9675
The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) addresses cleanup of hazardous substances and mandates liability for environmental cleanup on those whose actions cause release into the environment. In conjunction with the CWA, it requires preparation of a National Contingency Plan for responding to oil or hazardous substances release. The RCRA addresses hazardous waste management, establishing duties and responsibilities for hazardous waste generators, transporters, handlers, and disposers.

Porter-Cologne Water Quality Control Act, California Water Code §§ 13000-14958
The Porter-Cologne Water Quality Control Act contains provisions for enforcing water quality standards through issuance of Waste Discharge Requirements. Pursuant to the act, the SWRCB has the primary responsibility to protect

California's coastal and ocean water quality. SWRCB has been given the authority by the USEPA to administer the NPDES program for California. The Regional Water Quality Control Boards, in coordination with the SWRCB, issue both state waste discharge requirements and NPDES permits to individual dischargers. Dischargers are required to establish self-monitoring programs for their discharges and to submit compliance reports to Regional Water Quality Control Boards. The SWRCB has established regulations to implement these measures through water quality control plans, including the California Ocean Plan (Ocean Plan), the RegionalWater Quality Control Plans (Basin Plans), and the Thermal Water Quality Control Plan (California Ocean Resources Management Program 1995).

California Assembly Bills 2093 and 2672

California recently enacted legislation (Assembly Bills 2093 and 2672) that mandate stricter pollution prevention from cruise ships. One of the new laws (AB 2093) prohibits the discharge of graywater from cruise ships into state waters, and the other (AB 2672) prohibits the discharge of treated or untreated sewage from cruise ships into state waters. This legislation is significantly more stringent than federal regulation of cruise ships and also provides the strongest state protections from cruise ship pollution in the United States.

California Coastal Act, Cal. Pub. Res. Code § 30000 et seq.

The California Coastal Act of 1976 mandates protections for terrestrial and marine habitat through its policies on visual resources, land development, agriculture, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, power plants, ports, and public works. The Coastal Commission administers various programs, including Local Coastal Programs and the Water Quality Program, which facilitates the interagency Nonpoint Source Pollution Control Program.

California Marine Invasive Species Act, AB 433

The California Marine Invasive Species Act of 2003 mandates the management of ballast water. The act reauthorized and improved upon the California Ballast Water Management and Control Act (AB703). It requires mid-ocean exchange or retention of ballast water for vessels coming from outside the EEZ and requires vessels coming from other west coast ports to minimize ballast water discharge. Record-keeping and other compliance measures apply to all vessels entering California waters. As of March 22, 2006, all vessels must exchange ballast water when traveling between one port or place and another in the Pacific Coast Region.

MINERALS

CBNMS, GFNMS and MBNMS each have regulations that prohibit exploring for, or developing, or producing, oil, gas, or minerals in the Sanctuary (with an exception for jade in portions of MBNMS). In addition, GFNMS and MBNMS have regulations that prohibit drilling into, altering, or placing structures on the seabed.

California Coastal Sanctuary Act of 1994, Cal. Pub. Res. Code §§ 6240-6244
Since 1994, all new oil and gas exploration or drilling within California state waters has been permanently banned (to 3 nm [3.5 miles; 5.5 km] from the shore). This comprehensive ban on new oil and gas leasing in State waters was enacted through the California Coastal Sanctuary Act of 1994. The California Coastal Sanctuary Act created a comprehensive statewide coastal sanctuary that prohibits future oil and gas leasing in state waters, from Mexico to the Oregon border, in perpetuity. Existing oil and gas leases are added to the sanctuary as they are quitclaimed to the state.

1998 Presidential Directive
Since 1982, there has been a temporary moratorium placed by Congress on oil and gas leasing and development on the federal Outer Continental Shelf (OCS) adjacent to California. State tide and submerged lands include the area from the mean high tide line seaward to the 3 nm (3.5 miles; 5.5 km) boundary with the federal OCS. President Clinton issued a Presidential Directive under the OCS Lands Act in 1998 that blocked new leasing activity until at least 2012. The Davidson Seamount area is located within the federal OCS and is subject to this current moratorium. The following discussion of regulations is applicable to the Davidson Seamount area.

Submerged Lands Act, 43 U.S.C. § 1301 et seq.
Under the Submerged Lands Act (SLA) the location of energy and mineral resources determines whether or not they fall under state control. The SLA granted states title to the natural resources located within three miles of their coastline. For purposes of the Submerged Lands Act, the term “natural resources” includes oil, gas and all other minerals.

Outer Continental Shelf Lands Act, 43 U.S.C. § 1331 et seq.
The Outer Continental Shelf Lands Act (OCSLA), established federal jurisdiction over submerged lands on the OCS seaward of state boundaries. Under the OCSLA, the Secretary of the Interior is responsible for the administration of mineral exploration and development of the OCS. The OCSLA provides guidelines for implementing an OCS oil and gas exploration and development program, and authorities for ensuring that such activities are safe and environmentally sound.

Deep Seabed Hard Mineral Resources Act, 30 U.S.C. § 1401 et seq.
The Deep Seabed Hard Mineral Resource Act provides regulations for developing deep seabed hard minerals, requires consideration of environmental impacts prior to issuance of mineral development permits, and requires monitoring of environmental impacts associated with any mineral development activities. With regard to minerals on the deep seabed, seabed nodules contain nickel, copper, cobalt and manganese - minerals important to many industrial uses. No commercial deep seabed mining is currently conducted, nor is such

activity anticipated in the near future.

Ocean Thermal Energy Conversion Act, 42 U.S.C. § 9101 et seq.
With regard to alternative energy sources from the ocean, the Ocean Thermal Energy Conversion (OTEC) Act established a licensing program for facilities and plants that would convert thermal gradients in the ocean into electricity. The OTEC Act directed the Administrator of NOAA to establish a stable legal regime to foster commercial development of OTEC. In addition, the OTEC Act directed the Secretary of the department in which the USCG is operating to promote safety of life and property at sea for OTEC operations, prevent pollution of the marine environment, clean up any discharged pollutants, prevent or minimize any adverse impacts from construction and operation of OTEC plants, and ensure that the thermal plume of an OTEC plant does not unreasonably impinge on and thus degrade the thermal gradient used by any other OTEC plant or facility, or the territorial sea or area of national resource jurisdiction of any other nation unless the Secretary of State has approved such impingement after consultation with such nation. The OTEC Act also assigned responsibilities to the Secretary of State and the Secretary of Energy regarding OTEC plants.

BIOLOGICAL RESOURCES
There are numerous federal and state regulations providing protection of biological resources in the sanctuaries. The primary regulations and regulating agencies are summarized below.

Federal Clean Water Act, 33 U.S.C. §§ 1251-1387
The USACE and EPA have primary federal responsibility for administering regulations that concern waters and wetlands. The USACE acts according to the Rivers and Harbors Act (Sections 9 and 10), which regulates placement of structures or other work in addition to fill in “navigable waters,” and the CWA (Section 404), which governs fill in “waters of the United States,” including wetlands. A USACE permit is required if a project would place structures within navigable waters or if it would result in altering waters of the US below the ordinary high water mark in nontidal waters. The USACE does not issue these types of permits in cases where the USACE itself is the lead agency; instead it evaluates the project to determine compliance and acceptability. The primary criteria for evaluating the biological impacts of the USACE permit actions in wetlands is provided by the USEPA, but the mandates of other federal agencies apply as well. Those agencies include, but are not limited to, the USFWS and the National Marine Fisheries Service (NMFS). Additional enforcement of the CWA is provided by the State Water Quality Resources Control Board (SWQRCB), which must certify that a USACE permit action meets state water quality objectives (Section 401, CWA).

Endangered Species Act, 16 U.S.C. §§ 1531 – 1544
The ESA protects plant and animal species (and their habitats) that are listed as endangered and threatened. Species are listed as endangered if found to be in

danger of extinction throughout all or a significant portion of their ranges; species are listed as threatened if they are likely to become endangered within the foreseeable future. The ESA also protects designated critical habitat for listed species, which are areas of physical or biological features essential to the conservation of the species and which may require special management considerations. The ESA requires federal agencies to consult with USFWS and/or NMFS, as applicable, before initiating any action that may affect a listed species.

Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 et seq.

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the U.S. claimed sovereign rights and exclusive fishery management authority over all fish, and all Continental Shelf fishery resources, within the EEZ (within 200 nm [230 miles; 370 km] of the shoreline). The MSA established a procedure for authorizing foreign fishing, and prohibited unauthorized foreign fishingwithin the EEZ.

The MSA also established national standards for fishery conservation and management within the EEZ, and created eight Regional Fishery Management Councils composed of state officials with fishery management responsibility, the regional administrators of NOAA Fisheries, and individuals appointed by the Secretary of Commerce who are knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources of the geographical area concerned. The Councils are responsible for preparing and amending fishery management plans for each fishery under their authority that requires conservation and management.

Fishery management plans (FMPs) describe the fisheries and contain necessary and appropriate conservation and management measures, applicable to foreign vessels in U.S. waters and fishing byU.S. vessels. The plans are submitted to the Secretary of Commerce, who has delegated to NOAA approval of the plans. If approved, NOAA Fisheries promulgates implementing regulations. NOAA Fisheries may prepare Secretarial FMPs if the appropriate Council fails to develop such a plan.

Of particular relevance to this DEIS are recent changes to the Groundfish FMP. Amendment 19 has been prepared by NOAA Fisheries and the PFMC to comply with Section 303(a)(7) of the MSA by amending the Pacific Coast Groundfish FMP to:

- Describe and identify essential fish habitat (EFH) for the fishery;
- Designate Habitat Areas of Particular Concern (HAPC);
- Minimize to the extent practicable the adverse effects of fishing on EFH; and
- Identify other actions to encourage the conservation and enhancement of EFH.

The proposed rules and management measures are intended to minimize, to the extent practicable, adverse effects on Groundfish EFH from fishing. On May 11, 2006, NOAA Fisheries published a final rule to implement regulatory provisions of Amendment 19 to the Pacific Coast Groundfish FMP (71 FR 27408). This rule designated the areas within the 50-fathom isboath of Cordell Bank and the Davidson Seamount Management Area (as well as other areas in the ROI) as EFH, and implemented the following prohibitions as applicable within these EFH areas:

• Fishing with dredge gear anywhere in EFH;
• Fishing with beam trawl gear anywhere in EFH;
• Fishing with specified types of bottom trawl gear anywhere in EFH;
• Fishing with bottom contact gear within 50 fathoms of Cordell Bank; and
• Fishing with bottom contact gear or any other gear that is deployed deeper than 500 fathoms (3000 feet) within the Davidson Seamount.

Fish and Wildlife Coordination Act and Implementing Regulations, 16 U.S.C. §§ 661 – 666c

Any federal agency that proposes to control or modify any body of water must first consult with the USFWS or NMFS, as appropriate, and with the head of the appropriate state agency exercising administration over the wildlife resources of the affected state. The USACE has a memorandum of understanding with the USFWS to provide a coordination act report to assist in planning efforts.

Migratory Bird Treaty Act, 16 U.S.C. § 703 et. seq.

The MBTA is a federal statute that implements US treaties with several countries concerning the conservation and protection of migratory birds. The number of bird species covered by the MBTA is extensive and is listed at 50 CFR 10.13. Further, the regulatory definition of a migratory bird is broad and includes any mutation or hybrid of a listed species, as well as any part, egg, or nest of such bird (50 CFR 10.12). Migratory birds are not necessarily federally listed endangered or threatened under the ESA. The MBTA, which is enforced by the USFWS, makes it unlawful “by any means or manner, to pursue, hunt, take, capture [or] kill” any migratory bird except as permitted by regulation. The applicable regulations prohibit the take, possession, import, export, transport, sale purchase, barter, or the offering of these activities, except as permitted by the implementing regulations.

Marine Mammal Protection Act, 16 U.S.C. §§ 1361-1421h

The MMPA protects and conserves marine mammal species by placing a moratorium on harassing, hunting, capturing, or killing any marine mammal or attempting any of these. If a project proponent determines that an action could incidentally harass (“take”) marine mammals, the proponent must consult with either the USFWS or NMFS to determine if a permit to take a marine mammal is required. A recent redefinition of “take” of an MMPA-protected species occurred under the FY 2004 Defense Authorization Act (House Bill 1588), where an animal

is “taken” if it is harassed, and where harassment is defined as “(i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered” (section 315(f) P.L. 107–314; 16 U.S.C. § 703 note).

Rivers and Harbors Appropriations Act of 1899, 33 U.S.C. §§ 401, 403
Section 10 of the Federal Rivers and Harbors Appropriations Act of 1899 (RHA) prohibits the unauthorized obstruction or alteration of any navigable water. Navigable waters under the RHA are those “subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce” (33 CFR 3294). Typical activities requiring Section 10 permits are construction of piers, wharves, bulkheads, marinas, ramps, floats, intake structures, cable or pipeline crossings, and dredging and excavation.

Coastal Zone Management Act, 16 U.S.C. §§ 1451-1466
The CZMA encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources, such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. To encourage states to participate, the CZMA makes federal financial assistance available to any coastal state or territory that is willing to develop and implement a comprehensive coastal management program. Federal agencies are required to carry out activities that affect any land or water use or natural resource of a state’s coastal zone in a manner consistent with the enforceable policies of an approved state management plan.

Executive Order 11990
Executive Order 11990, Protection of Wetlands (42 FR 26961, May 24, 1977), was signed by President Carter in 1977 to avoid the adverse impacts associated with destroying or modifying wetlands.

Executive Order 13112
Enacted in 1999, this order directs federal agencies to prevent the introduction of invasive species and provide for their control; establishes the Invasive Species Council and directs them to write an invasive species management plan within 18 months.

National Invasive Species Act
The federal National Invasive Species Act (1996) strengthened the 1990 law requiring open water exchange (OWE) of ballast water and mandatory ballast management plans and reporting.

Ocean Dumping Act, 33 U.S.C., §§ 1401-1402

The USEPA has regulatory responsibilities with regard to ocean water quality under both the Clean Water Act (see above) and Title 1 of the Marine Protection, Research, and Sanctuaries Act (Ocean Dumping Act). The Ocean Dumping Act prohibits the unpermitted dumping of "any material transported from a location outside the United States" into the territorial sea of the United States, or into the zone contiguous to the territorial sea, to the extent discharge into the contiguous zone would affect the territorial sea or the territory of the United States. This act supersedes any related Clean Water Act requirements.

California Coastal Act, California Public Resources Code § 30000

The California Coastal Act (CCA) defines the "coastal zone" as the area of the state that extends three miles seaward and generally about 1,000 yards (910 meters) inland. In particularly important and generally undeveloped areas, where there can be considerable impact on the coastline from inland development, the coastal zone extends to a maximum of five miles (8 km) inland from mean high tide line. In developed urban areas, the coastal zone extends substantially less than 1,000 yards (910 meters) inland. The Coastal Commission's jurisdiction does not extend into or around San Francisco Bay, where development is regulated by the San Francisco Bay Conservation and Development Commission (Cal. Pub. Res. Code § 30103). Almost all development within the coastal zone, which contains many wetlands, requires a coastal development permit from either the Coastal Commission or a local government with a certified Local Coastal Program.

California Endangered Species Act, California Fish and Game Code §§ 2050-2111.5

The CESA places the responsibility for maintaining a list of threatened and endangered species on the CDFG. The CDFG also maintains a list of candidate species that are under review for addition to either the list of endangered species or the list of threatened species. Pursuant to the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any California-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the CDFG encourages informal consultation on any proposed project that may affect a candidate species.

Cal. Fish and Game Code §§ 1600-1607

The state's authority in regulating activities in wetlands resides primarily with the CDFG and the State Water Resources Control Board (SWRCB). The State of California regulates wetlands through the CDFG, which provides comment on USACE permit actions under the Fish and Wildlife Coordination Act. The CDFG may develop mitigation measures and require the preparation of a streambed alteration agreement if a proposed project would obstruct the flow or alter the

bed, channel, or bank of a river or stream in which there are fish or wildlife resources, including intermittent and ephemeral streams. The CDFG is authorized to do so by the State Fish and Game Code Sections 1600-1607.

The CDFG has established ecological reserves, marine reserves, game refuges, and marine life refuges in the ocean waters and submerged lands surrounding the Farallon Islands and Point Reyes. The agency has the authority to prohibit or restrict activities that may harm resources, including fishing, collecting, swimming, boating, and public entry. The CDFG works closely with the sanctuaries in oil spill response, damage assessment, and restoration through its Office of Spill Prevention and Response.

California Marine Invasive Species Act, AB 433

The California Marine Invasive Species Act of 2003 mandates the management of ballast water. The act reauthorized and improved upon the California Ballast Water Management and Control Act (AB 703). It requires mid-ocean exchange or retention of ballast water for vessels coming from outside the EEZ and requires vessels coming from other west coast ports to minimize ballast water discharge. Record-keeping and other compliance measures apply to all vessels entering California waters.

State Water Resources Control Board

The SWRCB adopts statewide water quality control plans and policies, such as the Ocean Plan, the Thermal Plan, and the State Implementation Policy. The SWRCB has established a system of 34 ASBS. These areas are designated for special protection from undesirable alteration in natural water quality. Five ASBSs are located in GFNMS, including Duxbury Reef, Point Reyes Headland, Double Point, Bird Rock, and the Farallon Islands.

COMMERCIAL FISHERIES

Commercial fisheries in the sanctuaries are managed by the PFMC, NOAA Fisheries, the CDFG, the California State Legislature and the California Fish and Game Commission. Coastal fisheries in state waters (up to 3 nm [3.5 miles, 5.5 km] from the shoreline) are generally managed by the CDFG and the Fish and Game Commission. NOAA Fisheries and the PFMC regulate and manage ocean fisheries beyond state waters (from 3 nm offshore to the extent of the EEZ, 200 nm [230 miles; 370 km] offshore).

Marine Life Management Act, AB 1241

California's Marine Life Management Act (MLMA), which became law on January 1, 1999 (codified in scattered sections of the Cal. Fish and Game Code), regulates the harvest of California's marine living resources, including commercial fisheries. The fishery management system established by the MLMA applies to four groups of fisheries:

1. Nearshore finfish fishery and the white seabass fishery;

2. Emerging fisheries (new and growing fisheries that are not currently subject to specific regulation);
3. Fisheries managed by the Fish and Game Commission before January 1, 1999; and
4. Commercial fisheries for which there is no statutory delegation of authority to the Fish and Game Commission and Department (CDFG 2004a).

Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§ 1801-1882

The MSA established the PFMC, one of eight regional councils established by the act. The PFMC has responsibility for establishing and updating management plans for key commercial fish species. Management plans include a *Groundfish Management Plan*, which covers 82 species of rockfish, flatfish, roundfish, sharks, skates, and others. Chinook *(Oncorhynchus tshawytscha)* and coho *(Oncorhynchus kisutch)* are the primary salmon species managed by the PFMC. Four coastal pelagic species are managed by the PFMC, including Northern anchovy *(Engraulis mordax),* Pacific sardine *(Sardinops sagax),* Pacific (chub) mackerel *(Scomber japonicus),* and Jack mackerel *(Trachurus symmetricus).* In conjunction with the International Pacific Halibut Commission, the PFMC manages the Pacific halibut *(Hippoglossus stenolepis),* a large flatfish that migrates between US and Canadian waters, in determining a total allowable catch (TAC) (PFMC 2000).

Highly Migratory Species Management

In 2004, NOAA Fisheries partially approved an FMP for West Coast highly migratory species (HMS) fisheries, species that are currently managed by individual states. The FMP for highly migratory species manages the following species:

• Tunas: north Pacific albacore, yellowfin, bigeye, skipjack, northern bluefin;
• Sharks: common thresher, pelagic thresher, bigeye thresher, shortfin mako, blue;
• Billfish/swordfish: striped marlin, Pacific swordfish; and
• Other: dorado (also known as dolphinfish and mahi-mahi).

The HMS FMP:

• Allows the PFMC to provide advice to NOAA Fisheries and the Department of State, so that West Coast interests are represented in international negotiations and decisionmaking;
• Increases public awareness about West Coast HMS fishery issues;
• Facilitates greater public involvement in managing HMS fisheries; and
• Helps garner congressional support to the PFMC and NOAA Fisheries for the study and management of HMS fisheries.

The HMS FMP is a “framework” plan, which means it includes some fixed elements as well as a process for creating or changing regulations without amending the plan. In biggest short-term change for fishers stemming from the HMS FMP are new monitoring requirements, which went into effect in 2005. Commercial fishers must obtain a permit from NOAA Fisheries to fish for HMS and maintain logbooks documenting their catch. (Current state-mandated logbooks meet this requirement.) Recreational charter vessels must also keep logbooks. If requested by NOAA Fisheries, a vessel must carry a fishery observer. These measures are intended to improve data collection about HMS catches.

Groundfish Management

The PFMC develops and recommends groundfish harvest specifications and management measures to NOAA Fisheries. If approved by NOAA Fisheries, these specifications and management measures typically become effective on January 1 of any given year (the beginning of the management cycle). Federal groundfish regulations include groundfish harvest levels and fishing restrictions (trip limits, area closures, season lengths, etc.), which are known as the "harvest specifications and management measures (NOAA 2006).

Since 2003, several groundfish conservation areas have been implemented through regulation by NOAA Fisheries Service to reduce overfishing on various groundfish species (NOAA 2006). A groundfish conservation area is defined by NOAA Fisheries as “any closed area intended to protect a particular groundfish species or species group or species complex.” Groundfish conservation areas in the ROI include: rockfish conservation areas, Farallon Islands groundfish closure, and Cordell Bank groundfish closure. The closures have been in existence in the ROI since 2003 and will remain closed until depleted groundfish species are “recovered” under the MSA.

The Rockfish Conservation Areas (RCAs) are large area closures intended to protect a complex of species, such as the overfished shelf rockfish species. The RCAs differ between gear types (e.g., there are a trawl RCA, a non-trawl RCA, and a recreational RCA), vary throughout the year with cumulative limit period, and have boundaries defined by specific latitude and longitude coordinates that approximate depth contours.

Of particular relevance to this DEIS are recent changes to the Groundfish FMP. Amendment 19 has been prepared by NOAA Fisheries and the PFMC to comply with Section 303(a)(7) of the MSA by amending the Pacific Coast Groundfish FMP to:

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• Fishing with bottom contact gear or any other gear that is deployed deeper than 500 fathoms (3000 feet) within the Davidson Seamount.

Sustainable Fisheries Act, P.L. 104-297
The Sustainable Fisheries Act (SFA), which became law on October 11, 1996, amended the Magnuson Act, renamed the Magnuson-Stevens Fishery Conservation and Management Act (the Magnuson-Stevens Act). NOAA has responsibilities under the Magnuson-Stevens Act for scientific data collection, fisheries management, and enforcement.

The California Aquaculture Development Act
The California Aquaculture Development Act of 1979 established the California Department of Fish and Game (CDFG) as the lead agency for aquaculture in the state. In 1982, legislation was passed that provided guidelines and authority for aquaculture regulations developed by the Fish and Game Commission. These guidelines and authority for aquaculture regulations are in California Code of Regulations, Title 14, Natural Resources: Division 1. Fish and Game Commission - Department of Fish and Game. These regulations are referred to as Title 14. CDFG is responsible for issuing leases and permits for specific aquaculture activities and coordinating with two committees, the Aquaculture Development Committee and the Aquaculture Disease Committee, which exist for the purpose of interaction among sectors of the aquaculture industry and government regulatory agencies.

There are several other state agencies that have regulatory authority over certain aspects aquaculture. They include the California Departments of Health Service and Food and Agriculture (disease and health), the State Lands Commission (leased lands), the Coastal Commission (coastal uses and public recreation and access), and the State Water Resources Control Board (water quality).

In federal waters NOAA, US Army Corps of Engineers, EPA, DOI, USDA and the US Department of Health and Human Services all have various jurisdictional oversight over aquaculture facilities and operations. There is also pending legislation relating to aquaculture in offshore waters.

CULTURAL AND MARITIME HERITAGE RESOURCES

Cultural and historical resources are regulated through a number of federal laws, as summarized below. Sanctuary and California State regulations prohibit disturbance of submerged archaeological and historical resources, except by permit. The NMSP and California State Lands Commission have an archaeological resource recovery permit system in place.

The National Historic Preservation Act (NHPA) (16 U.S.C. § 470 et seq.) serves as the basis for a process that considers the effects of federal undertakings on cultural and historic resources. The procedure an agency takes to achieve compliance with this legislation is commonly called the Section 106 process. Although the NHPA was created primarily in response to numerous federally funded urban renewal projects that demolished old neighborhoods and historic homes, it applies to any actions an agency may take that would affect historic or cultural resources as they are defined in the law. The intent of the process is to require the federal agency, in consultation with other affected parties, to make an informed decision as to the effect its actions would have on something that may be important to our heritage.

Depending on the resources identified, the following legislation could also apply within the sanctuaries:

National Historic Preservation Act of 1966, 16 U.S.C. §§ 470-470x-6
Cultural resources on federal lands are protected primarily through the NHPA of 1966 and its implementing regulations (found at 36 CFR Part 800). Section 106 of the NHPA requires federal agencies to identify and evaluate the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places (NRHP). Consultation with the State Historic Preservation Officer, Native American tribes, native Hawaiian organizations, the Advisory Council for Historic Preservation, and other interested parties is part of the regulatory process. To be protected under the NHPA, a property must meet specific criteria of significance established under the NHPA's regulations at 36 CFR Part 60.

Archaeological Resources Protection Act of 1979, 16 U.S.C. §§ 470aa – 470mm
This act requires all archaeological excavations on federal land to be undertaken pursuant to permit issued by the federal land manager. This act also imposes criminal penalties for unauthorized excavations.

Native American Graves Protection and Repatriation Act of 1990, 25 U.S.C. §§ 3001-3013
This act requires federal agencies to identify and inventory possible Native American, native Alaskan, or native Hawaiian human remains, burial goods, or cultural items in their collections and to make them available for repatriation to affiliated tribes or lineal descendants. The act also establishes procedures for handling and disposing of such remains, burial goods, or cultural items discovered on federal lands.

Abandoned Shipwrecks Act of 1987, 43 U.S.C. §§ 2101-2106
This act asserts federal ownership over all shipwrecks found in state waters (within the 3-mile line) and transfers ownership of those resources to the states. Shipwrecks in federal waters remain under the jurisdiction of the federal government.

Antiquities Act of 1906, 16 U.S.C. §§ 431-433
This act requires a permit to excavate or remove any historic objects or antiquities from federal lands, and grants the President the authority to designate as national monuments landmarks of historic or scientific importance. The permit provisions of the Antiquities Act are generally are enforced through the NHPA process.

Historic Sites, Buildings, Objects, and Antiquities Act of 1935, 16 U.S.C. §§ 461-467
This act establishes the national policy of preserving historic resources and gives the Secretary of the Interior the power to make historic surveys and document, evaluate, acquire, and preserve archaeological and historic sites across the country. This act provided the authority behind the establishment of the National Historic Landmarks and Historic American Buildings Survey programs.

HAZARDOUS WASTES AND WASTE DISPOSAL

Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9610
The CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The Superfund Amendments and Reauthorization Act (SARA) amended CERCLA on October 17, 1986. Superfund is the federal government's program to clean up the nation's uncontrolled hazardous waste sites.

The CERCLIS contains information on hazardous waste sites, potential hazardous waste sites, and remedial activities across the nation, including sites that are on the National Priorities List (NPL) or being considered for the NPL. CERCLIS contains information on sites located within the shoreline counties of

the ROI. There are four CERCLIS sites within Santa Cruz County, including one NPL site; eleven CERCLIS sites and one NPL site are within San Francisco County; three CERCLIS sites are within Marin County; six CERCLIS sites, including three NPL sites, are within Monterey County; twenty-seven CERCLIS sites, including two NPL sites, are within Sonoma County; one CERCLIS site is within San Luis Obispo County; and ten CERCLIS sites are within San Mateo County.

Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901-6992
The RCRA addresses hazardous waste management, establishing duties and responsibilities for hazardous waste generators, transporters, handlers, and disposers.

Clean Water Act, 33 U.S.C. § 1251 et seq.
Section 312 of the CWA requires the use of MSDs for all vessels within 3 nm (3.5 miles; 5.5 km) offshore; raw sewage can be legally discharged beyond 3 nm. Vessels over sixty-five feet in length must have a Type II or Type III MSD. In the sanctuaries, the discharge of raw sewage is prohibited, and it is required that properly functioning marine sanitation devices be used when discharging sewage waste (NOAA 2003c, 2003d, 2003e).

MARITIME TRANSPORTATION

Federal Regulations
Several acts of Congress govern the movements of commercial vessels in specified waterways. These acts include the Ports and Waterways Safety Act of 1972, the Port and Tanker Safety Act of 1978, and the Oil Pollution Act of 1990. In addition, the Coast Guard Vessel Traffic Service (VTS) regulations became effective October 1994. The VTS San Francisco Area includes the Pacific Ocean in a 38.7 nm (33 miles; 77 km) radius around Mount Tamalpais, which is 10 miles (16 km) north of the Golden Gate. State law also governs the discharging of ballast water through the Ballast Water Management for Control of Nonindigenous Species section of the California Public Resources Code (1999).

The Ports and Waterways Safety Act of 1972 authorizes the US Coast Guard to establish vessel traffic service/separation (VTSS) schemes for ports, harbors, and other waters subject to congested vessel traffic. The VTSS apply to commercial ships, other than fishing vessels, weighing 300 gross tons (270 gross metric tons) or more (NOAA 2005b).

The volunteer traffic separation lanes used by commercial vessels transiting the northern/central California coast were established in 2000 by the United Nations International Maritime Organization (IMO) and were the result of a collaborative effort between the USCG and MBNMS. The intention of this effort was to reduce the likelihood of a spill in MBNMS along the central and northern California Coast

as well as to ensure safe, efficient, and environmentally sound transportation by vessels.

The new plan routes large vessels in north-south tracks ranging from 13 to 20 nm (15 to 23 miles; 24 to 37 km) from shore between Big Sur and the San Mateo coastline. Most cruise ships sail along the northern/central California coast at 15 to 17 nm (13 to 15 miles; 28 to 31 km) from shore unless accessing a port. Ships carrying hazardous materials, such as refined petroleum, chemicals, and munitions, follow north-south tracks between 25 and 30 nm (29 to 34.5 miles; 46 to 56 km) from shore. Loaded tankers are required to stay at least 50 nm (57.5 miles; 93 km) offshore, while unloaded tankers are required to stay 25 nm (29 miles; 46 km) offshore.

The Port and Tanker Safety Act of 1978 provided broader regulatory authority over regulated and non-regulated areas. The act improved the supervision and control of all types of vessels operating in navigable waters of the US, and improved the safety of foreign or domestic tank vessels that transport or transfer oil or hazardous cargoes in ports or places subject to US jurisdiction (NOAA 2005b).

The Oil Pollution Act of 1990 established that parties responsible for discharging oil from a vessel or facility are liable for: (1) certain specified damages resulting from the discharged oil; and (2) removal costs incurred in a manner consistent with the National Contingency Plan (NCP). The liability for tank vessels larger than 3,000 gross tons was increased to $1,200 per gross ton or $10 million, whichever is greater. The fine for failing to notify the appropriate Federal agency of a discharge was increased from a maximum of $10,000 to a maximum of $250,000 for an individual or $500,000 for an organization, and the maximum prison term was increased from one year to five years. Civil penalties were authorized at $25,000 for each day of violation or $1,000 per barrel of oil discharged, and failure to comply with a Federal removal order can result in civil penalties of up to $25,000 for each day of violation (USEPA 2005).

State Regulations

The Ballast Water Management for Control of Nonindigenous Species section of the California Public Resources Code (Cal. Pub. Res. Code §§ 71203-71210.5) mandates that the operator of a vessel minimize the uptake and the release of nonindigenous species. Some of the steps to be taken include: a) discharging only the minimal amount of ballast water essential for vessel operations while in the waters of the state; (b) minimizing the discharge or uptake of ballast water in areas within, or that may directly affect, marine sanctuaries, marine preserves, marine parks, or coral reefs; (c) minimizing or avoiding uptake of ballast water in areas where invasive species or pollution are known to exist; and (d) cleaning the ballast tanks regularly in mid-ocean waters, or under controlled arrangements at port or in drydock, to remove sediments, and dispose of the sediments in accordance with local, state, and law.

March 27, 2008

Paul Michel, Sanctuary Superintendent
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey CA 93940

Dear Paul:

On behalf of the Monterey City Council, I am writing in response to the Monterey Bay National Marine Sanctuary (MBNMS) Decision Letter of February 15, 2008 to the Marine Protected Area Workgroup and Sanctuary Advisory Council Members. This Decision Letter announces the decision that the MBNMS will create more Marine Protected Areas (MPAs).

The City of Monterey has gone on record many times to support the wise and sustainable use of our ocean resources and the conservation goals of the Sanctuary Program. Our citizens want assurances that the ocean will be healthy for future generations to enjoy. If there are problems, we want all federal, state, and local agencies to review their management options and to coordinate a response to deal with the problem. MPAs are one of many management options available for marine resource issues. The City of Monterey will be an active partner with the MBNMS in supporting science-based solutions in which the needs of key stakeholders are addressed.

It is not within our expertise to offer an opinion as to the need of the ecosystem for additional protections, including additional MPAs, within this Sanctuary Region. However, the letter of February 15th contains issues of procedure, policy, and best available science, all previously advised by the City of Monterey in the form of a number of different policy statements or recommendations made to the MBNMS.

The February 15th letter contains two major points. The first point asserts that the Sanctuary has determined that there is a need for additional MPAs within the Sanctuary, and offers three justifications in support of that determination. The second major point outlines the legal authority that might be used to create additional MPAs.

Regarding the legal authority to create additional MPAs, several Monterey City Councils, over the past seven years, have gone on record on the question of the Sanctuary's authority, or lack of, to create regulations that affect fishing. During the early 1990's, the City of Monterey was very active in supporting the creation of the Monterey Bay National Marine Sanctuary. A crucial part of the willingness of the City to support the new Sanctuary was the commitment which we heard from both our federal and state elected leaders, and NOAA officials, that the new Sanctuary would not be a threat to fishermen and that they need not worry about the Sanctuary creating regulations that affect them or potentially put them out of business. I believe that this promise is well remembered still by many civic and business leaders in the Sanctuary Region, and is not limited to the City of Monterey.

Beginning in March 2001, after the Management Plan Review process was announced by the Sanctuary Program, the City Council created a series of policy statements on this issue. At their March 20, 2001 meeting, the City Council of Monterey adopted resolution #01-58, which supports the goals of the Alliance of Communities for Sustainable Fisheries. A copy of this resolution is attached, and I quote two brief sections:

> "Whereas, the Alliance expects the Monterey Bay National Marine Sanctuary to keep the clear promise that was made to the fishing community during the designation period for the Monterey Bay Sanctuary, that the Sanctuary would not become involved in fishery issues and,
>
> Whereas, the Alliance believes fishery management should continue to be the responsibility of the California Department of Fish and Game and the Pacific Fishery Management Council,"

The City Council supported this resolution unanimously.

At the Monterey City Council's November 20, 2001 meeting, recommendations were made to the MBNMS regarding the Management Plan Review process and potential issues. A copy of these recommendations is attached. Among them is:

"Understand and respect the original consensus building that created the Sanctuary."

In his letter to the Monterey Sanctuary of January 31, 2002, Congressman Sam Farr states this consensus effort quite clearly when he says,

> "In the process of building support for the designation of the Sanctuary, a clear commitment was made to the fishing community that the Sanctuary would not impose any regulations directed at fishing activities or fishing vessels. This agreement is based on the understanding that fisheries within the Sanctuary are already being regulated and that there is neither the necessity nor the resources for the National Marine Sanctuary Program to take on this responsibility."

Congressman Farr's position was reiterated to the MBNMS in his letter to you of December 13, 2007 (attached), as the MBNMS considered the MPA issue.

Certainly, the understanding made with the fishing community that the Sanctuary would not regulate fishing is one of the most critical pieces of the consensus building effort.

Also at the November 20, 2001 meeting, the City Council adopted recommendations to the MBNMS specifically about the fishing issue. The adopted policy statement is as follows:

> "To clarify that the Department of Fish and Game and the National Marine Fisheries Service (including the Pacific Fishery Management Council) are the agencies responsible for fishing regulations as per the original intent when the

Sanctuary was designated. Any zones or regulations proposed by the Sanctuary which affect fishing would occur only if they are the result of a cooperative effort with the fishing and/or aquaculture communities and they have the support of those communities."

Regarding the need for the MBNMS to gain the support of the fishing community before it proposes fishing regulations or zones, this was certainly a part of the understanding that the fishing community had with NOAA as the Sanctuary was being proposed. Additionally, the best available science on successful MPA processes is unanimous in concluding that stakeholder/community support for MPAs is needed.

At the City Council's October 4, 2005 meeting, the Council again reviewed their 2001 set of recommendations (attached). The City Council heard the perspective of the Monterey Sanctuary Staff and also received an update on the relevancy of these recommendations from Monterey City Staff. The Monterey City Council took no action on this update, thereby consciously leaving in place existing City Council policy.

When the Draft Management Plan was released, the City of Monterey formally commented on this Plan by sending a copy of the attached letter of January 2, 2007. As you can see, the City Council has confirmed each time its recommendation that the Monterey Sanctuary keep this important promise made to the fishing community. It is evident when we read the Sanctuary's February 15th Decision Letter, that the Sanctuary Program is preparing us for the possibility that the Sanctuary Document will be changed and the Sanctuary may create regulations affecting fishing via creating MPAs, including complete no-fishing zones, or that the Sanctuary will bring an MPA proposal to the Pacific Fishery Management Council which is not supported by fishermen. On this point the Monterey City Council is concerned that it is likely that if the Sanctuary does break this promise, there will be a reaction of deep concern toward the Sanctuary from civic and business leaders, and fishermen, throughout this region. This reaction and dismay may make it harder for the MBNMS to work with communities and stakeholders in a spirit of mutual trust.

It also must be pointed out that Monterey Sanctuary Regulations (15CFR, Chapter IX, Subchapter A and B, and Part 944) calls for a consultation to occur between the PFMC and the National Marine Fisheries Service, as well as the fishing industry, to determine an appropriate course of action if problems arise that might be caused by fishing activities. However, no consultation on issues of substance occurred with the three listed entities before the Sanctuary issued its Decision Letter.

The City of Monterey also has a longstanding policy of supporting the use of the "best available science" to inform or resolve resource management issues. With regard to the Sanctuary's Decision Letter, the first assertion made for the need for additional MPAs is that there are ecological concerns with any level of fishing activity, at least in certain areas. It is not within the expertise of the City Council to know whether or not this is a valid assertion. However, we do point out that the local organization, the Alliance of Communities for Sustainable Fisheries, has brought forth a detailed scientific analysis that deals with the question of the need for additional MPAs in this region. Staff at the MBNMS and the National Marine Sanctuary Program had this scientific analysis for some time prior to the creation of the Decision Letter, yet the

analysis and its conclusions are nowhere mentioned in the Decision Letter. We hope and expect that the Monterey Sanctuary will engage in a scientific discussion of the merits of this analysis through the Science and Statistical Committee of the Pacific Fishery Management Council (PFMC). As you know, the PFMC (as are all fishery councils in the United States) is now charged by the latest reauthorization of the Magnuson-Stevens Act, to utilize the best available science in their decision making, and to listen to the advice of their Science and Statistical Committees. It's clear with this recent reauthorization of the Magnuson-Stevens Act that Congress wants thorough science and not merely personal or even agency opinion to dictate the use and conservation of our marine resources.

The City of Monterey has also gone on record twice (in the context of the State's MPA process) asking for a thorough socio-economic analysis to be developed early-on in any MPA process. The MBNMS MPA Decision Letter does briefly mention that the Sanctuary will seek to "adequately understand the ...socio-economic impacts of any proposed action". While the City of Monterey understands that a complete socio-economic analysis cannot be done until the specific MPA locations are identified, the City wishes that key baseline socio-economic information would have been developed before the Sanctuary made the decision that additional MPAs are needed. Such information would have been relevant to the level of fishing activity that currently exists and relevant to a MBNMS decision on "need".

The Monterey City Council is also well aware that our robust tourism economy, which is the dominant economic engine of our community, is reliant to a large degree on the visiting public's desire to eat fresh local seafood and to experience the culture and heritage of our historic fishing community. A recent study conducted by Responsive Management Inc., has shown a very high correlation between fishing heritage and our tourism economy as recorded by local tourism professionals and civic leaders. One of the "Vision Statements" recently adopted by the City Council speaks directly to this point:

> "Appropriately preserve, promote, and maintain our historic, cultural, and environmental assets"

On this very point the City of Monterey was proud to receive from First Lady Laura Bush a 2005 "Preserve America Award" for our efforts to preserve our historic and cultural assets, our fishing heritage being among those.

The City of Monterey has also gone on record several times to express concern and to suggest constructive changes in the MBNMS public decision-making process. Most notable have been concerns about the structure and function of the Sanctuary Advisory Council. These concerns are expressed in the Monterey City comments made to the MBNMS during the Management Plan Review process. Because of the ability of the MBNMS to control the selection of most members of the SAC, the public is left to wonder if SAC advice truly represents the public, including on this MPA issue. I also point out that the Sanctuary Program timeline states that by January 8, 2008, a consultation had occurred with the Pacific Fishery Management Council and NOAA Fisheries. However, no such consultation on issues of substance occurred. These events may serve to make some of the public question the National Marine Sanctuary

decision-making process.

I want to comment on the assertion in the Decision Letter that the National Marine Sanctuary Act mandates mean that the MBNMS has a "need" to create wilderness areas in the ocean. First, let me note that this assertion is the antithesis of the promise made to fishermen, that the Sanctuary would not create regulations. Had this assertion been made during the run up to the sanctuary designation, I do not believe that a sanctuary would exist today. Secondly, this interpretation may be legally challenged. Third, may I point out that in an April 5, 2001 letter to the City of Monterey (copy attached), National Marine Sanctuary Program Director Dan Basta states, "While it is my position that each Management Plan Review will assess whether ecological reserves are appropriate, there is no policy that they must be established or that they must be a certain size." From this quote, I do not perceive that Director Basta is asserting the same mandate that the Sanctuary must create wilderness areas.

It appears that a strong difference of opinion exists between fishermen and the MBNMS regarding the fundamental question of the need for additional MPAs. This question, in our opinion, does need to be resolved before the Sanctuary goes ahead with an MPA design process. It has been previously pointed out that Monterey City Council adopted policy recommends to the Sanctuary that no fishing regulation or zone be adopted unless it has the support of the fishing community. This is not merely a City of Monterey policy and it does not confer "veto" power to fishermen. The Decision Letter presented by the Sanctuary refers to the 2003 National Research Council report on the use of Marine Reserves. However, the Decision Letter fails to mention key conclusions of the NRC report:

> "Local people must be deeply involved from the earliest possible stage in any MPA effort for it to be successful, and socio-economic considerations usually determine the success or failure of MPAs".
>
> and
>
> "Actions taken in the context of incomplete information require agreement among stakeholders, managers, and scientific researchers that regulatory actions are necessary and beneficial despite information gaps and conflicting perceptions of resource status."

On behalf of the Monterey City Council I strongly urge the MBNMS to reconcile the science which has been brought forth by the fishermen (including their own anecdotal knowledge) with what appears to be a top-down decision from the National Marine Sanctuary Program that additional MPAs are needed. Without such reconciliation it appears that there will not be support for an MPA network from the key stakeholders, as recognized even by the National Research Council. I further urge the MBNMS to not change the Designation Document for this Sanctuary or attempt to create its own MBNMS fishing regulations.

The City of Monterey always wants to be a working partner with the MBNMS for programs that support the wise and sustainable use of the ocean. It is our observation that the Sanctuary Program needs to take actions to assure the public that there is a strong, science-based rationale for determining that there is a need for additional MPAs in the federal waters of the MBNMS. The City will work with and support a

process to assure that the best available science, including socio-economics, is used to evaluate the need for additional protections, understanding that MPAs are one tool of many for preserving ocean health. As a constructive recommendation to the MBNMS, the City suggests that the Sanctuary seek to resolve this MPA issue by working with the Pacific Fishery Management Council in their new process to develop an "Ecosystem Fishery Management Plan". This would be a great opportunity to work with the PFMC, which is the Agency with the authority to create MPAs, to resolve the ""need" issue and/or even identify areas that should be made into MPAs if that is what the best science determines.

We well know that sometimes the advice of a community like Monterey to the Sanctuary Program may not be in agreement with actions proposed by the senior management of the National Marine Sanctuary Program. However, please know that City of Monterey advice is well-considered and aimed at assuring long-term community support for the Sanctuary.

Thank you for considering these observations and comments. The City of Monterey has been a key partner with the MBNMS on many issues and we look forward to working through the issues and concerns expressed above.

Sincerely,

Chuck Della Sala

Chuck Della Sala, Mayor
City of Monterey

Attachments

C: Vice Admiral Conrad Lautenbacher, USN (ret.), Undersecretary for Oceans and Atmosphere,
Department of Commerce, 1401 Constitution Ave. N.W., Washington, D.C. 20230
Anthony Botelho, President, AMBAG, P O Box 809, Marina, CA 93933
Representative Sam Farr, 1221 Longworth House Office Bldg, Washington, DC 20515
The Honorable Leon Panetta, 100 Campus Center, Bldg 86E, Seaside, CA 93955
Don Hansen, Chair, Pacific Fishery Management Council, 7700 NE Ambassador Pl., Suite
101, Portland, OR 97220-1384

RESOLUTION NO. 01- 58

CITY OF MONTEREY SUPPORT FOR THE ALLIANCE OF COMMUNITIES FOR SUSTAINABLE FISHERIES

WHEREAS, the Alliance of Communities for Sustainable Fisheries was formed, consisting of primarily representatives of the commercial fishing industry, but also including port representatives and businesses which relate to the fishing industry from all harbors between Morro Bay north to Pillar Point and,

WHEREAS, the Alliance expects the Monterey Bay National Marine Sanctuary to keep the clear promise that was made to the fishing community during the designation period for the Monterey Bay Sanctuary, that the Sanctuary would not become involved in fishery issues and,

WHEREAS, the Alliance perceives that there is much work to be done in guaranteeing that our central California fisheries are sustainable in the long run and,

WHEREAS, The Alliance believes fisheries management should continue to be the responsibility of the California Department of Fish and Game and the Pacific Fisheries Management Council.

WHEREAS, the Alliance has announced its intention to formally study several issues critical to fishing and,

WHEREAS, inviting the public and Sanctuary Advisory Council to participate in the Alliance's study process, the Sanctuary and public can have meaningful input into important fishing issues without the Sanctuary breaking its promise to the fishing community.

NOW, BE IS RESOLVED that the Council of the City of Monterey does support the goals of the Alliance of Communities for Sustainable Fisheries, as expressed in the Alliance's February 2, 2001 letter.

PASSED AND ADOPTED BY THE COUNCIL OF THE CITY OF MONTEREY this 20th day of March, 2001, by the following vote:

AYES: 5 COUNCILMEMBERS: ALBERT, CANEPA, EDGREN, ROBERSON, VREELAND

NOES: 0 COUNCILMEMBERS: NONE

ABSENT: 0 COUNCILMEMBERS: NONE

APPROVED:

/s/ DANIEL ALBERT
Mayor of said City

ATTEST:

/s/ BONNIE GAWF
City Clerk thereof

CITY OF MONTEREY

To: City Manager

From: Public Facilities Director

Date: November 2, 2001

Subject: Recommendations for the Monterey Bay National Marine Sanctuary (MBNMS) Management Plan Review

RECOMMENDATION

Adopt the attached recommendations.

POLICY IMPLICATIONS

The recommendations are consistent with the City of Monterey's past support for the conservation, education, research, and facilitation of use goals of the MBNMS Program.

FISCAL IMPLICATIONS

None.

ALTERNATIVES CONSIDERED

The City Council could choose to amend the recommendations.

DISCUSSION

The MBNMS is one of thirteen Sanctuaries located within the waters of the United States. The Sanctuary Program is Federal, located in the Department of Commerce and under the National Oceanic and Atmospheric Administration (NOAA) and the National Ocean Service (NOS), a branch of NOAA. The Sanctuary Program is authorized nationally by the National Marine Sanctuaries Act, a federal law adopted by Congress. Additionally, each Sanctuary is governed by a Management Plan, which is written by the Sanctuary Program staff with input from the public through formal comment periods and public workshops, and, ultimately approved by the Secretary of Commerce.

Congress does not approve the Management Plans, but is provided an opportunity to comment through a notice in the Federal Register, near the end of the Plan Review Process. It is on the point of Congressional involvement that caused the City Council last May to write to Congressman Sam Farr, asking him to involve himself early and directly in this process.

Federal law requires the periodic review of each Sanctuary's Management Plan. These individual Plans contain the basic rules

for each Sanctuary, and provides guidance to the Sanctuary staff in administering the Program. For our MBNMS, the original Management Plan, adopted in 1992, was the result of a significant consensus-building effort, spearheaded by then-Congressman Leon Panetta. This consensus effort sought to identify the type of Federal protection sought for the Bay, while reassuring that the Federal Program would respect the needs and regulatory authority of local agencies, and work cooperatively with local communities of interest, such as the agriculture and fishing industries. With the Management Plan Review comes the opportunity to comment formally to the Sanctuary Program. If the Sanctuary Program is like a ship, steaming toward a destination, the Plan Review is a chance to confirm the destination and correct the course accordingly as well as an opportunity to rethink the destination.

As the City Council will recall, at its August 29, 2001 meeting, the Council was requested by the Sanctuary Staff to postpone making any decisions regarding the City's scoping comments until after the "State of the Sanctuary" report was released, which was expected to be mid-October. The City Council set November 6th as the date to reconsider this matter, giving City staff time to prepare this report and everyone time to review the "State of the Sanctuary Report". However, City staff has now been informed that the release of this report will be in early November. Since the Monterey Scoping Meeting for public comment on Sanctuary issues is scheduled for November 29, 2001, it is important that the City Council decide on its recommendations prior to that meeting, if possible. However, additional comments may be submitted until January 31, 2002.

The attached recommendations constitute constructive suggestions for the Program that will keep it on course toward the goal of a balance between the conservation, use and enjoyment of the Sanctuary waters and its resources. Many of the recommendations are similar to those made to the Sanctuary Program by the Business and Tourism Working Group, a sub-set of the SAC. Much has been accomplished by the Program. The recommendations provided will, hopefully, help it avoid some future problems, compliment its accomplishments, and keep the Sanctuary Program in the mainstream of public support.

Carl E. Anderson

CEA:SBS:pt

attachment

c: Bill Douros, Sanctuary Superintendent
Stephanie Harlan, Sanctuary Advisory Council Chair

CITY OF MONTEREY RECOMMENDATIONS
for the Monterey Bay National Marine Sanctuary Management Plan Review

1) Program Accomplishments

Recommendation: The positive accomplishments of the program should be lauded and actively supported by the City, such as the Water Quality Protection Program; Education; Research; Offshore Ship Traffic; no Oil or Gas development, etc. The creation of Sanctuary-related signage located in appropriate areas of the Recreation Trail is an example of a way the City could actively support the Sanctuary Educational goal.

2) Understand And Respect Original Consensus-Building That Created the Sanctuary

Recommendation: The Management Plan Review needs to include a thorough re-visitation of these commitments to the original communities of interest who supported the formation of the Sanctuary. Time should be spent actually going to the leaders of these communities, asking if their expectations for the Sanctuary Program have been met. If changes are proposed that affect the nature of the original consensus, they should occur only if supported by the community of interest.

3) Sanctuary Advisory Council (SAC)

Recommendation: Request that the SAC Charter and Protocols be changed to allow the SAC freedom in setting agendas, drafting correspondence, including to members of Congress, and have SAC appointments made through a community process rather than by the Sanctuary Superintendent. SAC communication to members of Congress should be limited to policy issues, not include "grass roots lobbying" for increased funding, and only occur if representing a majority view of the SAC.

If the SAC Charter and Protocols cannot be changed, then alternatively it is recommended that the SAC be organized not within NOAA, but rather under State law, or through a local joint powers arrangement or MOU. An "arms length" relationship to NOAA would provide for truly independent advice and oversight.

For each of these options, it is also recommended that a conflict of interest disclosure statement be required of SAC members, similar to what is required of public officials throughout California.

It should be clearly noted that this recommendation is aimed at fixing a problem inherent in how the SAC is currently organized and in no way is meant to diminish the good will and expertise that each individual member brings to the SAC.

4) Fishing

Recommendation: Clarify that the Department of Fish and Game and the National Marine Fisheries Service (including the Pacific Fisheries Management Council) are the agencies responsible for fishing regulations as per the original intent when the Sanctuary was designated. Any zones or regulations proposed by the Sanctuary which affect fishing would occur only if they are the result of a cooperative effort with the fishing and or aquaculture communities and they have the support of those communities.

5) Human Impacts

Recommendation: Clarifying language needs to be added to the Management Plan to allow for human uses as long as there is no significant and sustained impact that permanently damages the resource, (i.e., allow for minor impacts). Include a guidance statement to help Sanctuary staff define major/minor impacts. Create more of a policy balance between conservation and use, with a strong educational program being the key to achieving this balance. Add language to include the concept that "ecosystem" includes an understanding of the socio-economic impact on a business or community of any particular sanctuary permit or regulation.

In making this recommendation, it should be clearly noted that any serious, sustained and permanent environmental degradation that might arise from human use or activities would still be evaluated by the Sanctuary program with regard to future regulations and the Program's mandate to protect Sanctuary resources. To do otherwise would cause public concern. As previously recommended, the Sanctuary Program should work cooperatively with the appropriate communities of interest in developing any further regulations.

6) Harbors & Dredging

Recommendation: Suggest language changes to also acknowledge the positive benefits of open harbors and dredging operations. Clarify that the Sanctuary does not regulate or issue permits for dredging, as it is already highly-regulated by numerous other Federal, State and local agencies. Acknowledge that harbors are the access corridors to the Sanctuary for commerce, education, research and law enforcement. Harbors and the Sanctuary should be partners, allied in the goals of the Program. The Sanctuary Program should be empowered to be more accommodating to the needs of its harbors. Any Sanctuary policy regarding dredging should be no more restrictive than other directly responsible regulatory agencies.

7) Regulatory and Permit Authority

Recommendation: Stress in the Management Plan Review that the essential work of the Program is the oil/gas ban, education, research, and the work of the Water Quality Protection Program. Also stress its need to accomplish its goals by working with other agencies and NGO's rather than by becoming a larger and larger organization itself. Any permit process administered by the Sanctuary Program should be streamlined, coordinated with other agencies, and "user friendly". An appeal process should be instituted. Generally, the Sanctuary should not add another layer of permit regulation if other Federal/State/Local/permit authorities are already in place. It is important that the Sanctuary Program not be viewed by the public as an onerous Federal bureaucracy.

8) **Water Quality**

Recommendation: The Sanctuary has made a good start on this issue, but more needs to be done in working cooperatively with other agencies to prevent accidental sewage spills and to identify the sources of polluted urban runoff. The City should actively continue with the support it has provided to the Sanctuary Program in this effort.

9) **Facilitation of Human Use**

Recommendation: Sanctuary use and economic opportunities need to be actively promoted. Add a staff position or redirect staff time or contract to develop a Sanctuary marketing plan and facilitate the use of the Sanctuary. Create specific, measurable goals. Conscientious (through education) use of the Sanctuary should be as much of a goal as research and conservation.

10) **Overlapping Jurisdictions**

Recommendation: Request that the Management Plan Review process include an analysis of jurisdictional issues. This analysis should consult with all coastal jurisdictions and property owners, and be available for public comment. The benefits of Sanctuary status for the very near shore urban areas should be weighed against any jurisdictional issues. If jurisdictional problems are evident, a possible solution would be to create an "urban buffer zone", which would still be within the Sanctuary boundary and which would continue to allow for Sanctuary education, conservation and research programs, but which would not be subject to Sanctuary Permit Authority. The Sanctuary does already have the authority to create special zones.

This recommendation should not be construed as an effort to avoid scrutiny for coastal projects. Rather, it reflects the Management Plan Review as an appropriate time to access intergovernmental relationships in an open and honest manner.

SAM FARR
17TH DISTRICT, CALIFORNIA

COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEES:
AGRICULTURE, RURAL DEVELOPMENT, FOOD AND DRUG ADMINISTRATION, AND RELATED AGENCIES
MILITARY CONSTRUCTION
CHAIR, CALIFORNIA DEMOCRATIC CONGRESSIONAL DELEGATION
CO-CHAIR, CONGRESSIONAL TRAVEL AND TOURISM CAUCUS

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sbmfarr@mail.house.gov
www.house.gov/farr

January 31, 2002

Mr. William Douros
Superintendent
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, California 93940-1463

Dear Mr. Douros:

As you know I have had an active interest in the Monterey Bay National Marine Sanctuary that dates back to its creation. From my perspective as a long-time supporter of the sanctuary, Member of Congress, and lifetime resident of Monterey, I have tried to remain well informed of the activities surrounding the sanctuary and its management. Having witnessed a decade of impressive accomplishments, I am pleased that the sanctuary has committed to building a strong foundation for continued success through a comprehensive review of the management plan. In the spirit of support for the Sanctuary Program, and with the greatest respect for the contributions that you and your staff have made to its numerous successes, I would like to take this opportunity to suggest several areas that should be given special attention during the review process.

The establishment of the Monterey Bay National Marine Sanctuary was as significant step for California, the Federal Sanctuary Program, and especially for the coastal communities that came together in support of its creation. I firmly believe that the sanctuary has been a great benefit to the region not only by prohibiting oil exploration and development, but by providing a federally funded mechanism for central coast residents to participate in improving the stewardship of local marine resources. This process has directly resulted in improved water quality, safety, research, monitoring, education, and management. It is no coincidence that the nation's largest marine sanctuary was designated in an area of the country where public interest and active local involvement are such defining characteristics. The sanctuary could not have been established without the broad base of support from local residents and, ten years after its creation, this support continues to be the sanctuary's greatest asset.

The management plan review process that is currently underway represents an extraordinary opportunity for the Sanctuary Program to look back over ten years of success, experimentation, and growth to build on its original mandate and define its role in the future. I feel that this management plan review should place a strong emphasis on strengthening the ties between the sanctuary management and the community of user groups, local governments and agencies that have been involved in the sanctuary since its establishment. The following recommendations suggest several specific ways that this can be achieved.

The Sanctuary Advisory Council (SAC)

The Sanctuary Advisory Council is the primary link between the sanctuary and its broad-based constituency. The SAC serves both as a vehicle for local input into sanctuary management, and as a means for the sanctuary to mobilize community support and involvement in management activities. The local community has clearly demonstrated, through years of extraordinary commitment by many devoted individuals, that there is a strong willingness to invest the time and effort into making the SAC an effective mechanism for public input. This management plan review should examine ways of providing the SAC with greater independence and strengthening its role as a trusted partner in sanctuary management.

The advisory role of the SAC, as defined in its charter, creates a necessary separation between the SAC and the Sanctuary Program by giving the sanctuary management final authority to selectively implement SAC recommendations. The charter, however, is inconsistent in maintaining this separation by also providing sanctuary management with oversight over virtually all SAC activity including its membership, communication, and agenda. Because this organizational structure permits hands-on sanctuary involvement in SAC affairs, it has a tendency to diminish public confidence that there is truly a sanctuary-independent mechanism for community input. This, in turn, opens the door to greater mistrust and criticism of final management decisions.

I strongly encourage the sanctuary management to objectively evaluate their ability, under the current protocols, to maintain a relationship with the SAC that affords it the independence essential to its role as an effective liaison between the sanctuary and the community. In making this evaluation I would encourage sanctuary management to engage in a dialogue with both current and past SAC members as well as influential members of the community to obtain insights into how the SAC is perceived and how it can be strengthened to more effectively maintain the confidence of its constituency. "

Collaborative management

Long-term cooperative relationships with user groups, agencies, and local governments have been and will continue to be the sanctuary's most effective tool in addressing resource protection issues. The strength of these relationships is also the key to finding a workable balance between the sanctuary's duel mandates of resource protection and maintaining compatible public use.

It is vitally important that the local Sanctuary Management create the flexibility in their new management plan to work closely with user groups to collaboratively develop common-sense management approaches that meet the goals of the sanctuary's resource protection mandate. The sanctuary should use this flexibility to avoid assuming the role of an uncompromising regulatory entity. The perception that the sanctuary is needlessly adding to the federal bureaucracy or is becoming an unresponsive or redundant permitting agency, creates frustration among groups that would otherwise be willing to make significant voluntary efforts to help the sanctuary further their goals.

It is always difficult to strike a balance between resource protection and human use, but the sanctuary should strive to maintain a functional equilibrium by working with user groups to develop appropriate regulatory measures based on a clear and common understanding of their scientific necessity. If these groups feel that the sanctuary management is unable to exercise the flexibility to find common ground in policies that impose economic or practical burdens on their activities, they will be less inclined to collaborate in resource protection efforts that would be in the long-term interest of the sanctuary.

The role of the Sanctuary in regulating fisheries

In the process of building support for the designation of the sanctuary, a clear commitment was made to the fishing community that the sanctuary would not impose any regulations directed at fishing activities or fishing vessels. This agreement is based on the understanding that the fisheries within the sanctuary are already being regulated and that there is neither the necessity nor the resources for the National Marine Sanctuary Program to take on this responsibility. This management plan review process should not be used as a means toward altering this basic agreement. The regulation of fishing in the sanctuary should remain under the jurisdiction of the California Department Fish and Game and the Pacific Fisheries Management Council. Any future reexamination of this relationship should be conducted directly with representatives of the fishing community and these two agencies.

An important issue, however, that needs clarification during this review, involves the sanctuary's role in collaborating and consulting with other agencies on matters relevant to fisheries management. There remains a considerable range of disagreement about the extent to which sanctuary staff should avoid indirect influence on fisheries regulation. Misunderstandings surrounding this issue have the potential to jeopardize the working relationship that is evolving between the fishing community and the sanctuary. I hope that sanctuary management will consider the resolution of this issue to be of primary importance during the management plan review.

Given the sanctuary's broad mandate to study and protect resources on an ecosystem-wide basis, along with their obligation to share information and coordinate efforts with other agencies, it is unrealistic to think that they can or should work in absolute isolation from these issues. I consider it a very encouraging sign that the local fishing industry, through the formation of the Alliance of Communities for Sustainable Fisheries, recognizes this reality and has been collaborating with sanctuary staff and working groups on fishing-related issues.

The sanctuary should work with the Alliance during the management plan review to define a reasonable framework within which they can investigate and provide comments on issues related to fishing. I believe that by establishing standards for openness, opportunities for comment, and a common understanding of the scope and limits of sanctuary expertise, such a framework could serve as a foundation for a much stronger working relationship between the sanctuary and the fishing industry.

Finally, I would like to commend the sanctuary staff for their excellent work in organizing the public scoping meetings that have occurred during first phase of the review. I have received a great deal of positive feedback from these meetings and understand that they were well publicized, well attended, and very productive. In the next phase of the process, as you begin to assimilate public comments, conduct issue workshops, and develop action plans, I encourage you maintain this commitment to public input by working closely with the SAC and facilitating the participation of the users, interest groups, and local governments that make up the core sanctuary constituency.

The sanctuary has a great deal to gain by using this process as a way to build a foundation for improved interaction and collaboration with the community. By making a true commitment to a functional, bottom-up management approach that emphasizes local input and outreach, I feel that the National Marine Sanctuary Program has the potential to play a significant role in shaping the future of federal resource management.

Thank you for the opportunity to provide this input, and please feel free to contact me or my staff with information and updates on the management plan review.

Sincerely,

SAM FARR
Member of Congress

CC: Dan Basta, Director, National Marine Sanctuary Program

SAM FARR
17TH DISTRICT, CALIFORNIA

COMMITTEE ON APPROPRIATIONS
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AGRICULTURE, RURAL DEVELOPMENT, FOOD AND DRUG ADMINISTRATION, AND RELATED AGENCIES
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December 13, 2007

Mr. Paul Michel
Superintendent
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, California 93940-1463

Dear Mr. Michel:

Congress established the National Marine Sanctuary system "to maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations, and ecological processes." As such, they were the first application of ecosystem-based management to our oceans. Unlike other laws that focused narrowly on fishing, dumping of waste, or oil development, the Marine Sanctuaries Act allowed the Secretary of Commerce to carve out a discrete area of the ocean for comprehensive management. It is just this type of management that the U.S. Commission on Ocean Policy, the Pew Ocean Commission, and the Joint Ocean Commission Initiative recommend.

The Monterey Bay National Marine Sanctuary (MBNMS) contains our nation's largest kelp forest, one of North America's largest underwater canyons, and the closest-to-shore deep ocean environment in the continental United States. It is home to one of the most diverse marine ecosystems in the world, including 33 species of marine mammals, 94 species of seabirds, 345 species of fishes, and numerous invertebrates and plants. These features make it ideally situated for learning about and engaging the public with the marine environment and I believe its establishment has contributed to the health of our coastal economy.

From my perspective as a Member of Congress, long-time supporter of the sanctuary and lifetime resident on its shores, I see the sanctuary's commitment to building a strong foundation for continued success by actively engaging local residents in what is possibly the most involved citizen advisory group in the system. I believe it is this commitment that has maintained the broad base of support that continues to be the sanctuary's greatest asset.

In the process of building the initial support for the designation of the sanctuary, a clear commitment was made to the fishing community that the sanctuary would not impose any regulations directed at fishing activities or fishing vessels. This agreement was based on the understanding that the fisheries within the sanctuary are already being regulated and that there is neither the necessity nor the resources for the National Marine Sanctuary Program to take on this responsibility.

Given the sanctuary's broad mandate to study and protect resources on an ecosystem-wide basis along with their obligation to share information and coordinate efforts with other agencies, it is unrealistic to think that they can or should work in absolute isolation from these issues. I was encouraged that the local fishing industry, through the formation of the Alliance of Communities for Sustainable Fisheries, recognized this reality and has been collaborating with sanctuary staff and working groups on fishing-related issues including the evaluation of the use of Marine Protected Areas within the Sanctuary as an ecosystem-based management tool. If there is a need for this type of management tool, then the sanctuary should continue to work with fishing groups to implement this tool without imposing it on them.

When I first met you, Mr. Michel, I was pleased to hear you say you would move this process forward and ask the working group to finally report their findings. This report is timely, now that the Channel Islands National Marine Sanctuary to the south has established a system of marine protected areas and now that the State has designated 29 marine protected areas along the Central Coast.

A fair process that engages the fishing community, scientists, and other stakeholders is the best possible way to answer this question. I trust the sanctuary's process has been just that, and eagerly await the Sanctuary's decision.

Sincerely,

Sam Farr
Member of Congress

SF/lp

CITY OF MONTEREY

To: City Manager

From: Public Facilities Director

Date: September 19, 2005

Subject: City's Recommendations for the Monterey Bay National Marine Sanctuary Management Plan Review

RECOMMENDATION

Hear a presentation from staff on the attached recommendations first adopted in November 2001. If it is the wish of the City Council, agendize some or all of the recommendations for discussion and action at a later date.

POLICY IMPLICATIONS

The recommendations are consistent with the City of Monterey's past support for the conservation, education, research, and facilitation of use goals of the Monterey Bay National Marine Sanctuary Program.

FISCAL IMPLICATIONS

None

ALTERNATIVES CONSIDERED

The City Council could choose to not reconfirm or amend individual recommendations. However, this is not recommended.

DISCUSSION

The City Council will hear a brief presentation on Monterey Bay National Marine Sanctuary Programs, followed by a staff review of the recommendations adopted in November 2001 to the MBNMS as they began their Management Plan Review process.

The MBNMS is one of thirteen sanctuaries located within the waters of the United States. The Sanctuary Program is Federal, located within the Department of Commerce, and under the National Oceanic and Atmospheric Administration (NOAA), and the National Ocean Service (NOS), a branch of NOAA. The Sanctuary Program is authorized nationally by the National Marine Sanctuaries Act, a federal law adopted by Congress and reauthorized approximately every five years and amended as needed by Congress. Additionally, each sanctuary is governed by a Designation Document, which contains within it essentially the agreement that is made between the State, local communities, and the Federal Sanctuary Program as to how the Sanctuary would operate within the region. Additionally, each Sanctuary is governed by a Management Plan, which is written by Sanctuary Program Staff with input from the public through formal comment

periods and public workshops. This Plan is ultimately approved by the Secretary of Commerce.

Federal law requires the periodic review of each Sanctuary's Management Plan. These individual Plans contain the basic rules for each Sanctuary, and provide guidance to the Sanctuary Staff in administering the Program. Congress does not approve the Management Plans, but is provided an opportunity to comment through a notice in the Federal Register near the end of the Plan Review process.

For our MBNMS, the original Management Plan adopted in September 1992 was the result of a significant consensus building effort, spearheaded by then Congressman Leon Panetta. This consensus effort sought to identify the type of Federal protection sought for the Bay while reassuring that the Federal Program would respect the needs and regulatory authority of local agencies and work cooperatively with local communities of interest, such as the agriculture and fishing industries.

Local agencies and organizations have a long-term relationship with the National Marine Sanctuary Program. Likewise, the Sanctuary Program and its Staff are in a relationship to us as well, and are motivated to have a mutually respectful cooperative and productive relationship with the broad public, as it is from them which they largely derive their authority to govern. The attached recommendations were adopted in November of 2001. Staff has written current comments on each recommendation, but as you can see, these recommendations in whole are still considered to be valid and appropriate. Please note that the first comment on the successes of the National Marine Sanctuary Program contains a long list of successful sanctuary programs, which the City has either been in partnership with, or which we have actively supported in other ways. It should be clearly noted that these successes are all completely consistent with the recommendations adopted by the City of Monterey. In the Staff's opinion, these are examples of how the Sanctuary can accomplish its conservation goals while still providing human use opportunities, and create a broadening public support for the Program.

There have been some areas of controversy with how the Sanctuary Program has functioned within this community, or related to agencies and organizations. The Sanctuary Advisory Council issue is an example of this as an area in which continuing controversy occurs over to what degree stakeholders themselves and their organizations get to have a meaningful say in the selection process for representatives for their own stakeholder interest group. Also, it appears that the fishing community perceives that the Sanctuary is on a path to create fishing regulations, despite the promise they feel was made to them that it would not. These areas are examples of areas of some controversy for the Sanctuary Program, but in which the advice provided by the City's recommendations remains, in the Staff opinion, valid advice that would serve the Program well to maintain broad community support.

If, after hearing from representative of the Monterey Bay National Marine Sanctuary, staff, and public comment, the City Council wishes to agendize some or all of these recommendations, a future council meeting can be set for this.

Carl E. Anderson

CEA:pt

CITY OF MONTEREY RECOMMENDATIONS
for the Sanctuary Management Plan Review
2001 Recommendations Adopted November 20, 2001

PROGRAM ACCOMPLISHMENTS

2001 Issue Statement: Much of the public is unaware of the successes of the program.

2001 Adopted Recommendation: The positive accomplishments of the program should be lauded and actively supported by the City, such as the Water Quality Protection Program; Education; Research; Offshore Ship Traffic; no Oil or Gas development, etc. The creation of Sanctuary-related signage located in appropriate areas of the Recreation Trail is an example of a way the City could actively support the Sanctuary Educational goal.

2005 Comment: The list of Sanctuary Program successes, including those done in partnership with the City of Monterey, has grown. These include a partnership between the City and the Sanctuary to obtain Grant funds for the Harbor Oily-Water Bilge Pump-out system; Sanctuary assistance to the City in obtaining a grant to put a pollution catch basin system in the waterfront area; the; "Ag Plan" as part of the Sanctuary's Water Quality Protection Program, to reduce agricultural runoff done as a cooperative effort between this region's agricultural community and the Sanctuary; the City and Sanctuary have cooperated implementing the Sanctuary's Water Quality Protection Plan for such things as monitoring storm water effluent; Monterey Harbor and the Sanctuary cooperated in developing Best Management Plans for Boating activities; the City and the Sanctuary co-sponsored (in addition to the Alliance of Communities for Sustainable Fisheries) an educational event promoting public awareness of sustainable fishing; the City has supported past budget increases for the Sanctuary Program; the City is working with the Sanctuary to provide for a small educational/information center; the Sanctuary and the City worked well together to develop the Cruise Ship Action Plan, and the City and Sanctuary have worked together to attempt to rid Monterey Harbor of the invasive seaweed "undaria".

UNDERSTAND AND RESPECT ORIGINAL CONSENSUS-BUILDING THAT CREATED THE SANCTUARY

2001 Issue Statement: With a variety of special interest groups advocating for changes to the Management Plan, consensus-building agreements struck with many local communities of interest (i.e., agriculture, fishing, the Harbors, etc.) may be overturned, which could cause a loss of credibility for the Sanctuary Program.

2001 Adopted Recommendation: The Management Plan Review needs to include a thorough re-visitation of these commitments to the original communities of interest that supported the formation of the Sanctuary. Time should be spent actually going to the leaders of these communities, asking if their expectations for the Sanctuary Program have been met. If changes are proposed that affect the nature of the original consensus, they should occur only if supported by the community of interest.

2005 Comment: This recommendation is still wise advice provided to the Sanctuary Program. The Sanctuary should give great consideration to the consensus effort that occurred to gain support for sanctuary designation and the understanding of those leaders as to how the Sanctuary would accomplish its goals. The MBNMS did a good job

in seeking public and agency comment during its scoping phase of the Management Plan Review and involved hundreds of community members in developing action plans for the proposed, revised management plan. The MBNMS did not conduct a targeted outreach campaign to those community leaders who were involved in the 1991-92 run-up to sanctuary designation, and where some of those leaders were involved in scoping meetings and working groups, it appears that no special weight was given to those peoples' comments.

SANCTUARY ADVISORY COUNCIL (SAC)

2001 Issue Statement: The SAC is organized within NOAA and is subject to Federal Law. The Sanctuary Superintendent appoints SAC members. All SAC correspondence and agendas must have the concurrence of the Superintendent. The SAC can offer advice when asked, but cannot exercise the oversight of the program that was originally expected. The SAC is sometimes not consulted or asked to offer advice on important Sanctuary issues, and sometimes its advice is not taken, with little consequence. The SAC cannot write to Congress if concerned about the direction of the Sanctuary Program from either a national or local perspective. Generally, there is no formal structure or process that makes the Sanctuary Program accountable for its decisions to the local communities and the SAC has been unable to fulfill this role.

2001 Adopted Recommendation: Request that the SAC Charter and Protocols be changed to allow the SAC freedom in setting agendas, drafting correspondence, including to members of Congress, and have SAC appointments made through a community process rather than by the Sanctuary Superintendent. SAC communication to members of Congress should be limited to policy issues, not include "grass roots lobbying" for increased funding, and only occur if representing a majority view of the SAC.

If the SAC Charter and Protocols cannot be changed, then alternatively it is recommended that the SAC be organized not within NOAA, but rather under State law, or through a local joint powers arrangement or MOU. An "arms length" relationship to NOAA would provide for truly independent advice and oversight.

For each of these options, it is also recommended that a conflict of interest disclosure statement be required of SAC members, similar to what is required of public officials throughout California.

It should be clearly noted that this recommendation is aimed at fixing a problem inherent in how the SAC is currently organized and in no way is meant to diminish the good will and expertise that each individual member brings to the SAC.

2005 Comment: Even though the SAC is only advisory to the Sanctuary Program, it is widely promoted as the "voice of the community" and numerous Management Plan revisions are attributed to the advice of the SAC. The fact that senior Sanctuary Staff is able to choose who will represent the various stakeholder groups, and even reject individuals who have clear support from major stakeholder organizations, has been quite controversial. Generally there is no formal structure or process that makes the Sanctuary Program accountable for its decisions to the local communities and the SAC continues to be unable to fill this role. The AMBAG Board of Directors reviewed the rules governing the SAC during 2004. That Board adopted several very moderate recommendations. In the most recent recruitment for new SAC members, the MBNMS implemented the AMBAG recommendations, like greater outreach for SAC openings, allowing outside parties to make recommendations for the seats in question, allowing

Interested parties to testify to the review committee, and requiring "conflict of interest" statement by SAC members, to the credit of the Program. However, Senior Sanctuary Management still has the power to nominate and appoint whomever it wants, despite what stakeholder organizations may want, so this remains a public issue and the 2001 advice remains valid.

FISHING

2001 Issue Statement: The Current Management Plan mostly reflects promises made to the fishing community and states that the Sanctuary will not regulate fisheries; however, other language which calls for "habitat protection" and "ecosystem management" could be interpreted to create "no fishing zones". This appears contradictory.

2001 Adopted Recommendation: Clarify that the Department of Fish and Game and the National Marine Fisheries Service (including the Pacific Fisheries Management Council) are the agencies responsible for fishing regulations as per the original intent when the Sanctuary was designated. Any zones or regulations proposed by the Sanctuary which affect fishing would occur only if they are the result of a cooperative effort with the fishing and or aquaculture communities and they have the support of those communities.

2005 Comment: This is a very high profile issue. The "promise" made to fishermen is reflected in the MBNMS Designation Document, and the existing Management Plan, which do not give the Sanctuary the authority to create fishery regulations. Many public agencies and organizations have asked that the Sanctuary keep its promise and look to the State Department of Fish & Game and the Federal Pacific Fisheries Management Council for fishing regulations. Most recently the Monterey County Board of Supervisors voted 5 – 0 to pass a resolution to this effect, and the AMBAG Board of Directors passed a similar motion by an overwhelming majority.

The MBNMS properly worked with the fishing community and the State and Federal Council to make a recommendation on krill fishing, and has looked to those agencies to create regulations. Similarly, the MBNMS sought advice from selected fishermen and went before the Pacific Fisheries Management Council (PFMC) on the proposed Davidson Seamount designation, where the MBNMS would like to see fishing prohibited on the seafloor of the seamount.

Although not specifically solicited by the MBNMS, a strong recommendation was provided by virtually all of the major recreational and commercial fishing organizations to not change the Designation Document or attempt to write a Sanctuary non-fishing regulation. The PFMC acted to unanimously endorse the objectives of the Sanctuary Program but asked NOAA to adopt the fishing regulation under federal fishery management laws rather than endorse the MBNMS wish to change the Designation Document and use the Sanctuaries Act. In the MBNMS efforts to consider the need for MPAs, which has involved four years of meetings with fishermen and other affected parties, the MBNMS has not made a decision on the need for, or siting of, marine protected areas, or which law any might be adopted under. This has caused considerable anxiety within the fishing community. As part of the Management Plan Review process, the MBNMS is not seeking broad regulatory authority over fishing activity in the Sanctuary, but seems to be still considering the adoption of specific regulations under the authority of the Sanctuaries Act.

Therefore, it remains valid advice to the Sanctuary, to keep the promise and to keep the fishing community supportive.

HUMAN IMPACTS

2001 Issue Statement: The Current Management Plan calls for Sanctuary resources to be conserved and protected, but also allows for "multiple uses" as long as they are consistent with the above. Under existing language, conflicts between use and protection are resolved in favor of protection. Since it is nearly impossible for human activity not to create some impact on Sanctuary resources, there is a concern that this situation will lead to more and more restrictions on human use of the Sanctuary, affecting fishermen, divers, surfers, kayakers, etc., and in turn dilute the broad public support which the program should enjoy.

2001 Adopted Recommendation: Clarifying language needs to be added to the Management Plan to allow for human uses as long as there is no significant and sustained impact that permanently damages the resource, (i.e., allow for minor impacts). Include a guidance statement to help Sanctuary staff define major/minor impacts. Create more of a policy balance between conservation and use, with a strong educational program being the key to achieving this balance. Add language to include the concept that "ecosystem" includes an understanding of the socio-economic impact on a business or community of any particular sanctuary permit or regulation.

In making this recommendation, it should be clearly noted that any serious, sustained and permanent environmental degradation that might arise from human use or activities would still be evaluated by the Sanctuary program with regard to future regulations and the Program's mandate to protect Sanctuary resources. To do otherwise would cause public concern. As previously recommended, the Sanctuary Program should work cooperatively with the appropriate communities of interest in developing any further regulations.

2005 Comment: The Sanctuary continues to need either deminimus-waiver authority or to create broad categorical exemptions for common human impacts which could technically violate a sanctuary rule.

HARBORS & DREDGING

2001 Issue Statement: The existing language characterizes all dredging as bad, and does not allow for minor impacts. When the Sanctuary was being negotiated, Harbors were told that the Sanctuary would not have permit authority over dredging, but it does. Many businesses and recreational users are dependent on open harbors. The existing language seems to constrain the Sanctuary staff from being as helpful to harbors as they could be.

2001 Adopted Recommendation: Suggest language changes to also acknowledge the positive benefits of open harbors and dredging operations. Clarify that the Sanctuary does not regulate or issue permits for dredging, as it is already highly-regulated by numerous other Federal, State and local agencies. Acknowledge that harbors are the access corridors to the Sanctuary for commerce, education, research and law enforcement. Harbors and the Sanctuary should be partners, allied in the goals of the Program. The Sanctuary Program should be empowered to be more accommodating to the needs of its harbors. Any Sanctuary policy regarding dredging should be no more restrictive than other directly responsible regulatory agencies.

2005 Comment: It should be noted that the Sanctuary Staff has worked to be as accommodating as possible for the Harbor's dredging needs, not just in Monterey but in other Sanctuary area harbors. It is believed however, that the language of the National Marine Sanctuary Act and the existing Management Plan ties the hands of the Sanctuary

staff in some situations. The Draft Management plan has addressed some, but not all, issues of importance to harbors. This remains valid advice.

REGULATORY AND PERMIT AUTHORITY

2001 Issue Statement: The vast majority of early public support for the idea of forming a Sanctuary came from seeking an oil and gas development ban. Education, research, the work that has been accomplished by the Water Quality Protection Program were added dividends. The program does involve itself in a regulatory and enforcement role already. It is likely that certain special interest groups will seek even greater Sanctuary regulatory and enforcement roles in the future.

2001 Adopted Recommendation: Stress in the Management Plan Review that the essential work of the Program is the oil/gas ban, education, research, and the work of the Water Quality Protection Program. Also stress its need to accomplish its goals by working with other agencies and NGO's rather than by becoming a larger and larger organization itself. Any permit process administered by the Sanctuary Program should be streamlined, coordinated with other agencies, and "user friendly". An appeal process should be instituted. Generally, the Sanctuary should not add another layer of permit regulation if other Federal/State/Local/permit authorities are already in place. It is important that the Sanctuary Program not be viewed by the public as an onerous Federal bureaucracy.

2005 Comment: This remains wise advice to the Sanctuary Program. The MBNMS has been open about the regulatory modifications being considered. The conceptual language for all have been shared in public and reviewed by the Sanctuary Advisory Council; most of the new or modified regulations came directly out of the stakeholder working group process. Regulations proposed by the Sanctuary should also be justified by the ability to scientifically document that a significant problem exists and that the regulatory solution is also supported by good science. Per the 2001 recommendation, if a proposed regulation is within the authority of a state or local jurisdiction, the Sanctuary would take its concern to that agency.

WATER QUALITY

2001 Issue Statement: Both point and non-point pollution continues to plague our Bay.

2001 Adopted Recommendation: The Sanctuary has made a good start on this issue, but more needs to be done in working cooperatively with other agencies to prevent accidental sewage spills and to identify the sources of polluted urban runoff. The City should actively continue with the support it has provided to the Sanctuary Program in this effort.

2005 Comment: The Sanctuary and the City have worked well together on this issue. The MBNMS Staff has worked with the City in refining our stormwater "Best Management Practices," provided test results and helpful recommendations, and worked well to coordinate an approach to respond to the Cease and Desist Order for the Area of Special Biological Significance.

FACILITATION OF HUMAN USE

2001 Issue Statement: The facilitation of human use of the Sanctuary is a stated program goal, yet very little has been done to promote this goal.

2001 Adopted Recommendation: Sanctuary use and economic opportunities need to be actively promoted. Add a staff position or redirect staff time or contract to develop a Sanctuary marketing plan and facilitate the use of the Sanctuary. Create specific, measurable goals. Conscientious (through education) use of the Sanctuary should be as much of a goal as research and conservation.

2005 Comment: This remains a valid issue and wise advice. The MBNMS is doing a number of things to facilitate human uses. The Sanctuary is working with restaurants in a new pilot project throughout the Sanctuary and have started a partnership with hotels on the Monterey Peninsula. In addition, the MBNMS has held various workshops as part of the Management Plan Review process involving whale watching businesses, has produced numerous outreach products related to human uses and using the Sanctuary wisely, and the Team OCEAN kayak program occurs right off Cannery Row where contact with thousand of kayakers actively using the Sanctuary is made.

OVERLAPPING JURISDICTIONS

2001 Issue Statement: Does it make sense for a highly protected area to immediately adjoin a highly urbanized area? Activities such as harbor management, fireworks shows, maintenance, desalinization facilities, etc. can be more complicated and difficult to accomplish. Each of these activities already have numerous levels of environmental review in place.

2001 Adopted Recommendation: Request that the Management Plan Review process include an analysis of jurisdictional issues. This analysis should consult with all coastal jurisdictions and property owners, and be available for public comment. The benefits of Sanctuary status for the very near shore urban areas should be weighed against any jurisdictional issues. If jurisdictional problems are evident, a possible solution would be to create an "urban buffer zone", which would still be within the Sanctuary boundary and which would continue to allow for Sanctuary education, conservation and research programs, but which would not be subject to Sanctuary Permit Authority. The Sanctuary does already have the authority to create special zones.

This recommendation should not be construed as an effort to avoid scrutiny for coastal projects. Rather, it reflects the Management Plan Review as an appropriate time to access intergovernmental relationships in an open and honest manner.

2005 Comment: Generally this remains wise advice. It should be noted that the City did request a 2,000-foot buffer zone around the harbor in 1992, before the Sanctuary boundary was set. This being said, City staff has not advocated a City position for such a buffer zone since this recommendation was adopted in 2001.

CITY OF MONTEREY

To: City Manager

From: Public Facilities Director
Director of Plans, Engineering, & Environmental Compliance

Date: December 13, 2006

Subject: City's Comments on Monterey Bay National Marine Sanctuary Draft Management Plan and Environmental Impact Statement

RECOMMENDATION

Authorize the Mayor to sign the attached letter with comments.

POLICY IMPLICATIONS

These comments are consistent with the City of Monterey's past support for the conservation, education, and research and facilitation of use goals of the Monterey Bay National Marine Sanctuary Program. They are also consistent with recommendations which have been adopted by the City Council in November of 2001, and reviewed again by the City Council in September of 2005.

FISCAL IMPLICATIONS

Unknown.

ALTERNATIVES CONSIDERED

The Council can choose to eliminate, or modify some or all of the attached recommendations; however, this is not recommended.

DISCUSSION

The City Council will hear a brief staff presentation on the Monterey Bay National Marine Sanctuary Draft Management Plan. This will be followed by a very brief staff review of the MBNMS recommendations adopted in November 2001 as the Management Plan Review Process began. Staff will conclude with a more in-depth presentation on the recommended comments on the MBNMS Draft Management Plan.

The MBNMS is one of thirteen sanctuaries located within the waters of the United States. The Sanctuary Program is Federal, located within the Department of Commerce, and under the National Oceanic and Atmospheric Administration (NOAA), and the National Ocean Service (NOS), a branch of NOAA. The Sanctuary Program is authorized nationally by the National Marine Sanctuaries Act, a federal law adopted by Congress and reauthorized approximately every five years and amended as needed by Congress. Additionally, each sanctuary is governed by a

Designation Document, which contains within it essentially the agreement that is made between the State, local communities, and the Federal Sanctuary Program as to how the Sanctuary would operate within the region. Additionally, each Sanctuary is governed by a Management Plan, which is written by Sanctuary Program Staff with input from the public through formal comment periods and public workshops. This Plan is ultimately approved by the Secretary of Commerce.

Federal law requires the periodic review of each Sanctuary's Management Plan. These individual Plans contain the basic rules for each Sanctuary, and provide guidance to the Sanctuary Staff in administering the Program. Congress does not approve the Management Plans, but is provided an opportunity to comment through a notice in the Federal Register near the end of the Plan Review process.

For our MBNMS, the original Management Plan adopted in September 1992 was the result of a significant consensus building effort, spearheaded by then Congressman Leon Panetta. This consensus effort sought to identify the type of Federal protection sought for the Bay while reassuring that the Federal Program would respect the needs and regulatory authority of local agencies and work cooperatively with local communities of interest, such as the agriculture and fishing industries.

The City of Monterey has long sought to be a good steward to our coast and ocean and strongly supported the creation of the Sanctuary in 1992. It is fair to say that if compelling arguments are brought forward to the City that certain actions are needed to preserve the health of the ocean, that the City would support those actions. To this degree, the City has been supportive over the past fourteen years of the broad goals of the Sanctuary Program. There does exist, however, considerable latitude in how the Sanctuary accomplishes its broad ecosystem protection goals. Generally, the City has strongly supported the Sanctuary's work in education, research, and in working cooperatively with other agencies and organizations to accomplish these goals. The attached cover letter to the City's comments contains a lengthy paragraph praising the Sanctuary for the elements of the Draft Management Plan that emphasize these three roles.

The Sanctuary Staff made a tremendous effort to hear public comment on the Plan as it developed, and the Plan as now presented represents many thousands of hours of time from the MBNMS Staff, the Sanctuary Advisory Council, and the public. The Plan contains many thoughtful sections that will advance the care of our Bay. The Sanctuary Staff is to be congratulated for their efforts.

The question of the Sanctuary taking on a greater regulatory role and applying increasing restrictions through enforcement actions or permit conditions is one which has generated considerable discussion throughout the Monterey Bay Region. The City of Monterey adopted a set of recommendations in November of 2001(attached). These recommendations were publicly reviewed again in September 2005, and remain unchanged. One of the key recommendations is that the Sanctuary should view itself not primarily as a regulatory agency, but one that works to solve problems through cooperative efforts among different agencies and constituencies. Additionally, the Sanctuary should look to state and local agencies who have jurisdiction and authority to solve problems, even regulatory problems, rather than creating new authorities for itself.

These recommendations clearly parallel the concerns of other agencies and organizations within

the region. In 2001 and 2002, the City of Morro Bay, the Moss Landing Harbor District, the Santa Cruz Port District, the San Mateo County Harbor District, the Monterey Peninsula Chamber of Commerce, the California Marine Affairs and Navigation Conference, the Alliance of Communities for Sustainable Fisheries, and others, adopted similar recommendations to the Sanctuary Program. In August 2005, the Monterey County Board of Supervisors unanimously adopted a resolution which requests the Sanctuary to not duplicate the authority to regulate fishing, but to look to the Pacific Fishery Management Council and the State of California for any needed change to fishing regulations. A year ago, the Association of Monterey Bay Area Governments (AMBAG) adopted a recommendation similar to the Board of Supervisors. Recently, AMBAG adopted a set of recommendations for the Draft Management Plan that embrace the recommendations provided by the City of Monterey as adopted in 2001.

At the AMBAG meeting, it was clear that the question of how the use of federal authority relates to the role of local governments was one in which the AMBAG Directors had strong opinions. The letter sent by AMBAG to the Sanctuary Program commenting on the Draft Management Plan is attached. It also contains comments of individual AMBAG Board Members.

The attached comments, therefore, are consistent with prior City Council reviewed recommendations made to the National Marine Sanctuary Program.

The City Council will note that the 2001 City Council recommendations are purposely very general to enable them to be applied to proposed Sanctuary regulations or action plans as they were developed. This is why the Council will not see items like "Coastal Armoring," "Personal Watercraft," "Marine Protected Areas," or "Introduced Species" in the 2001 Council guidance.

We believe that these comments on the Draft Management Plan are consistent with the City's past support of sound conservation and protection measures for our Bay, yet at the same time, provide advice and guidance to the Sanctuary Program about the best way of accomplishing those goals. Comments are provided only for those Action Plans which we believe need further work. It should be noted that the debate over federal authority and responsibility versus states' rights (local authority and responsibility) is as old as the development of the U. S. Constitution. Inherent in the City's recommendations and recommendations of other agencies, such as AMBAG, is the message that the federal role in managing our Bay must be balanced with respect for the authorities and concerns of local communities.

It is our recommendation that the City Council adopt the attached list of comments and authorize Mayor Della Sala to sign the accompanying letter.

Carl E. Anderson

Bill Reichmuth

CEA:pt

attachments

c: MBNMS

November 10, 2006

Brady Phillips
JMPR Management Plan Coordinator
1305 East-West Highway, N/ORM-6
Silver Spring, MD 20910

Dear Mr. Phillips:

Please accept the attached comments to the Draft Monterey Bay National Marine Sanctuary Management Plan and accompanying Environmental Impact Statement. The development of this plan represents many thousands of hours of time on the part of Sanctuary Staff, the Sanctuary Advisory Council, agencies, and the public. The Sanctuary has done a very good job of soliciting public comment as the plan has gone through its various stages, including this Draft Management Plan process.

The Plan contains many thoughtful and effective proposed actions that will further the health of our bay, and its sustainable use. Particularly regarding the Water Quality Action Plan, the City continues to value the practical and constructive working relationship we have had with the staff of the Monterey Bay National Marine Sanctuary. The Action Plans for desalination, coastal erosion, education (including a Spanish language outreach), "wildlife disturbance" outreach to the whale watching and kayaking communities, and others, all highlight the Sanctuary's critical and constructive role in coordinating between local, state, and other federal agencies to resolve resource management issues. The City of Monterey congratulates the Monterey Bay National Marine Sanctuary for its efforts, and these Action Plans, which are based on the Sanctuary taking a leadership role in working cooperatively with the public and other agencies. These plans stress research and education as primary tools for sound decision making and to help the public be good stewards of our ocean.

There is one significant shortcoming, however, in the Sanctuary's Plan Review process that must be acknowledged. Congressman Sam Farr, the City of Monterey, and a number of other local agencies and organizations, all commented at the beginning of the Management Plan Review that there were problems in the structure and representiveness of the Sanctuary Advisory

Council, and that those problems should be addressed early in this process. This is a crucial issue because the Sanctuary, by its own statements, has relied extensively on the advice of the SAC to prioritize issues. Because the Sanctuary Advisory Council is appointed largely by Sanctuary Management, "it has a tendency to diminish public confidence that there is truly a Sanctuary – independent mechanism for community input" (quote from Congressman Farr's January 31, 2002 letter to NOAA). It should also be further noted that late in this Plan Review process this issue went to the Association of Monterey Bay Area Governments for resolution. However, the outcome of the AMBAG process did not substantially resolve the fundamental questions of who the SAC represents and how its members are accurately selected. Therefore, this issue continues to remain unresolved, and the public is left to wonder if the Management Plan truly represents the public's priorities.

The attached comments regarding the Management Plan are aimed at those Action Plans that the City feels need to be modified. They are meant to be taken in the spirit of assuring long-term public support for this important program. Many of the City's comments reflect what appears to be a fundamental difference of opinion as to the way in which the Sanctuary will be most effective in managing these resources. The City's comments are largely aimed at the Sanctuary playing a cooperative and collaborative role with other agencies, utilizing the authority of other agencies, unless a significant problem is shown with no other agency being willing or able to address that problem. It should be noted that the Sanctuary is proposing only a modest number of regulations. We applaud that, and believe that in part the City of Monterey 's early comments to that effect may have influenced this decision. However, as you will see in the specific Plan Review Comments, even some of these proposed regulations appear not to be based on facts or the best available science, or could well be addressed by other state or local agencies with authority.

Again we hope that the City of Monterey's comments will be taken in the spirit of advancing stewardship of our ocean, and we look forward to a positive and continuing relationship with the Monterey Bay National Marine Sanctuary and its staff.

Sincerely,

Chuck Della Sala
Mayor

City of Monterey
Comments to the MBNMS Sanctuary Management Plan

Davidson Seamount Action Plan

The City of Monterey had previously commented on this Action Plan indicating that it could not support the Plan if it involves changing the Sanctuary Designation Document to let the Sanctuary use its authority to create fishing regulations. However, since that comment letter was sent, the Pacific Fishery Management Council acted to utilize the authority found in the Magnuson-Stevens Act to protect the habitat below 3,000 feet from all extraction. The City of Monterey therefore supports the inclusion of the Davidson Seamount within the boundaries of the Monterey Bay National Marine Sanctuary with fishing restrictions as adopted by the PFMC.

Bottom Trawling Effects on Benthic Habitats Action Plan

The information-gathering sections of this Action Plan are consistent with City of Monterey recommendations against the Sanctuary creating its own fishery regulations. The first part of this Action Plan describes a process of fact finding about the effects of bottom trawling on the Sanctuary. It is hard not to note that the language used to describe bottom trawling is entirely negative. It would be good if this language could be put into more neutral terms to identify the effects of bottom trawling. It is possible that a scientific assessment of certain trawling methods over soft bottom habitat could show that no long-term harm is occurring. There may also be a set of benefits, particularly economic, depending on one's perspective. Without a neutral tone, the public might conclude that the Sanctuary has already made up its mind on this issue.

There are also proposed actions including the potential for the Sanctuary to propose regulatory changes. On one hand the Sanctuary's strategy (BH-6) states that "the MBNMS will present potential management measures to the relevant fishery management agency". However, the same strategy continues (BH6.4) "If and when the MBNMS determines it may need to restrict trawling activities or consider other measures ..." This certainly appears that the Sanctuary sees itself as potentially creating its own regulations. The City recommendation would be that any good data that the Sanctuary develops be presented to the appropriate fishery management agencies for their consideration and action. The Sanctuary should also give full respect to the fact that other federal laws apply to this area, specifically the Magnuson-Stevens Act. The City would not support the Sanctuary changing its Designation Document to regulate this fishery even in the event that the appropriate fishery management agencies, after their scientific review, decline to act on the Sanctuary's behalf.

Harbors and Dredge Disposal Action Plan

For harbors to remain useable and economically viable, great flexibility must exist in maintaining the harbor to keep pace with natural forces. The Sanctuary's

Action Plan contains some encouraging concepts to address the real-life needs of harbors, but it still falls far short of creating the assurances that harbor needs are going to be met. Specifically, the City recommendation is to clarify that the Sanctuary does not regulate or issue permits for dredging and dredge material disposal. This recommendation is completely absent from the Sanctuary's draft Action Plan. Also absent from the Sanctuary Action Plan is any statement per the City recommendation that dredging and dredge material disposal permit conditions be no more restrictive from the Sanctuary than as proposed by other directly responsible regulatory agencies. It should be noted that the other responsible agencies, i.e. the Regional Water Board and US Army Corp of Engineers/USEPA, have published science standards to evaluate dredging activities.

Motorized Personal Watercraft Action Plan

The Sanctuary's proposed Action Plan for modern jet-powered vessels has been extremely controversial. The main City recommendation that applies to this Action Plan is the recommendation that the Sanctuary should work with State and Local jurisdictions that have authority to regulate any uses or activities which cause concern, rather than creating new authorities for the Sanctuary. These modern jet-powered craft operate entirely within the waters of the State of California. They are, therefore, subject to the State boating law as well as laws and permits imposed by counties and municipalities and even special districts in some cases. The Sanctuary did not look to these agencies to resolve any problems that they perceived; rather, the MBNMS went straight to the use of their own authority.

If a real problem exists with these modern jet-pump craft the City of Monterey could well support local regulations or educational efforts regarding their use to mitigate these problems. However, the City cannot endorse this Action Plan as written because it did not utilize obvious local agencies of authority and jurisdiction. For the City, which has two launch ramps utilized by modern jet-pump powered craft, there has been no real problem with their use regarding the disturbance of wildlife or any other issue during the past 14 years. In fact, the City has received far more complaints about kayakers getting too close to wildlife than any similar problem with jet powered craft. If the City had been having problems with modern jet-pump powered craft, the City has the legal authority to create a very slow speed zone within our City waters.

A reasonable alternative would be for the MBNMS to approach the State to request a 5-knot speed zone for all motorized vessels operating within 300 yards of the shore.

It should be noted that there are additional problems with this Action Plan that others more directly affected may comment on.

Cruise Ship Discharges Action Plan

For this Action Plan, the stated goal is "to prevent impacts to the Monterey Bay

National Marine Sanctuary Resources from cruise ship discharges" does not appear to be consistent with the proposed regulations.

The proposed regulation states that the Sanctuary will prohibit the discharge or depositing from within or into the Sanctuary any material or any other matter from a cruise ship except vessel engine cooling water, vessel generator cooling water, or anchor wash. It must be pointed out that during the discussions by the Sanctuary Advisory Council on these proposed regulations, there was substantial discussion about using the word "harmful" in the regulation, i.e. harmful materials would be illegal. This was specifically done because there has been an evolution in cruise ship management that has included the expenditure of substantial funds on individual ships to outfit them with processor units that convert all black and gray water into potable water, which can then be discharged. This was done for the expressed purpose of not creating any real or perceived issue with the discharge of gray water or treated sewage, or sewage treated to a lesser degree. The several ships that visited Monterey with this system spent approximately 5 million dollars per ship to install such a system. We can think of no reason why this material could not be discharged into the Sanctuary or elsewhere. It is the City's recommendation therefore, that the word "harmful" be reinserted back into the proposed new regulation to make it clear the Sanctuary is regulating and prohibiting the discharge of harmful materials, and not preventing the discharge of benign materials.

The language suggested in the EIS as an "alternative", to meet Alaska standards, would also be acceptable.

Marine Protected Areas Action Plan

This work plan is designed to assess the need, if any, for additional closed areas to fishing (Marine Protected Areas). The City's recommendation for Sanctuary actions which affect fishing include the statement "any zones or regulations proposed by the Sanctuary which affect fishing would occur only if they are the result of a cooperative effort with the fishing and/or aquaculture communities and they have the support of those communities."

If the Sanctuary's MPA Work Group process is designed to fully asses the support of the fishing community for potential MPAs and fishermen give their support, then the City will support recommendations from the Sanctuary to create MPAs in those areas. However, also per the City's recommendation, the City does not support changing the Sanctuary's Designation Document to give itself the authority to create such rules. Rather, the Sanctuary should work through the Pacific Fishery Management Council and the State of California for actual regulations. Those agencies would in turn be free to agree, disagree, or modify Sanctuary proposals based on their scientific analysis.

It also should be noted that the Monterey County Board of Supervisors voted unanimously to ask the Sanctuary not to change its Designation Document and create fishery rules under its own authority. Likewise, the Association of Monterey Bay Area Governments, made up of elected officials from Monterey/Santa Cruz/San Benito Counties, also voted overwhelmingly to ask the

Sanctuary not to create their own fishing regulations. Many other local jurisdictions and organizations have also passed similar motions. While there may be some community support for establishing additional Marine Protected Areas within the Sanctuary, there is little political support for the Sanctuary to get into the business of making rules that affect fisheries.

Since the City's recommendations to the Sanctuary requires the fishermen's support for MPA recommendations, attention should be given that the MPA workgroup structure and process will be open, fair, and representative, and based on the best science.

The Introduced Species Action Plan

The goal of this Plan is to detect, prevent, control and possibly eradicate harmful species that are introduced into MBNMS waters.

There is little doubt that introduced species could pose a significant threat to Monterey Harbor and other Sanctuary resources. The City strongly supports education efforts to prevent and manage the spread of introduced species. It does appear however, that the Sanctuary wishes to grant itself great authority with no obvious limits inherent to this authority to accomplish this task. This would be through regulation, enforcement, and/or perhaps the permit process. The City of Monterey's comment here is to largely support this Action Plan, with the caveat that regulations, permit requirements, or other enforcement oriented actions that will affect public agencies be coordinated with, and agreed to by those agencies before they become federal law.

Coastal Armoring

The goal of this Action Plan is to reduce the expansion of hard coastal armoring in the coastal areas of the Sanctuary region by developing collaborative approaches to address the issues of erosion and the demand for coastal armoring, including improved guidance to better enable decision making. The MBNMS sees itself in a crucial role in the developing of these guidance and enforcement strategies.

The MBNMS describes numerous negative environmental consequences to coastal armoring projects, and strategies are proposed such as incorporation of a "no-hard-armoring" policy for new developments, the realignment of coastal roads and highways, and new setback requirements to be established for demolition or rebuilding projects in urbanized areas. Some of these alternatives propose enormous economic consequences to both private and public owners, i.e., the realignment of a highway. This Action Plan should include a guidance statement which acknowledges that many of the goals of this Action Plan may involve costs which are not feasible for the landowner.

Likewise, there is no mention of economic impacts of not allowing armoring, such as condemnation, loss of infrastructure, etc. Also not addressed are the economic impacts of the creation of, for example, new setbacks for coastal

property, or agreements which will bind the owner to never proposing coastal armoring. This could have tremendous impact on land value, especially when we cannot foresee over the course of 100 years or more what might happen.

Also missing from the Sanctuary discussion is any mention of positive benefits of armoring projects. It should be noted that both the San Carlos Beach Project and the Monterey Bay Aquarium have hardened structures. The public benefits of education and the recreational/educational opportunities of scuba diving are enormous. This Action Plan should be more neutral in tone and discuss the circumstances in which the benefits of projects might outweigh potential environmental impacts.

While the need for a coordinated approach to the multitude of armoring projects is obvious, it should be recognized that the Sanctuary is utilizing its authority found in the existing Sanctuary regulation that prohibits the "alteration of the sea bed," and establishes Sanctuary authority over any project that occurs below the mean high water line. What is not clear is whether the Sanctuary will assert authority for projects above the mean high tide line if they are subject to California Coastal Commission permits. It is recommended, therefore, that the Sanctuary be very mindful of the needs of coastal jurisdictions and property owners as they coordinate these coastal armoring efforts.

Beach Closure & Microbial Contamination Action Plan

The City is generally highly supportive of Sanctuary efforts to improve water quality within the City and throughout the region. City and Sanctuary Staff have worked cooperatively together on numerous projects. The following comments are provided in the spirit of clarifying this Action Plan for the benefit of Sanctuary Staff and the affected communities.

The stated goal of this Action Plan is to "eliminate beach closures by reducing microbial contamination in the MBNMS waters." It is recommended that this goal be modified to state that it is to "eliminate beach closures caused by human activities..." The reason for this is because there are numerous and significant sources of natural microbial pollution, such as marine birds and mammals. The language which describes the sources of contaminated water in this Action Plan need to be expanded to include the forms of natural pollution caused by marine birds and mammals. Indeed, in many nearshore areas, where there is an abundance of these animals, this could be a greater factor than human caused activity. The Plan should reflect this.

It would be good if the Action Plan could reflect the strides that have been made by Monterey. Monterey has the best stormwater management system in the region. In part, this can be attributed to the increased public awareness of problems with stormwater, and the Sanctuary has done a good job of making this stewardship issue well known to the public. In fact, at least for the City of Monterey, there are now very few beach closures related to sewage releases.

It is recommended that the Sanctuary develop a science-based system to differentiate between human caused and other warm-blooded animal caused

bacterial contamination. The only way that this Action Plan can be effective is to properly attribute the source.

The City of Monterey currently reports all spills to the State Regional Water Quality Control Board. The Sanctuary should work through the State to get notifications via the State's notification system. The majority of sewage spills never make it to the water body, let alone the ocean. Therefore, notifying the Sanctuary of all spills appears overly burdensome, especially if the Sanctuary's going to expect its own individual notification.

As an overarching recommendation, the Sanctuary should utilize the authority of the Regional Water Quality Control Board, and work closely and cooperatively with that agency to make any of Sanctuary concerns known.

City of Monterey Public Works Department Specific Comments

Attached are additional, very specific comments provided by the City's Public Works Department on several of these same Action Plans. These additional comments are consistent with existing City recommendations to the MBNMS, and should also be provided to NOAA.

Response: While marine mammals, migratory seabirds and endangered species are protected under these acts, NOAA believes that the higher penalties afforded under the MPRSA will provide a stronger deterrent.

The MBTA sets maximum criminal fines at either $500 or $2,000 per violation, depending on the violation. The MMPA sets maximum civil penalties at $10,000 and maximum criminal fines at $20,000. The ESA sets maximum civil penalties at $500, $12,000 - $25,000 per violation, depending on ie violation; maximum criminal fines are set at $50,000. (All three statutes also provide for imprisonment for criminal violations.)

The MPRSA (under section 307) allows NOAA to assess civil penalties as high as $50,000 for each violation. In addition, monies collected under the MPRSA are available to enhance the National Marine Sanctuary Program.

(16) *Comment:* Many commenters stated fishing should not be prohibited within the Sanctuary. Instead, fisheries resource regulation should remain under the jurisdiction of the State of California, the National Marine Fisheries Service (NMFS) and the Pacific Fisheries Management Council (PFMC). Other commenters requested NOAA to regulate harmful fishing activities such as gill-netting and shark finning. NOAA's position should be clarified in the FEIS/MP.

Response: Fishing is not being regulated as part of the Sanctuary regime and is not included in the Designation Document as an activity subject to future regulation. Fisheries management will remain under the existing jurisdiction of the State of California, NMFS and PFMC. Sanctuary prohibitions that may indirectly affect fishing activities have been written to explicitly exempt aquaculture, kelp harvesting and traditional fishing activities.

Existing fishery management agencies are primarily concerned with the regulation and management of fish stocks for a healthy fishery. In contrast, the sanctuary program has a different and broader mandate under the MPRSA to protect all sanctuary resources on an ecosystem wide basis. Thus, while fishery agencies may be concerned about certain fishing efforts and techniques in relation to fish stock abundance and distribution the Sanctuary program is also concerned about the potential incidental impacts of specific fishery technique on all sanctuary resources including benthic habitats or marine mammals as well as the role the target species plays in the health of the ecosystem. In the case of the Monterey Bay area fish resources are already extensively managed by existing authorities.

Should problems arise in the future NOAA would consult with the State, PFMC and NMFS as well as the industry to determine an appropriate course of action.

(17) *Comment:* Many commenters requested NOAA to prohibit motorized aircraft from flying over the Sanctuary. Other commenters stated Federal Aviation Regulations (FARs) already adequately protect Sanctuary resources from aircraft impacts, making additional regulations unnecessary. In addition, new regulations may hinder cooperative emergency response plans, routine helicopter operations, and rescue attempts.

Response: The regulations prohibit flying motorized aircraft at less than 1,000 feet above the Sanctuary within four zones. Generally, these zones are from Point Santa Cruz north, Carmel Bay south (overlapping the California Sea Otter Game Refuge), and around Moss Landing and Elkhorn Slough (see appendix II for specific zones).

NOAA recognizes that overflights are regulated under the FARs. Unlike the FARs, however, Sanctuary overflight regulations are intended to protect the living marine resources of the Sanctuary from disturbance by low-flying aircraft and in this case require flying at higher altitudes than normally required by the FARs. The prohibition does not apply to overflights that:

(1) Are necessary to respond to an emergency threatening life, property or the environment;

(2) Are necessary for valid law enforcement purposes; or

(3) Conducted by the Department of Defense and specifically exempted by NOAA after consultation with that Department.

(18) *Comment:* A more precise definition of "thrill craft" is needed.

Response: NOAA has changed the term "thrill craft" in the proposed regulations to "motorized personal water craft" (MPWC) in the final regulations and revised the definition to include vessels up to fifteen feet. This category of vessel was selected because of the threat posed to Sanctuary resources by their operation.

(19) *Comment:* Thrill craft should be prohibited throughout the Sanctuary. The danger these craft pose to the biological resources of the area, such as marine mammals and kelp beds, as well as other users of the area such as divers and surfers necessitates a prohibition or regulation of personal water craft. In addition, MPWC should be prohibited in "areas of biological significance," including those with high human-use levels such as beaches; diving, swimming and surfing areas; state parks; and reserves. Besides the potential danger to recreationists, MPWC disrupt low-intensity area uses. In addition, many commenters found the operation of MPWC to be incompatible with the existence of the Sanctuary for reasons unquantifiable.

Response: NOAA recognizes the threat posed by MPWC operation to the conservational, recreational, ecological and esthetic resources and qualities of the Sanctuary. As a result, the regulations have been revised to prohibit the operation of MPWC within the Sanctuary, except within four zones and access routes (15 CFR 944.5(a)(8)). Generally, these areas are located off the harbors of Pillar Point, Santa Cruz, Moss Landing, and Monterey. They were chosen to avoid injury to kelp beds, sea otters and other marine mammals, seabirds and other marine life and to minimize conflicts with other recreational users and because these areas are accessible from launch areas and encompass areas traditionally used by MPWC. Restriction of MPWC operation to these areas of the Sanctuary will also reduce esthetic disturbance.

A prohibition of MPWC operation in the Sanctuary except in the four areas is designed to increase resource protection while still allowing opportunities for this form of recreation in the Sanctuary. There has been at least one reported collision in the Monterey Bay area between a jet ski and sea otters. Collisions with and other disturbance of marine mammals elsewhere from MPWC have also occurred. The small size, maneuverability and high speed of these craft is what causes these craft to pose a threat to resources. Resources such as sea otters and seabirds are either unable to avoid these craft or are frequently alarmed enough to significantly modify their behavior such as cessation of feeding or abandonment of young. Also other, more benign, uses of the Sanctuary such as sailing, kayaking, surfing and diving are interfered with during the operation of MPWC. Further, as indicated above, restriction of operation of MPWC to the specified zones and access routes will reduce esthetic disturbance. The zones and access routes where the MPWC can still operate allow the MPWC operators to continue this form of recreation albeit in areas away from those other forms of recreation and beyond those areas inhabited by marine mammals and seabirds and other sensitive marine life. By establishing defined MPWC

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Silver Spring, Maryland 20910

APR - 5 2001

Mr. Stephen B. Scheiblauer
Harbormaster
Monterey City Hall
City of Monterey Harbor
Pacific and Madison Street
Monterey, CA 93940

Dear Steve:

I was pleased to have the opportunity to meet with you and the other members of the California Marine Affairs and Navigation Conference (CMANC). I want to thank you for your quick response and suggested language on a statement regarding the relationship between the Monterey Bay National Marine Sanctuary (MBNMS) and the commercial and recreational fishers. Our frank discussion and exchange of views has led me to a better understanding of your concerns and fears about the upcoming management plan review and any potential ecological reserves in the Monterey Bay area. Let me reiterate that the ports and harbors and fishing industries are important constituents of the MBNMS, and that we take very seriously our obligation to treat these groups fairly and equitably. Similarly, I trust you also came away with a more complete understanding of both how the National Marine Sanctuary System (NMSS) conducts the reviews, and the process we use when reviewing the efficacy of establishing ecological reserves. As I agreed at our meeting, I want to provide to you in writing an explanation of how the Alliance of Communities for Sustainable Fisheries (the Alliance) and CMANC will be included in the decisions regarding the establishment of ecological reserves in the Monterey Bay area.

It is important to note that the NMSS has made no decision to establish ecological reserves within the MBNMS. While it is my position that each management plan review will assess whether ecological reserves are appropriate, there is no policy that they must be established or that they be a certain size. As you know, our purpose for assessing the potential need for

ecological reserves is to protect bio-diversity and sensitive ecological features. This decision will be a product of the management plan review and reached through a community-based and science-driven process.

Community-based process means that there will be numerous opportunities for the Alliance and CMANC members to participate and make their views known. In addition to public meetings and hearings, there will be workshops on key issues and I hope that members will be willing to participate in key working groups. In correspondence to Bill Douros, ACSF has outlined a proposal to set up a study group to review no take zones. The proposal involves industry representatives and MBNMS Advisory Council members. I have spoken with Bill Douros, and he will be working directly with ACSF and consulting with the Sanctuary Advisory Council, to explore this proposal.

Science-driven process means that we will be using the best available information to make resource management decisions. This includes not only natural resource data, but socioeconomic information as well. We will be collecting important data on the nature and location of both commercial and recreational fishing and the value of the landings. It is our normal practice to work with the local fishing community and economists to gather information and we will be doing this in the MBNMS as well. It is important to note that one of our objectives in considering any ecological reserve is to minimize the adverse economic impact of restrictions on fishers. As we have done with the Florida Keys National Marine Sanctuary (FKNMS) in the late 1990s, and the more recently designated Tortugas Ecological Reserve in the FKNMS, we seek to minimize adverse impacts to the fishers while providing maximum protection for the resource. The Florida Keys fishers who participated in the working group acknowledged the fairness of the process and supported the establishment of the ecological reserve.

In addition, I think that it is important to point out that this type of process already has been successfully applied at the MBNMS in addressing complex water quality issues and has led to outcomes acceptable to most, if not all, stakeholders. The Sanctuary's water quality protection program, including a component on harbors and marinas, is based on this type of stakeholder process. The Agricultural and Rural Lands plan, which took several years to develop jointly with the agricultural community, is another example. I think that the NMSS and the MBNMS already has a proven track record of working with all stakeholders in good faith to develop the best and fairest possible solutions to difficult marine resource management issues. I expect this to be the case with the management plan review as well.

I hope that this letter clarifies the way in which the NMSS intends to work with the harbor and fishing industries through the course of the upcoming Monterey management plan review. Please feel free to call Bill Douros or me with any further questions or concerns.

Sincerely,

Daniel J. Basta
Director
Office of National Marine Sanctuaries

December 1, 2004

Dan Basta, Director
Office of National Marine Sanctuaries
1305 East-West Highway, Room 11523
Silver Spring, Maryland 20910

Dear Director Basta:

Thank you for your letter received October 27, 2004, asking for comments regarding MBNMS Management Plan Review Program changes. I'm writing to comment specifically about the Monterey Bay National Marine Sanctuary and the addition of the Davidson-Seamount to the Sanctuary, which would require that the Sanctuary Designation Document be changed to give the Sanctuary the authority to regulate fishing.

The City of Monterey has twice gone on record supporting that the promise made to fishermen, that the Sanctuary would not create fishing regulations, should be upheld. Therefore, as City policy, the City cannot support any such change in the Designation Document.

Thank you for requesting our view on this matter.

Sincerely,

Dan Albert
Mayor

Attachments: 1. City of Monterey Recommendations for the Sanctuary Management Plan Review
2. Resolution 01-58 re Alliance of Communities for Sustainable Fisheries

CALIFORNIA ASSOCIATION OF
HARBOR MASTERS AND PORT CAPTAINS
INCORPORATED

March 31, 2008

Agenda Item I.1.e
Supplemental Public Comment 3
April 2008

Don Hansen, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Dear Chairman Hansen:

I'm writing on behalf of the California Association of Harbormasters and Port Captains, a 60-year-old professional organization of mostly coastal ports and harbors. I'm writing to comment on the National Marine Sanctuary Program's effort to create additional marine protected areas within the Monterey Sanctuary.

Our Association members have long valued the National Marine Sanctuary Program for its educational and cooperative programs, such as its Water Quality Protection Program. Certainly our members and our boater-customers want a healthy ocean. We have, however, concerns about how the Sanctuary Program, not limited to the Monterey Sanctuary, makes its decisions for resource management issues.

In the Sanctuary's Decision Letter dated February 15, 2008, from Monterey Superintendent Paul Michel, three rationales are put forward to create additional marine protected areas in the federal waters of the Monterey Sanctuary.

Our Association hopes that the Pacific Fishery Management Council will require a very strong science-based rationale for any action undertaken by the Sanctuary Program that affects human usage of Sanctuary waters. We can't help but note that both the research and the wilderness area rationales don't require any science to justify the creation of new MPAs for those purposes. Rather, it could be the opinions of Senior Sanctuary Program Management as to what areas they feel have intrinsic or research value. This would not be a very satisfying outcome of a public process, and I'm sure I don't need to remind the PFMC that the economic and food production contributions of fishing to this nation are within your care and responsibility.

We believe that the Sanctuary Program must have very strong science-based reasons to remove any waters from sustainable fishing activities. We hope that you will hold the MBNMS to that standard.

Thank you for considering this matter.

Sincerely,

Jack Peveler, President
California Association of Harbormasters and Port Captains

P.O. Box 510, Sonoma, CA 95476
Phone: (707) 364-6737 Fax (707) 780-4607 E-mail: cahmpc@comcast.net www.harbormaster.org

AMBAG
ASSOCIATION OF MONTEREY BAY AREA GOVERNMENTS

April 7, 2008

Pacific Fishery Management Council
7700 NE Embassador Place, Ste. 101
Portland, OR 97220

Dear Members of the Council,

On behalf of the Board of Directors of the Association of Monterey Bay Area Government, I would like to reiterate our long held position on the issue of fishing regulations within the Monterey Bay National Marine Sanctuary (MBNMS), which follows:

> MBNMS should strive to utilize existing permit processes, regulations and organizations (e.g. California Depart of Fish & Game, National Marine Fisheries Service, etc.) to the extent feasible, prior to considering initiating their own.

Our Board of Directors has also reinstated this policy again in September of 2005 by stating:

> "Support the original promise made to the fishing community, as found in the (Monterey Bay National Marine Sanctuary) 1992 Designation Document, that fishing regulations were made by the appropriate State and Federal fishery management agencies."

Thank you for your consideration of our position.

Sincerely,

for Anthony Botelho,
AMBAG President

cc. AMBAG Board of Directors
Paul Michel, MBNMS Superintendent

Does the MBNMS need more MPAs to protect the ecosystem?

Socio-economic study - Barbara Walker (UCSB)

Research Needs - Doyle Hanan (MLPA member)

Modeling - Ray Hilborn and Carl Walters

Review of existing regulations and effects - R. Parrish

Do we need additional protection in the Monterey Bay National Marine Sanctuary

Monterey Landings

2006	179 tons	1.4%
1996	12,383 tons	

National Marine Sanctuaries

EAST COAST 3 NMS 896 sq. mi.

WEST COAST 6 NMS 12,852 sq mi

. HR 1187 new area 15,118 sq mi

Olympic Coast	3,310		
. Cordell Bank	526	+ new	736
. Gulf of Farallons	1,255	+ new	1,530
. Monterey Bay	5,328		
. Davidson Seamount	775		
. Channel Islands	1,658		

GULF COAST 2 NMS 3,857 sq mi

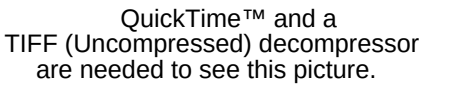
New NMS HR 1187

3 Central California NMS extend 250 nm

Same as entire coast of Oregon

Half of the outer coast of Washington is in

Olympic NMS



HR 1187

SEC. 3. POLICY AND PURPOSE

c) Effect on Fishing Activities- Nothing in this Act is intended to alter any existing authorities regarding the conduct and location of fishing activities in the Sanctuaries.

Ecosystem-based fishery Mgt.

1. Was ecosystem function in federal waters threatened by past federal management?
2. What are the existing protections?
3. How successful are existing protections?
4. Is ecosystem function in federal waters threatened by current federal management?
5. If threatened: what type of regulations will be the most beneficial?

1. Was ecosystem function in federal waters threatened by past federal management?

Before federal management

Whales, pinnipeds, otters, sardine, mackerel and some salmonid stocks were exploited to near extinction

On my watch

A number of groundfish species were overfished.

WHY?

Biologists used same concept as MPA advocates

Assumed high density-dependence with quick population doubling time at low biomass

Tropical reef fishes	- double 2-3 yrs	40%
Productive CC groundfish	- double 7-10 yrs	10%
Many CC groundfish	- double 15-25 yrs	3%

2. What are the existing protections?

Traditional State of California Resource Management (2006)

Report describes most of the California gear, area, season, size, sex, and bag limit regulations. Summarizes them by habitat type.

--- Very complicated, overlapping series of regulations that provide considerable ecosystem and fishery protection.

NOT ENOUGH PROTECTION OR NEAR TOTAL PROTECTION
Exceptions pot shellfish crab, lobster, spot prawn SSS

1. Some important species in hard-bottom nearshore, shelf and deeper habitats not adequately protected by California regulations.

2. In contrast, the total effect of traditional regulations make it impossible to economically harvest all but a few species living on soft-bottom nearshore, shelf and shelf break habitats.

3. Provide considerable ecosystem protection
(rockfish gillnet restrictions : protect birds and mammals)

2. What are the existing protections?

Pacific Fisheries Management Council

Federal regulations based on fishery management plans (FMPs)

Direct Control of Catch (DCC) - Optimum Yield -bimonthly limits

Traditional gear limitations - ecosystem protections

Essential Fish Habitat areas (MPAs) - ecosystem protections

Temporary MPAs - Rockfish Conservation Areas - weak stock mgt.

Single Species Management
Ecosystem Management

Belief-based Management
Knowledge-based Management

Adaptive Management
Static Management

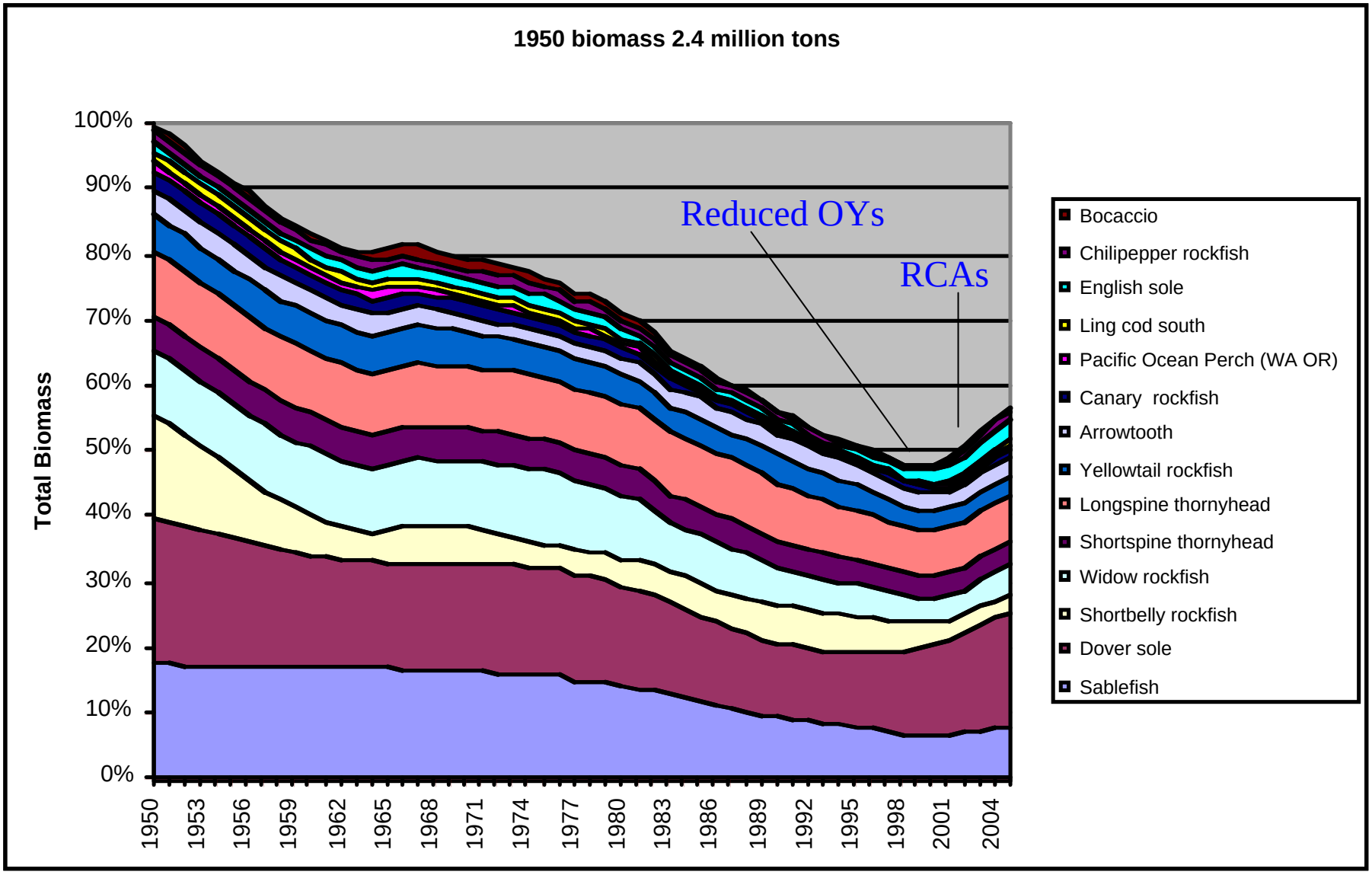
Pacific Fisheries Management Council

knowledge-based, adaptive, single species management

Salmon fishery No fishing season 2008.
Stock Synthesis Biomass Models
Weak stock management - RCAs
Sardine Harvest Rule

3. How successful are existing protections?

Trends in the abundance of groundfish stocks off the west coast



Belief-based, static, ecosystem management

NGOs and Forage Species

Krill fishing prohibited - AB 2712 - forage fish

NGOs and Trawling

Trawl buyout in Central California

Legislation prohibiting trawling in State Waters AB 2712

Present MBNMS MPA proposal

2 Active Trawl permits in MBNMS - None South of Pt. Sur

Landings in MBNMS

(Santa Cruz, Moss Landing, Monterey)

	1996	2006		
TOTAL	25,774 tons	29,969 tons		+16%
	$18,448	$6,402		-65%
Sardine, anchovy	12,722	27,939	93.2%	+120%
Other pelagics	3,917	873	2.9%	-78%
Total slope species	3,228	806	2.7%	-75%
Total everything else	2,068	372	1.2%	-82%

Pelagics were 96% of 2006 Landings

MPAs not effective protection for pelagic species

Landings of pelagics (tons)

COASTAL PELAGICS	tons				
	1996	%	2006	%	change
Sardine	8,805	34.2%	19,523	65.1%	+122%
Anchovy	3,917	15.2%	8,416	28.1%	+115%
Squid	5,150	20.0%	561	1.9%	-89%
Mackerel unspec.	877	3.4%	189		-78%
Herring	274	1.1%	41		-85%
HIGHLY MIGRATORY PELAGICS		tons			
Albacore	238		22		-91%
Swordfish	221		19		-92%
Opah	20		1		-95%
Thresher shark	15		<1		-99%
Bluefin tuna	13		<1		-99%
Chinook salmon	937	3.6%	37		-96%
Other	14		4		-69%

Slope species - 2.7% 2006 landings

	1996	2006	change
TOTAL	3,228	806 tons	-75%
Grenadier	994 tons	46 tons	-95%
Dover sole	849	214	-75%
Sablefish	773	273	-65%
Thornyheads (2 sp.)	420	126	-70%
Splitnose Rockfish	160	96	-40%
Blackgill Rockfish	28	17	-39%
Bank Rockfish	4	22	+573%

Everything else - 1.2% 2006 landings

	1996	2006	change
TOTAL	2,068	372 tons	-82%
Bocaccio	126	2	-98%
Chilipepper Rf.	674	11	-98%
Widow Rf.	174	4	-98%
Sanddab	124	4	-93%
English sole	109	9	-92%
Rex sole	107	12	-89%
Lingcod	84	6	-92%
California halibut	56	35	-37%
Petrale sole	123	94	-33%
Spot Prawn	35	31	-11%
Dungeness crab	17	83	+392%
All other species	437	67	-75%

Why did the landings of non-pelagics and highly migratory species decline so markedly over the last decade?

Greatly reduced federal catch limits for groundfish

Rockfish Conservation Area (2003)

Area-based drift gillnet restrictions for leatherback turtles (2001)

State Nearshore Species Management Plan

Reduction in the number of commercial fishers:

(20,363 California comm. fishers in 1980 : 3,835 in 2007)

(9,229 comm. boats in 1980 ; 4,856 in 1996 : 2,968 in 2007

Limited entry, trawler buy-outs, loss of shore facilities, economics

Do we need additional protection in the Monterey Bay National Marine Sanctuary

Monterey Landings

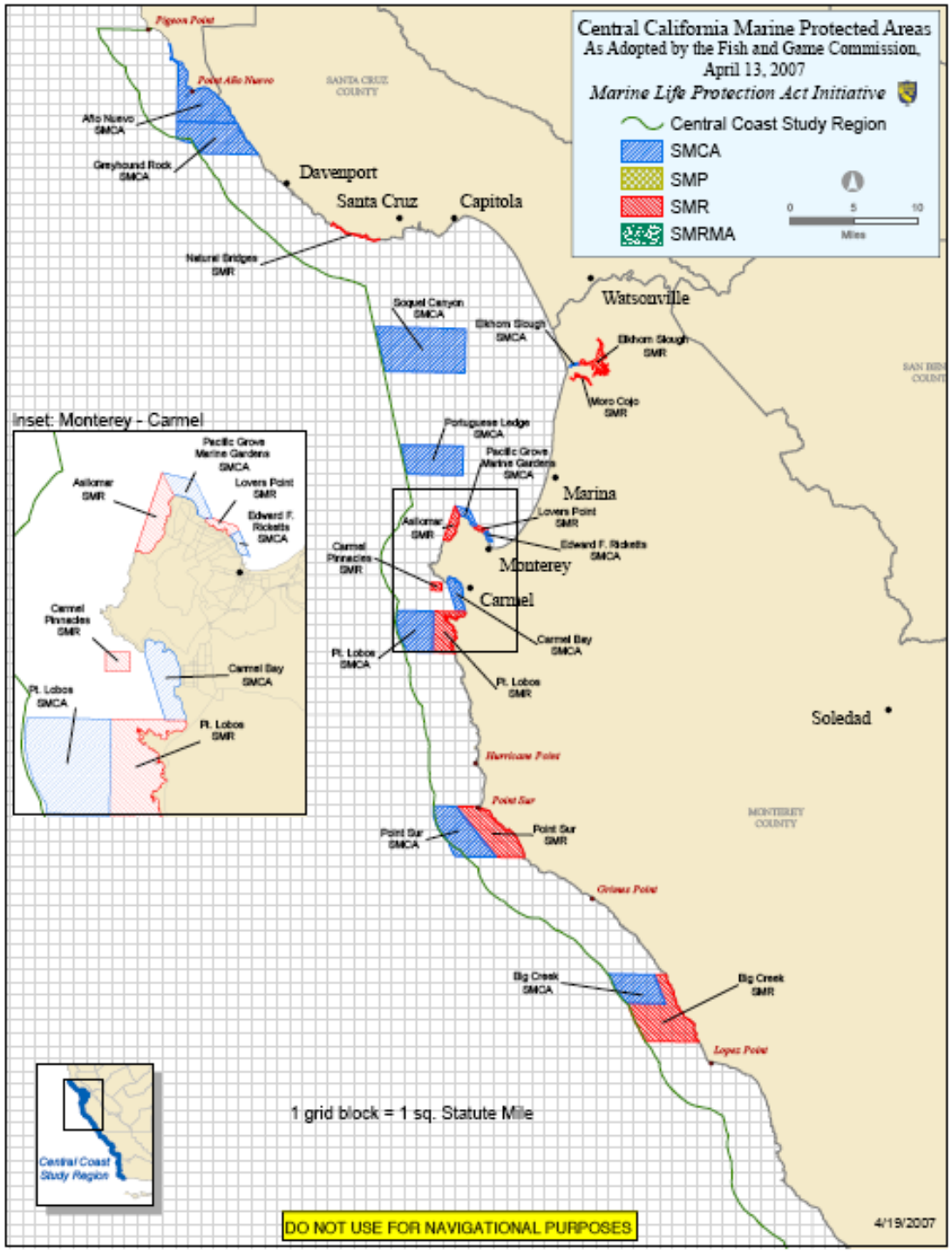
2006	179 tons	1.4%
1996	12,383 tons	

Since 2006

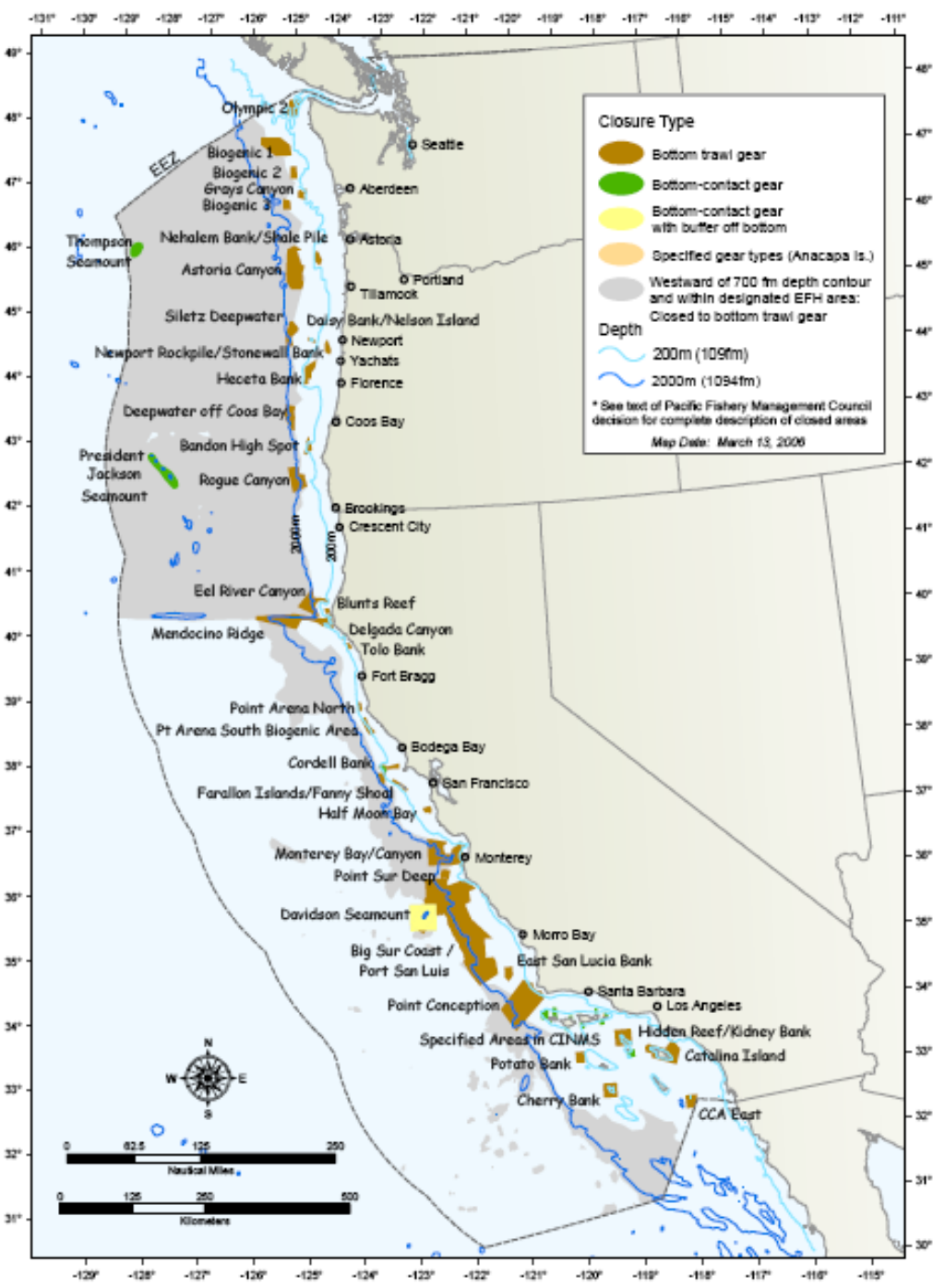
- 21 State MPAs created in MBNMS
- State no-trawl zone extended to 12 miles in MB
- 3 EFH Areas created in MB area (4,908 sq mi)
- Drift gillnet closed for HMS
- Trawl buyout of majority of Fed. trawl permits
  - between Pt Conception and Golden Gate
  - 2 active Fed. Permits in MBNMS; 0 south of MB
- Additional reductions in groundfish catch limits

State MPAs

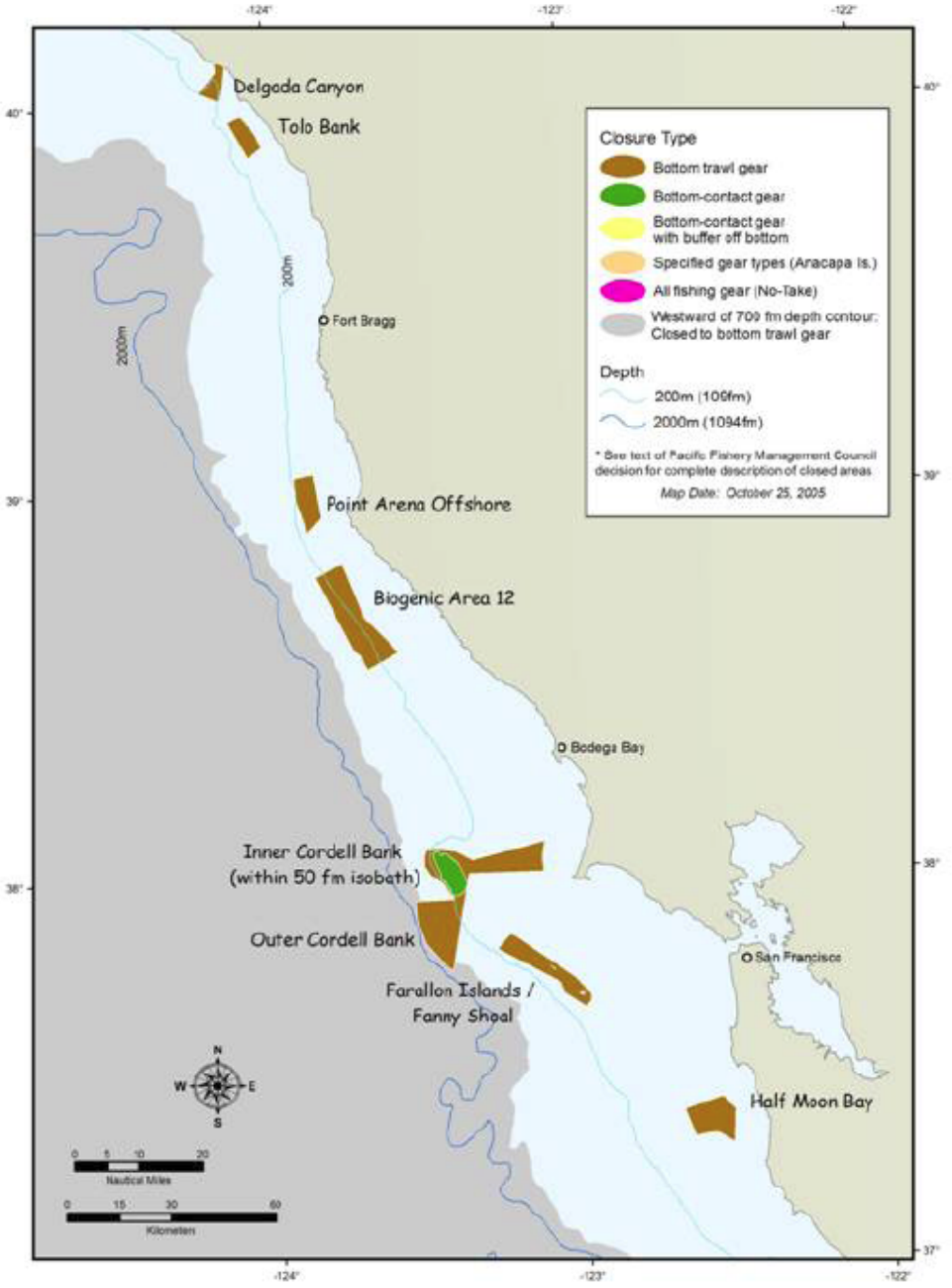
State waters
no-trawl
Fed. MPA



Federal Essential Fish Habitat MPAs



Federal Essential Fish Habitat MPAs



igure 2-35: Areas Identified as Ecologically Important Areas Under the Council Preferred lternative –Northern California. (new since DEIS)

Federal Essential Fish Habitat MPAs

Established June 12, 2006

3 EFH areas in study area

Total 4,907 sq mi

1,435 in study area

DSM 775 sq mi

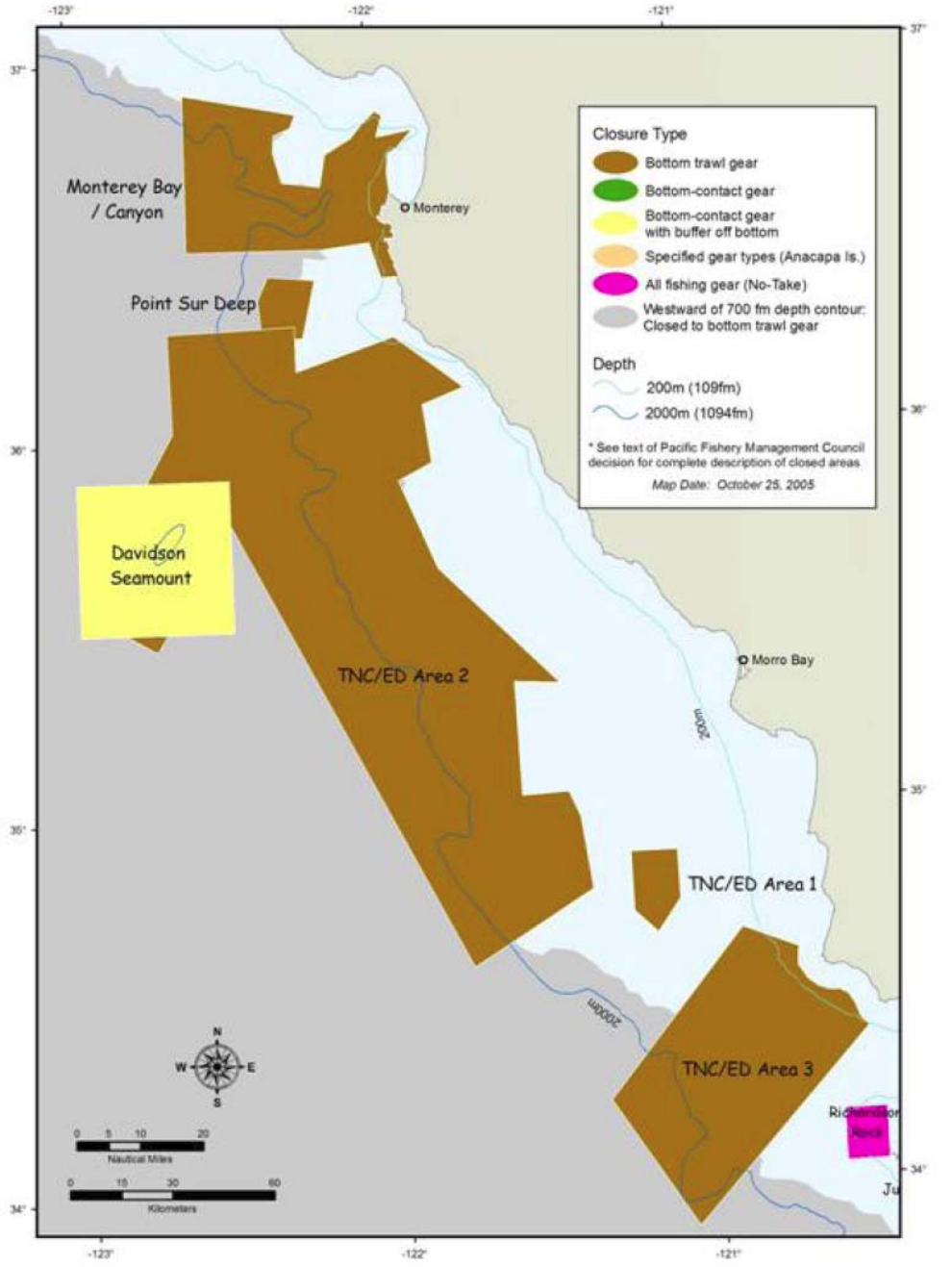


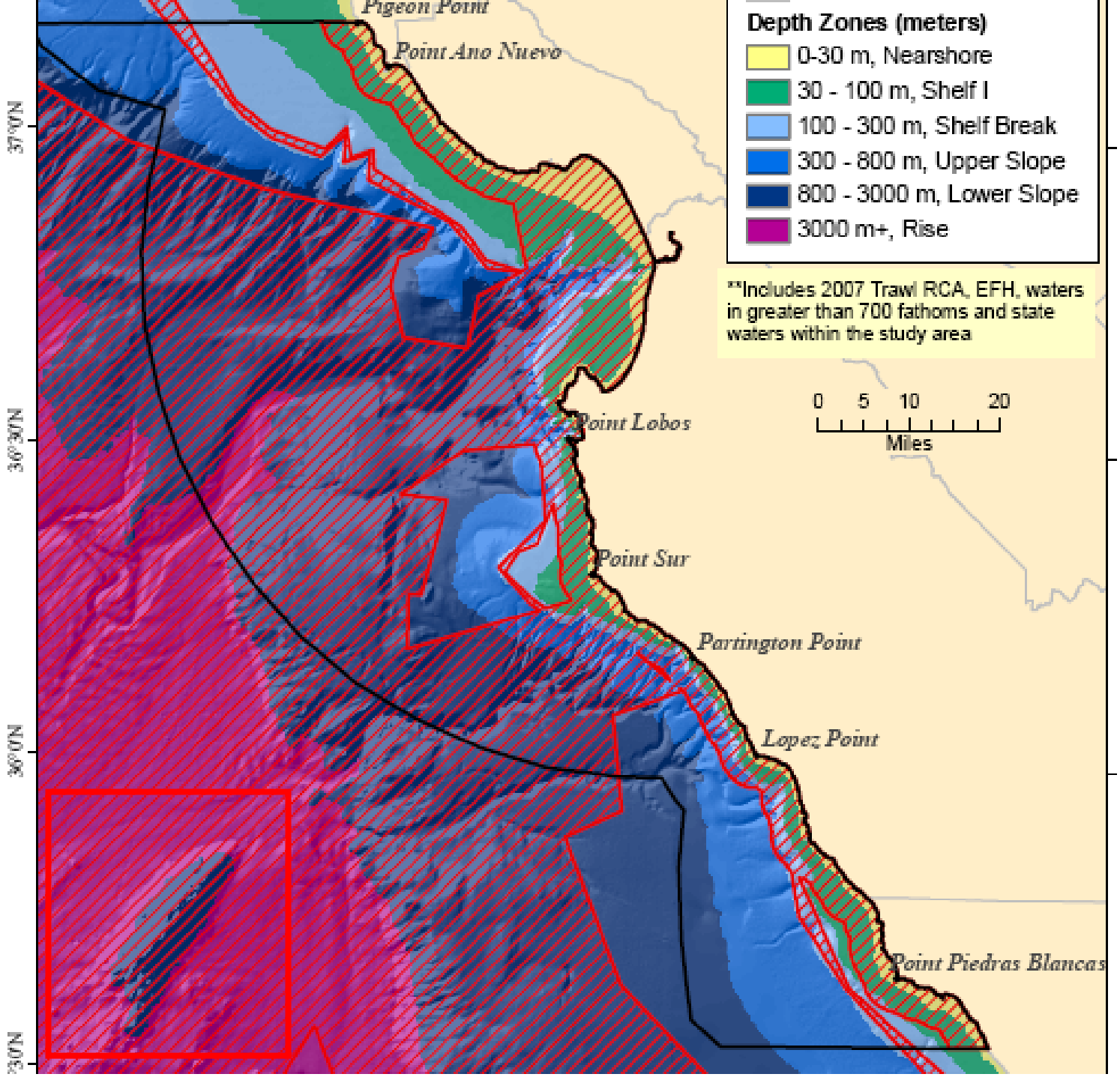
Figure 2-36: Areas Identified as Ecologically Important Areas Under the Council Preferred Alternative –Central California. (new since DEIS)

Area and percentage of area by habitat type for no trawling and no take of bottomfish MPAs.

(data provided by Sophie De Beukelae MBNMS)

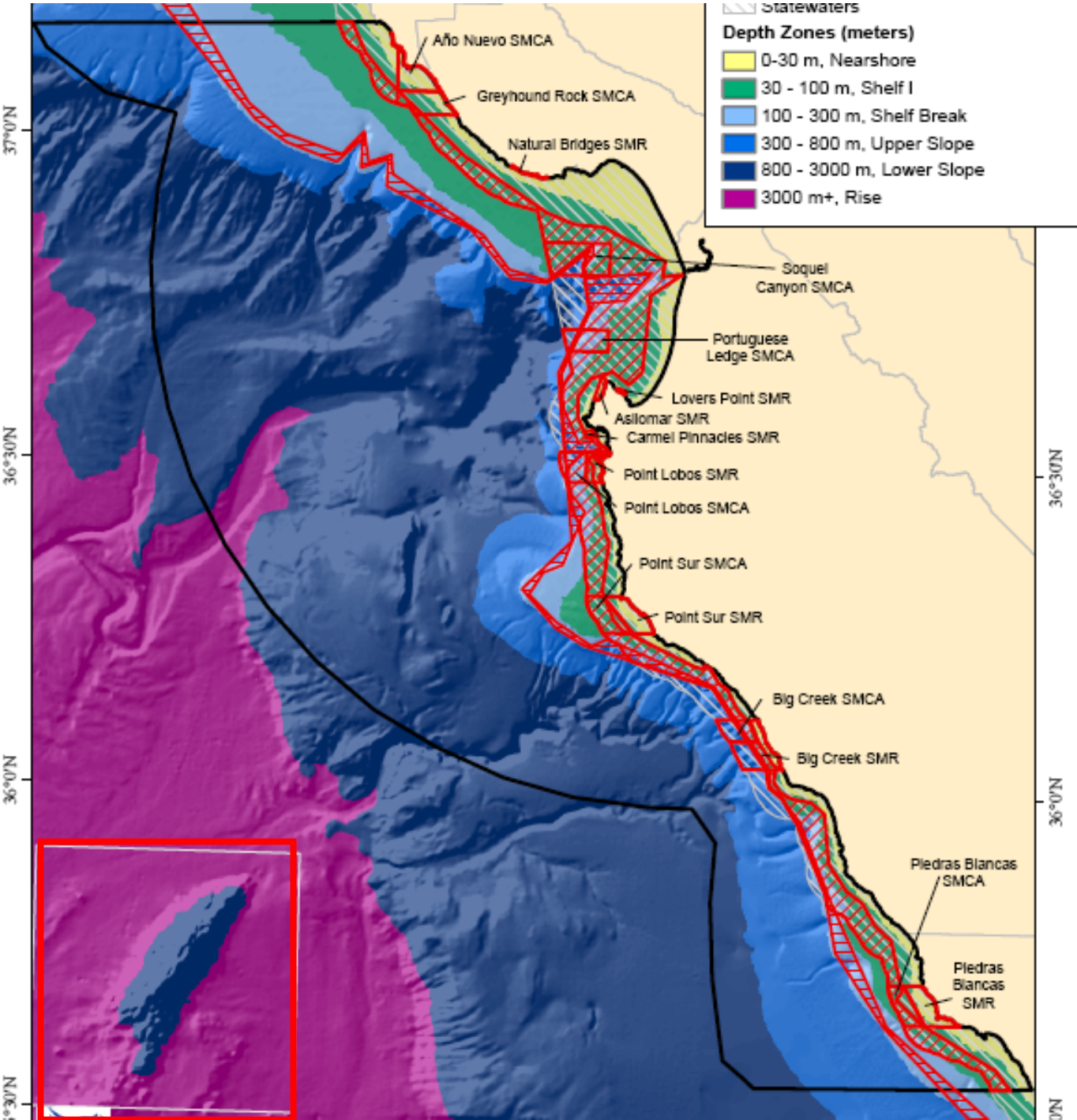
Habitat	Depth Meters	Area sq mi	No Trawling RCA	No Trawling -RCA	No Bottomfish RCA	No Bottomfish -RCA
Nearshore	0-30	164	99%	99%	18%	17%
Shelf	30-100	542	74%	73%	48%	12%
Shelf break	100-300	399	37%	23%	36%	5%
Upper slope	300-800	897	22%	20%	7%	2%
Lower slope	800-3000	2141	81%	81%	0%	0%
Rise	3000+	70	100%	100%	0%	0%
TOTAL		4215	64%	62%	12%	3%
Davidson Sea Mount		775		100%		100%

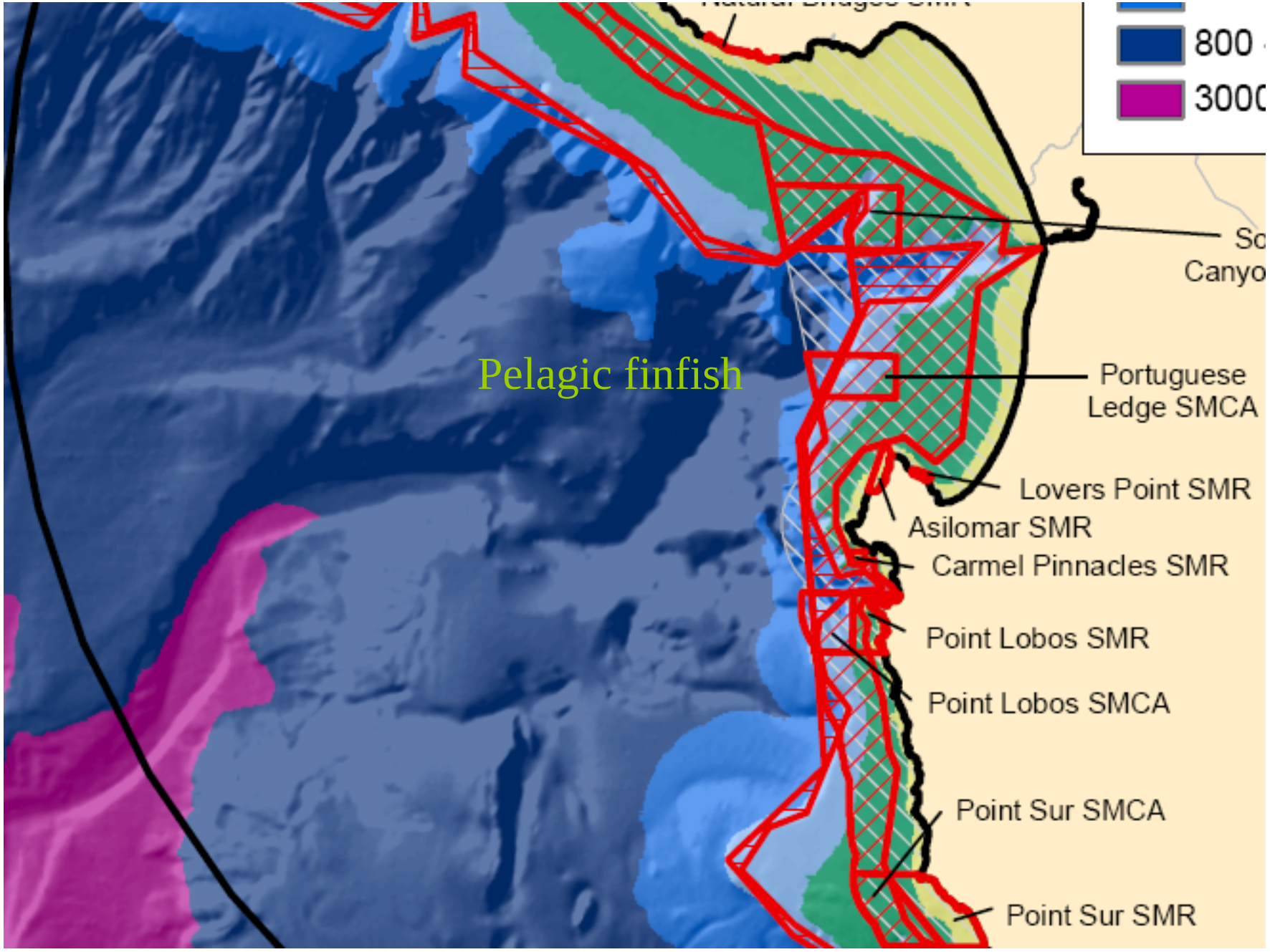
MPAs with no trawling



MPAs with no take of bottomfishes

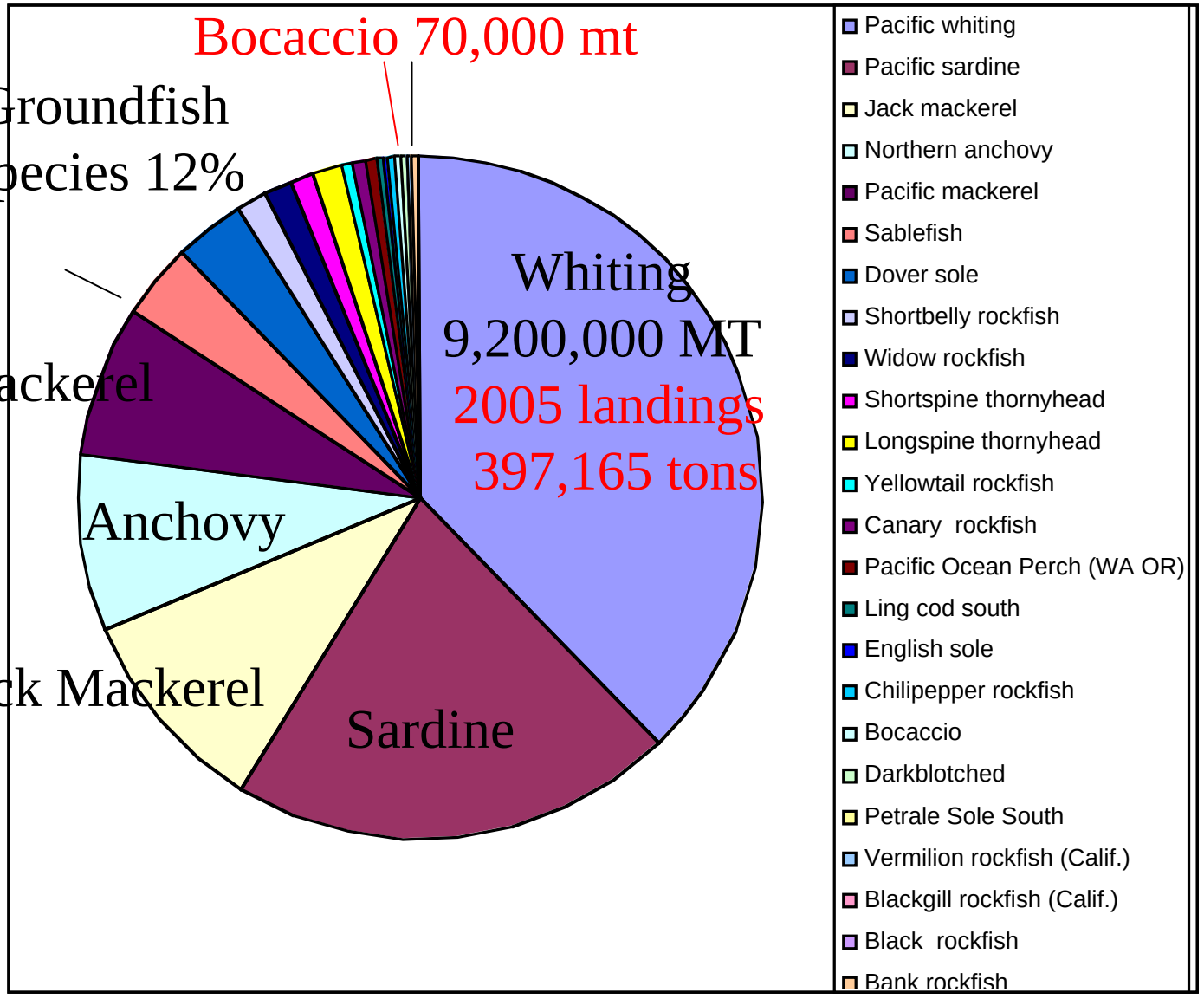
Davidson Sea Mount




800
3000
Pelagic finfish
Portuguese
Ledge SMCA
Lovers Point SMR
Asilomar SMR
Carmel Pinnacles SMR
Point Lobos SMR
Point Lobos SMCA
Point Sur SMCA
Point Sur SMR

Ecosystem Protection - unfished stock sizes for major pelagic and groundfish species in the California Current ecosystem.

Cabezon
1,350 mt



MBNMS
2006 landings
non-pelagics
1,178 tons

5. If ecosystem function is threatened what type of regulations will be the most beneficial

Two competing strategies for ecosystem protection MPAs vs Quotas (catch limits)

MPAs work where they decrease the catch.

Overfished territorial species (tropical reef species)

MPAs will have little population effect in areas with highly regulated catch limits because they will not result in catch reductions.

WHY - Catch limits achieved outside

Catch limits and MPAs

With catch limits in place the only way that catch will be reduced is if densities outside the MPAs become so low that the catch limits cannot be caught.

Example: Lobster with a pretend annual OY

Compare 25% MPAs vs 25% OY reduction

2 tons fuel + 0.5 ton bait = 1 ton lobster

Fuel at $3.50 per gallon = $ 875 /ton

. Lobster at $10.00 per lb = $ 20,000/ton

2 tons fuel + 0.5 ton bait = 1 ton lobster

After 10 yrs MPAs: CPUE - 33% : Catch same .
3 tons fuel + 0.75 ton bait = 1 ton lobster .
No reduction in catch : No increase in population
. more lobster in MPAs balanced by less outside

After 10 yrs MPAs: CPUE -50% : Catch - 25%
. 4 tons fuel + 1 ton bait to = 1 ton lobster
. Reduction in catch after 5 yrs : X increase in population
. more lobster in MPAs and less outside

After 10 yrs Quota: CPUE +20% : Catch same .
1.6 tons fuel + 0.4 ton bait = 1 ton lobster .
Reduction in catch 10 yrs : 2X increase in population
. more lobster everywhere

Ecosystem Management

Major Problem: Un-coordinated management by 4 different agencies with 4 different philosophies.

California State Legislature

California Fish and Game Commission

Pacific Fisheries Management Council

National Marine Sanctuaries

Do we need additional protection in the Monterey Bay National Marine Sanctuary

Monterey Landings

2006	179 tons	1.4%
1996	12,383 tons	

OLYMPIC COAST NATIONAL MARINE SANCTUARY CONDITION REPORT

The Olympic Coast National Marine Sanctuary Management Plan is currently scheduled for review in September 2008. The Office of National Marine Sanctuaries is developing "Condition Reports" for each of the sanctuaries around the country. The reports are intended to document the "status and trends of water quality, habitat, living resources, and maritime archaeological resources and human activities that affect them." The Olympic Coast National Marine Sanctuary's (OCNMS) Condition Report will serve as a supporting document for the forthcoming Management Plan review process. The Condition Report will not include proposals for regulatory changes. However, if the Condition Report identifies negative effects on sanctuary resources due to fishing activities, consideration of future fishery regulations may be part of the OCNMS Management Plan review process.

In a March 11, 2008 letter to Council Executive Director Dr. Donald McIsaac (Agenda Item I.2.a, Attachment 1), Ms. Carol Bernthal, OCNMS Superintendent, describes the purpose and the role of the Condition Report and requests that the Council and its advisory bodies participate in the review of the first draft of the OCNMS Condition Report. The letter also presents two important enclosures. The first, "*OCNMS Condition Report Charge to Reviewers*," provides guidance on the specific types of Council comments and recommendations that may be of most use to the OCNMS as it completes the final draft of the Condition Report. The second, "*Rating Scheme for System-Wide Monitoring Questions*," provides additional information on the specific questions the Condition Report is addressing and the criteria used to rate status and trends.

Unfortunately, the OCNMS was unable to provide the draft Condition Report to the Council or its advisory bodies in time for the advance April Briefing Book; depending on the time of distribution and the content of the document, this agenda item may need to be postponed. The OCNMS plans to distribute the first draft as supplemental material as soon as it is available, which is likely to be at or shortly before the start of the April Council meeting. In the interim, the OCNMS has prepared a fact sheet that covers frequently asked questions on the Condition Report (Agenda Item B.2.b, Attachment 1).

Council Action:

Provide Council comments on the draft OCNMS Condition Report.

Reference Materials:

1. Agenda Item I.2.a, Attachment 1: March 11, 2008 letter from OCNMS Superintendant Carol Bernthal to Dr. McIsaac regarding Council review of the OCNMS Condition Report.
2. Agenda Item I.2.b, Attachment 1: Background Material for the OCNMS Condition Report.

Agenda Order:

a. Agenda Item Overview — Mike Burner
b. OCNMS Report — Steve Gittings/Carol Bernthal
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. **Council Action:** Provide Council comments on the draft OCNMS Condition Report.

PFMC
03/24/08

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT
Olympic Coast National Marine Sanctuary
115 East Railroad Avenue, Suite 301
Port Angeles, WA 98362-2925

March 11, 2008

Mr. Don McIsaac
Executive Director
Pacific Fishery Management Council
7700 NE Ambassador Place
Suite 101
Portland, Oregon 97220-1364

Dear Mr. McIsaac:

The Olympic Coast National Marine Sanctuary (OCNMS) seeks the assistance of the Pacific Fishery Management Council and the Scientific and Statistical Committee (SSC) in reviewing portions of a report on the condition of sanctuary resources. The report, which is being prepared by sanctuary staff and selected subject matter experts, contains information that relates to marine fisheries. We would like to have the opinion of members of the SSC on our interpretation of that information to ensure the report's accuracy and to encourage early coordination between the PFMC and OCNMS.

The Office of National Marine Sanctuaries (ONMS) is in the process of developing "Condition Reports" for all sanctuaries as part of its System-wide Monitoring Program. The primary purpose of the document is to report in a standardized way on the status and trends of water quality, habitat, living resources and maritime archaeological resources and the human activities that affect them. Evaluations of status and trends are made by sanctuary staff, based on interpretation of quantitative and, when necessary, non-quantitative assessments and observations of scientists, managers and users. Therefore, ratings reflect the collective level of concern among participants based on their knowledge and perceptions of local problems. The report will also describe the anthropogenic pressures on these resources and explain management responses to the pressures.

The report will serve as a tool to determine if the OCNMS is achieving its resource protection and improvement goals and as a supporting document in the OCNMS Management Plan Review Process, scheduled to begin in September 2008. The OCNMS condition report will be released to the public in advance of scoping meetings and will help inform the public on key issues facing the sanctuary. In the event that the condition report identifies fishing as a negative factor affecting marine resources, the issue may be prioritized and further evaluated during the OCNMS management plan review,

eventually lead to programmatic, policy or regulatory changes, including actions brought before or initiated by the PFMC. To clarify, we are not making any proposals at this time to change OCNMS regulations.

The SSC plays an important role in providing scientific advice for fishery management decisions and in providing peer review for the Council. Early review by SSC will allow time to consider and incorporate their expert opinion and perspectives into the final document and to help inform any subsequent deliberations.

If you can accommodate our request, a first draft of the condition report will be provided to the SSC in time for your April meeting. In order to allow us to finalize the report prior to public scoping, we request your written comments within three (3) weeks of receiving the draft report. We understand that normally such a review would take place over the course of two meetings; however, waiting until the June meeting for feedback would result in a delay in drafting the report and the OCNMS management plan review schedule. The draft report will also be provided to the Olympic Coast National Marine Sanctuary Advisory Council, Olympic Coast Intergovernmental Policy Council and experts involved in creating the resource ratings. A final peer review will be conducted and the final condition report will be publicly available on the OCNMS and ONMS websites.

The guidelines for SSC review and additional background on the Condition Report is provided in Attachments 1 and 2. If it would be helpful, national marine sanctuary program staff could also give a presentation and answer any questions on the intent, purpose and structure of the condition report and proposed SSC review at the March PFMC meeting.

Thank you for considering this request. I am confident that PFMC involvement will improve the quality of the document and ensure that management decisions rely on the best available science. If you have any questions, please don't hesitate to call me at 360-457-6622, Ext 11.

Sincerely,

Carol Bernthal

Carol Bernthal
Sanctuary Superintendent

Attachments

Cc: William Douros, ONMS

Attachment 1
OCNMS Condition Report Charge to Reviewers

As you review the document, please do so recognizing that the report is much like an executive summary that is based on sanctuary-specific data that may not be presented in detail within the report. To the extent possible, references and web links to existing data are given, and appropriate summary graphics or data are shown, but original sources are likely to contain much more information than the condition report.

The 17 questions listed in the report and in Attachment 2 are asked of all sanctuaries. The interpretation of the questions by sanctuary staff, and their responses to the questions are standardized according to the descriptions and explanations provided in Appendix A. We are not requesting your review of this portion of the report, as these standards were established by the original panel of experts who designed SWiM, and in subsequent design modifications. You are welcome to review as much of the report as you like, the most substantive sections of the report being Site History and Resources, Pressures on the Sanctuary, State of Sanctuary Resources, and Responses to Pressures. But given your relevant experience and knowledge of the fisheries resources of Olympic Coast National Marine Sanctuary, there are certain questions within the section titled State of Sanctuary Resources for which your review is particularly important. For these, we are interested in your expert opinion of our judgments of resource status and trends, the bases for judgment, and whether you feel that other data could or should have been incorporated into the ratings. We welcome any recommendations you may have regarding additional data or information sources that may improve assessments of resource conditions. In our opinion, the questions that are most likely contain or benefit from information within your area of expertise are (please note that additional explanation can be found for each question in Appendix 2):

1. **Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality and how are they changing?** The question has to do with multiple stressors, which may include changing environmental conditions that are reflected in fisheries data or in the quality of harvested species.
3. **Do sanctuary waters pose risks to human health and how are they changing?** This question concerns the risk posed to humans by sanctuary waters, and we sometimes include information about shellfish or other closures as evidence of problems.
4. **What are the levels of human activities that may influence water quality and how are they changing?** Though the question concerns the level of human activities that might affect water quality, it would benefit from greater understanding about whether discharges from large vessels, perhaps including fishing vessels, are affecting water quality in the sanctuary.
5. **What are the abundance and distribution of major habitat types and how are they changing?** Among other things, we are interested in any evidence of changing habitat quality resulting from fishing.
6. **What is the condition of biologically-structured habitats and how is it changing?** We seek information on the status and trends of habitats with substantial amounts of biogenic structure.
7. **What are the contaminant concentrations in sanctuary habitats and how are they changing?** We are interested to know whether there may be fisheries data that inform us on whether there are likely to be contaminants in sanctuary habitats.
8. **What are the levels of human activities that may influence habitat quality and how are they changing?** We are interested in learning more about the *levels* of any destructive fishing activities that occur within the sanctuary.
9. **What is the status of biodiversity and how is it changing?** There might be information on biodiversity that comes from the fishing community that would help us respond to this question. Most relevant may be changes that have been observed in food web structure due to altered populations of predators and prey, and extirpations that may have occurred.
10. **What is the status of environmentally sustainable fishing and how is it changing?** This may be the most important question for you to help with. Note that while it requires information on levels of harvesting

and stock status, the responses paired with each color rating try to focus on the extent to which harvesting alters the ecosystem and its ability to withstand the impacts of harvesting.

11. **What is the status of non-indigenous species and how is it changing?** If fisheries data indicate anything about the history of invasives in OCNMS, it would be helpful to add it to our response on this question.
12. **What is the status of key species and how is it changing?** For purposes of your review, please consider the status of keystone species in the ecosystem, and those that have special protected status.
13. **What is the condition or health of key species and how is it changing?** We are interested in information on the condition/health of the species identified in Question 12, particularly with regard to evidence of stress and their ability to contribute to the next generation.
14. **What are the levels of human activities that may influence living resource quality and how are they changing?** Among other things, this question addresses *levels* of fishing. Your review is therefore critical here.

On behalf of the staff of the National Marine Sanctuary Program, I thank you for taking the time to review this report. I am confident that your assistance will improve the quality of the document and ensure that management decisions rely on the best available science and dependable judgments of knowledgeable experts.

Attachment 2

Rating Scheme for System-Wide Monitoring Questions

The purpose of this appendix is to clarify the 17 questions and possible responses used to report the condition of sanctuary resources in "Condition Reports" for all national marine sanctuaries. Individual staff and partners utilized this guidance, as well as their own informed and detailed understanding of the site to make judgments about the status and trends of sanctuary resources.

The questions derive from the National Marine Sanctuary Program mission, and a system-wide monitoring framework (National Marine Sanctuary Program, 2004) developed to ensure the timely flow of data and information to those responsible for managing and protecting resources in the ocean and coastal zone, and to those that use, depend on, and study the ecosystems encompassed by the sanctuaries. They are being used to guide staff and partners at each of the 14 sites in the sanctuary system in the development of this first periodic sanctuary condition report. The questions are meant to set the limits of judgments so that responses can be confined to certain reporting categories that will later be compared among all sites, and combined.

Following a brief discussion about each question, statements are presented that were used to judge the status and assign a corresponding color code. These statements are customized for each question. In addition, the following options are available for all questions: " N/A" - the question does not apply; and "Undet." - resource status is undetermined.

Symbols used to indicate trends are the same for all questions: "**▲ " -** conditions appear to be improving; "**—**" - conditions do not appear to be changing; "**▼ " -** conditions appear to be declining; and "**?" –** trend is undetermined.

Question 1 (Water/Stressors): Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality and how are they changing?

This is meant to capture shifts in condition arising from certain changing physical processes and anthropogenic inputs. Factors resulting in regionally accelerated rates of change in water temperature, salinity, dissolved oxygen, or water clarity, could all be judged to reduce water quality. Localized changes in circulation or sedimentation resulting, for example, from coastal construction or dredge spoil disposal, can affect light penetration, salinity regimes, oxygen levels, productivity, waste transport, and other factors that influence habitat and living resource quality. Human inputs, generally in the form of contaminants from point or non-point sources, including fertilizers, pesticides, hydrocarbons, heavy metals, and sewage, are common causes of environmental degradation, often in combination rather than alone. Certain biotoxins, such as domoic acid, may be of particular interest to specific sanctuaries. When present in the water column, any of these contaminants can affect marine life by direct contact or ingestion, or through bioaccumulation via the food chain.

[Note: Over time, accumulation in sediments can sequester and concentrate contaminants. Their effects may manifest only when the sediments are resuspended during storm or other energetic events. In such cases, reports of status should be made under Question 7 – Habitat contaminants.]

Good	Conditions do not appear to have the potential to negatively affect living resources or habitat quality.
Good/Fair	Selected conditions may preclude full development of living resource assemblages and habitats, but are not likely to cause substantial or persistent declines.
Fair	Selected conditions may inhibit the development of assemblages, and may cause measurable but not severe declines in living resources and habitats.
Fair/Poor	Selected conditions have caused or are likely to cause severe declines in some but not all living resources and habitats.
Poor	Selected conditions have caused or are likely to cause severe declines in most if not al, living resources and habitats.

Question 2 (Water/Eutrophic Condition): What is the eutrophic condition of sanctuary waters and how is it changing?

Nutrient enrichment often leads to planktonic and/or benthic algae blooms. Some affect benthic communities directly through space competition. Overgrowth and other competitive interactions (e.g., accumulation of algal-sediment mats) often lead to shifts in dominance in the benthic assemblage. Disease incidence and frequency can also be affected by algae competition and the resulting chemistry along competitive boundaries. Blooms can also affect water column conditions, including light penetration and plankton availability, which can alter pelagic food webs. Harmful algal blooms often affect resources, as biotoxins are released into the water and air, and oxygen can be depleted.

Good	Conditions do not appear to have the potential to negatively affect living resources or habitat quality.
Good/Fair	Selected conditions may preclude full development of living resource assemblages and habitats, but are not likely to cause substantial or persistent declines.
Fair	Selected conditions may inhibit the development of assemblages, and may cause measurable but not severe declines in living resources and habitats.
Fair/Poor	Selected conditions have caused or are likely to cause severe declines in some but not all living resources and habitats.
Poor	Selected conditions have caused or are likely to cause severe declines in most if not all living resources and habitats.

Question 3 (Water/Human Health): Do sanctuary waters pose risks to human health and how are they changing?

Human health concerns are generally aroused by evidence of contamination (usually bacterial or chemical) in bathing waters or fish intended for consumption. They also emerge when harmful algal blooms are reported or when cases of respiratory distress or other disorders attributable to harmful algal blooms increase dramatically. Any of these conditions should be considered in the course of judging the risk to humans posed by waters in a marine sanctuary.

Some sites may have access to specific information on beach and shellfish conditions. In particular, beaches may be closed when criteria for safe water body contact are exceeded, or shellfish harvesting may be prohibited when contaminant loads or infection rates exceed certain levels. These conditions can be evaluated in the context of the descriptions below.

Good	Conditions do not appear to have the potential to negatively affect human health.
Good/Fair	Selected conditions that have the potential to affect human health may exist but human impacts have not been reported.
Fair	Selected conditions have resulted in isolated human impacts, but evidence does not justify widespread or persistent concern.
Fair/Poor	Selected conditions have caused or are likely to cause severe impacts, but cases to date have not suggested a pervasive problem.
Poor	Selected conditions warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts are likely or have occurred.

Question 4 (Water/Human Activities): What are the levels of human activities that may influence water quality and how are they changing?

Among the human activities in or near sanctuaries that affect water quality are those involving direct discharges (transiting vessels, visiting vessels, onshore and offshore industrial facilities, public wastewater facilities), those that contribute contaminants to stream, river, and water control discharges (agriculture, runoff from impermeable surfaces through storm drains, conversion of land use), and those releasing airborne chemicals that subsequently deposit via particulates at sea (vessels, land-based traffic, power plants, manufacturing facilities, refineries). In addition, dredging and trawling can cause resuspension of contaminants in sediments.

Good	Few or no activities occur that are likely to negatively affect water quality.
Good/Fair	Some potentially harmful activities exist, but they do not appear to have had a negative effect on water quality.

Fair	Selected activities have resulted in measurable resource impacts, but evidence suggests effects are localized, not widespread.
Fair/Poor	Selected activities have caused or are likely to cause severe impacts, and cases to date suggest a pervasive problem.
Poor	Selected activities warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts have occurred or are likely to occur.

Question 5 (Habitat/Abundance/Distribution): What are the abundance and distribution of major habitat types and how are they changing?

Habitat loss is of paramount concern when it comes to protecting marine and terrestrial ecosystems. Of greatest concern to sanctuaries are changes caused, either directly or indirectly, by human activities. The loss of shoreline is recognized as a problem indirectly caused by human activities. Habitats with submerged aquatic vegetation are often altered by changes in water conditions in estuaries, bays, and nearshore waters. Intertidal zones can be affected for long periods by spills or by chronic pollutant exposure. Beaches and haul-out areas can be littered with dangerous marine debris, as can the water column or benthic habitats. Sandy subtidal areas and hardbottoms are frequently disturbed or destroyed by trawling. Even rocky areas several hundred meters deep are increasingly affected by certain types of trawls, bottom longlines, and fish traps. Groundings, anchors, and divers damage submerged reefs. Cables and pipelines disturb corridors across numerous habitat types and can be destructive if they become mobile. Shellfish dredging removes, alters, and fragments habitats.

The result of these activities is the gradual reduction of the extent and quality of marine habitats. Losses can often be quantified through visual surveys and to some extent using high-resolution mapping. This question asks about the quality of habitats compared to those that would be expected without human impacts. The status depends on comparison to a baseline that existed in the past - one toward which restoration efforts might aim.

Good	Habitats are in pristine or near-pristine condition and are unlikely to preclude full community development.
Good/Fair	Selected habitat loss or alteration has taken place, precluding full development of living resource assemblages, but it is unlikely to cause substantial or persistent degradation in living resources or water quality.
Fair	Selected habitat loss or alteration may inhibit the development of assemblages, and may cause measurable but not severe declines in living resources or water quality.
Fair/Poor	Selected habitat loss or alteration has caused or is likely to cause severe declines in some but not all living resources or water quality.
Poor	Selected habitat loss or alteration has caused or is likely to cause severe declines in most if not all living resources or water quality.

Question 6 (Habitat/Structure): What is the condition of biologically-structured habitats and how is it changing?

Many organisms depend on the integrity of their habitats and that integrity is largely determined by the condition of particular living organisms. Coral reefs may be the best known examples of such biologically-structured habitats. Not only is the substrate itself biogenic, but the diverse assemblages residing within and on the reefs depend on and interact with each other in tightly linked food webs. They also depend on each other for the recycling of wastes, hygiene, and the maintenance of water quality, among other requirements.

Kelp beds may not be biogenic habitats to the extent of coral reefs, but kelp provides essential habitat for assemblages that would not reside or function together without it. There are other communities of organisms that are also similarly co-dependent, such as hard-bottom communities, which may be structured by bivalves, octocorals, coralline algae, or other groups that generate essential habitat for other species. Intertidal assemblages structured by mussels, barnacles, and algae are another example, seagrass beds another. This question is intended to address these types of places, where organisms form structures (habitats) on which other organisms depend.

Good	Habitats are in pristine or near-pristine condition and are unlikely to preclude full community development.

Good/Fair	Selected habitat loss or alteration has taken place, precluding full development of living resources, but it is unlikely to cause substantial or persistent degradation in living resources or water quality.
Fair	Selected habitat loss or alteration may inhibit the development of living resources, and may cause measurable but not severe declines in living resources or water quality.
Fair/Poor	Selected habitat loss or alteration has caused or is likely to cause severe declines in some but not all living resources or water quality.
Poor	Selected habitat loss or alteration has caused or is likely to cause severe declines in most if not all living resources or water quality.

Question 7 (Habitat/Contaminants): What are the contaminant concentrations in sanctuary habitats and how are they changing?

This question addresses the need to understand the risk posed by contaminants within benthic formations, such as soft sediments, hard bottoms, or biogenic organisms. In the first two cases, the contaminants can become available when released via disturbance. They can also pass upwards through the food chain after being ingested by bottom dwelling prey species. The contaminants of concern generally include pesticides, hydrocarbons, and heavy metals, but the specific concerns of individual sanctuaries may differ substantially.

Good	Contaminants do not appear to have the potential to negatively affect living resources or water quality.
Good/Fair	Selected contaminants may preclude full development of living resource assemblages, but are not likely to cause substantial or persistent degradation.
Fair	Selected contaminants may inhibit the development of assemblages, and may cause measurable but not severe declines in living resources or water quality.
Fair/Poor	Selected contaminants have caused or are likely to cause severe declines in some but not all living resources or water quality.
Poor	Selected contaminants have caused or are likely to cause severe declines in most if not all living resources or water quality.

Question 8 (Habitat/Human Activities): What are the levels of human activities that may influence habitat quality and how are they changing?

Human activities that degrade habitat quality do so by affecting structural (geological), biological, oceanographic, acoustic, or chemical characteristics. Structural impacts include removal or mechanical alteration, including various fishing techniques (trawls, traps, dredges, longlines, and even hook-and-line in some habitats), dredging channels and harbors and dumping spoil, vessel groundings, anchoring, laying pipelines and cables, installing offshore structures, discharging drill cuttings, dragging tow cables, and placing artificial reefs. Removal or alteration of critical biological components of habitats can occur along with several of the above activities, most notably trawling, groundings, and cable drags. Marine debris, particularly in large quantities (e.g., lost gill nets and other types of fishing gear), can affect both biological and structural habitat components. Changes in water circulation often occur when channels are dredged, fill is added, coastal areas are reinforced, or other construction takes place. These activities affect habitat by changing food delivery, waste removal, water quality (e.g., salinity, clarity and sedimentation), recruitment patterns, and a host of other factors. Acoustic impacts can occur to water column habitats and organisms from acute and chronic sources of anthropogenic noise (e.g., shipping, boating, construction). Chemical alterations most commonly occur following spills and can have both acute and chronic impacts.

Good	Few or no activities occur that are likely to negatively affect habitat quality.
Good/Fair	Some potentially harmful activities exist, but they do not appear to have had a negative effect on habitat quality.
Fair	Selected activities have resulted in measurable habitat impacts, but evidence suggests effects are localized, not widespread.
Fair/Poor	Selected activities have caused or are likely to cause severe impacts, and cases to date suggest a pervasive problem.
Poor	Selected activities warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts have occurred or are likely to occur.

Question 9 (Living Resources/Biodiversity): What is the status of biodiversity and how is it changing?

This is intended to elicit thought and assessment of the condition of living resources based on expected biodiversity levels and the interactions between species. Intact ecosystems require that all parts not only exist, but that they function together, resulting in natural symbioses, competition, and predator-prey relationships. Community integrity, resistance and resilience all depend on these relationships. Abundance, relative abundance, trophic structure, richness, H' diversity, evenness, and other measures are often used to assess these attributes.

Good	Biodiversity appears to reflect pristine or near-pristine conditions and promotes ecosystem integrity (full community development and function).
Good/Fair	Selected biodiversity loss has taken place, precluding full community development and function, but it is unlikely to cause substantial or persistent degradation of ecosystem integrity.
Fair	Selected biodiversity loss may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity.
Fair/Poor	Selected biodiversity loss has caused or is likely to cause severe declines in some but not all ecosystem components and reduce ecosystem integrity.
Poor	Selected biodiversity loss has caused or is likely to cause severe declines in ecosystem integrity.

Question 10 (Living Resources/Extracted Species): What is the status of environmentally sustainable fishing and how is it changing?

Commercial and recreational harvesting are highly selective activities, for which fishers and collectors target a limited number of species, and often remove high proportions of populations. In addition to removing significant amounts of biomass from the ecosystem, reducing its availability to other consumers, these activities tend to disrupt specific and often critical food web links. When too much extraction occurs (i.e. ecologically unsustainable harvesting), trophic cascades ensue, resulting in changes in the abundance of non-targeted species as well. It also reduces the ability of the targeted species to replenish populations at a rate that supports continued ecosystem integrity.

It is essential to understand whether removals are occurring at ecologically sustainable levels. Knowing extraction levels and determining the impacts of removal are both ways that help gain this understanding. Measures for target species of abundance, catch amounts or rates (e.g., catch per unit effort), trophic structure, and changes in non-target species abundance are all generally used to assess these conditions.

Other issues related to this question include whether fishers are using gear that is compatible with the habitats being fished and whether that gear minimizes by-catch and incidental take of marine mammals. For example, bottom-tending gear often destroys or alters both benthic structure and non-targeted animal and plant communities. "Ghost fishing" occurs when lost traps continue to capture organisms. Lost or active nets, as well as lines used to mark and tend traps and other fishing gear, can entangle marine mammals. Any of these could be considered indications of environmentally unsustainable fishing techniques.

Good	Extraction does not appear to affect ecosystem integrity (full community development and function).
Good/Fair	Extraction takes place, precluding full community development and function, but it is unlikely to cause substantial or persistent degradation of ecosystem integrity.
Fair	Extraction may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity.
Fair/Poor	Extraction has caused or is likely to cause severe declines in some but not all ecosystem components and reduce ecosystem integrity.
Poor	Extraction has caused or is likely to cause severe declines in ecosystem integrity.

Question 11 (Living Resources/Invasive Species): What is the status of non-indigenous species and how is it changing?

Non-indigenous species are generally considered problematic, and candidates for rapid response, if found, soon after invasion. For those that become established, their impacts can sometimes be assessed by quantifying changes in the affected native species. This question allows sanctuaries to report on the threat posed by non-indigenous species. In some cases, the presence of a species alone constitutes a significant threat (certain invasive algae). In other cases, impacts have been measured, and may or may not significantly affect ecosystem integrity.

Good	Non-indigenous species are not suspected or do not appear to affect ecosystem integrity (full community development and function).
Good/Fair	Non-indigenous species exist, precluding full community development and function, but are unlikely to cause substantial or persistent degradation of ecosystem integrity.
Fair	Non-indigenous species may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity.
Fair/Poor	Non-indigenous species have caused or are likely to cause severe declines in some but not all ecosystem components and reduce ecosystem integrity.
Poor	Non-indigenous species have caused or are likely to cause severe declines in ecosystem integrity.

Question 12 (Living Resources/Key Species): What is the status of key species and how is it changing?

Certain species can be defined as "key" within a marine sanctuary. Some might be keystone species, that is, species on which the persistence of a large number of other species in the ecosystem depends - the pillar of community stability. Their functional contribution to ecosystem function is disproportionate to their numerical abundance or biomass and their impact is therefore important at the community or ecosystem level. Their removal initiates changes in ecosystem structure and sometimes the disappearance of or dramatic increase in the abundance of dependent species. Keystone species may include certain habitat modifiers, predators, herbivores, and those involved in critical symbiotic relationships (e.g. cleaning or co-habitating species).

Other key species may include those that are indicators of ecosystem condition or change (e.g., particularly sensitive species), those targeted for special protection efforts, or charismatic species that are identified with certain areas or ecosystems. These may or may not meet the definition of keystone, but do require assessments of status and trends.

Good	Key and keystone species appear to reflect pristine or near-pristine conditions and may promote ecosystem integrity (full community development and function).
Good/Fair	Selected key or keystone species are at reduced levels, perhaps precluding full community development and function, but substantial or persistent declines are not expected.
Fair	The reduced abundance of selected keystone species may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity; or selected key species are at reduced levels, but recovery is possible.
Fair/Poor	The reduced abundance of selected keystone species has caused or is likely to cause severe declines in some but not all ecosystem components, and reduce ecosystem integrity; or selected key species are at substantially reduced levels, and prospects for recovery are uncertain.
Poor	The reduced abundance of selected keystone species has caused or is likely to cause severe declines in ecosystem integrity; or selected key species are at severely reduced levels, and recovery is unlikely.

Question 13 (Living Resources/Health of Key Species): What is the condition or health of key species and how is it changing?

For those species considered essential to ecosystem integrity, measures of their condition can be important to determining the likelihood that they will persist and continue to provide vital ecosystem functions. Measures of condition may include growth rates, fecundity, recruitment, age-specific survival, tissue contaminant levels, pathologies (disease incidence tumors, deformities), the presence and abundance of critical symbionts, or parasite loads. Similar measures of condition may also be appropriate for other key species (indicator, protected, or charismatic species). In contrast to the question about keystone species (#12 above), the impact of changes in the abundance or condition of key species is more likely to be observed at the population or individual level, and less likely to result in ecosystem or community effects.

Good	The condition of key resources appears to reflect pristine or near-pristine conditions.
Good/Fair	The condition of selected key resources is not optimal, perhaps precluding full ecological function, but substantial or persistent declines are not expected.
Fair	The diminished condition of selected key resources may cause a measurable but not severe reduction in ecological function, but recovery is possible.
Fair/Poor	The comparatively poor condition of selected key resources makes prospects for recovery uncertain.
Poor	The poor condition of selected key resources makes recovery unlikely.

Question 14 (Living Resources/Human Activities): What are the levels of human activities that may influence living resource quality and how are they changing?

Human activities that degrade living resource quality do so by causing a loss or reduction of one or more species, by disrupting critical life stages, by impairing various physiological processes, or by promoting the introduction of non-indigenous species or pathogens. (Note: Activities that impact habitat and water quality may also affect living resources. These activities are dealt with in Questions 4 and 8, and many are repeated here as they also have direct effect on living resources).

Fishing and collecting are the primary means of removing resources. Bottom trawling, seine-fishing, and the collection of ornamental species for the aquarium trade are all common examples, some being more selective than others. Chronic mortality can be caused by marine debris derived from commercial or recreational vessel traffic, lost fishing gear, and excess visitation, resulting in the gradual loss of some species.

Critical life stages can be affected in various ways. Mortality to adult stages is often caused by trawling and other fishing techniques, cable drags, dumping spoil or drill cuttings, vessel groundings, or persistent anchoring. Contamination of areas by acute or chronic spills, discharges by vessels, or municipal and industrial facilities can make them unsuitable for recruitment; the same activities can make nursery habitats unsuitable. Although coastal armoring and construction can increase the availability of surfaces suitable for the recruitment and growth of hard bottom species, the activity may disrupt recruitment patterns for other species (e.g., intertidal soft bottom animals) and habitat may be lost.

Spills, discharges, and contaminants released from sediments (e.g., by dredging and dumping) can all cause physiological impairment and tissue contamination. Such activities can affect all life stages by reducing fecundity, increasing larval, juvenile, and adult mortality, reducing disease resistance, and increasing susceptibility to predation. Bioaccumulation allows some contaminants to move upward through the food chain, disproportionately affecting certain species.

Activities that promote introductions include bilge discharges and ballast water exchange, commercial shipping and vessel transportation. Releases of aquarium fish can also lead to species introductions.

Good	Few or no activities occur that are likely to negatively affect living resource quality.
Good/Fair	Some potentially harmful activities exist, but they do not appear to have had a negative effect on living resource quality.
Fair	Selected activities have resulted in measurable living resource impacts, but evidence suggests effects are

localized, not widespread.

Fair/Poor	Selected activities have caused or are likely to cause severe impacts, and cases to date suggest a pervasive problem.
Poor	Selected activities warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts have occurred or are likely to occur.

Question 15 (Maritime Archaeological Resources/Integrity): What is the integrity of known maritime archaeological resources and how is it changing?

The condition of archaeological resources in a marine sanctuary significantly affects their value for science and education, as well as the resource's eligibility for listing in the National Register of Historic Places. Assessments of archaeological sites include evaluation of the apparent levels of site integrity, which are based on levels of previous human disturbance and the level of natural deterioration. The historical, scientific and educational values of sites are also evaluated, and are substantially determined and affected by site condition.

Good	Known archaeological resources appear to reflect little or no unexpected disturbance.
Good/Fair	Selected archaeological resources exhibit indications of disturbance, but there appears to have been little or no reduction in historical, scientific, or educational value.
Fair	The diminished condition of selected archaeological resources has reduced, to some extent, their historical, scientific, or educational value, and may affect the eligibility of some sites for listing in the National Register of Historic Places.
Fair/Poor	The diminished condition of selected archaeological resources has substantially reduced their historical, scientific, or educational value, and is likely to affect their eligibility for listing in the National Register of Historic Places.
Poor	The degraded condition of known archaeological resources in general makes them ineffective in terms of historical, scientific, or educational value, and precludes their listing in the National Register of Historic Places.

Question 16 (Maritime Archaeological Resources/Threat to Environment): Do known maritime archaeological resources pose an environmental hazard and is this threat changing?

The sinking of a ship potentially introduces hazardous materials into the marine environment. This danger is true for historic shipwrecks as well. The issue is complicated by the fact that shipwrecks older than 50 years may be considered historical resources and must, by federal mandate, be protected. Many historic shipwrecks, particularly early to mid-20th century, still have the potential to retain oil and fuel in tanks and bunkers. As shipwrecks age and deteriorate, the potential for release of these materials into the environment increases.

Good	Known maritime archaeological resources pose few or no environmental threats.
Good/Fair	Selected maritime archaeological resources may pose isolated or limited environmental threats, but substantial or persistent impacts are not expected.
Fair	Selected maritime archaeological resources may cause measurable, but not severe, impacts to certain sanctuary resources or areas, but recovery is possible.
Fair/Poor	Selected maritime archaeological resources pose substantial threats to certain sanctuary resources or areas, and prospects for recovery are uncertain.
Poor	Selected maritime archaeological resources pose serious threats to sanctuary resources, and recovery is unlikely.

Question 17 (Maritime Archaeological Resources/Human Activities): What are the levels of human activities that may influence maritime archaeological resource quality and how are they changing?

Some human maritime activities threaten the physical integrity of submerged archaeological resources. Archaeological site integrity is compromised when elements are moved, removed, or otherwise damaged. Threats come from looting by divers, inadvertent damage by scuba diving visitors, improperly conducted archaeology that does not fully document site disturbance, anchoring, groundings, and commercial and recreational fishing activities, among others.

Good	Few or no activities occur that are likely to negatively affect maritime archaeological resource integrity.
Good/Fair	Some potentially relevant activities exist, but they do not appear to have had a negative effect on maritime archaeological resource integrity.
Fair	Selected activities have resulted in measurable impacts to maritime archaeological resources, but evidence suggests effects are localized, not widespread.
Fair/Poor	Selected activities have caused or are likely to cause severe impacts, and cases to date suggest a pervasive problem.
Poor	Selected activities warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts have occurred or are likely to occur.

Background Material for the OCNMS Condition Report
1/4/08

The following Q &A provides background information relating to this endeavor.

1. **What is a Condition Report?**
   A Condition Report provides a summary of resources in the Olympic Coast National Marine Sanctuary, pressures on those resources, the current condition and trends, and management responses to the pressures that threaten the integrity of the marine environment. Specifically, the Condition Report will include information on the status and trends of water quality, habitat, living resources and maritime archaeological resources and the human activities that affect them.

2. **What is the goal of the OCNMS Condition Report?**
   The OCNMS Condition Report will document the condition of sanctuary resources based on OCNMS staff judgments after consultation with selected partners and best available information. The report will serve as a tool to determine if the sanctuary is achieving its resource protection and improvement goals as reflected in NMSP performance measures.

3. **Who is the audience?**
   The report will serve as a supporting document during the OCNMS Management Plan Review Process, to be used by constituents who desire to participate in that process. It will also serve as a reporting tool to be used by policy makers, particularly within NOAA and DOC. The report will also be used as an education and outreach tool. It will be distributed to constituents and made available to the general public at events and on the internet (all reports will be posted on the NMSP website). The report will not be utilized by staff at the site level to make management decisions; managers will continue to reference more specific monitoring work and data accumulated at the site and by partners.

4. **What is the format of the report?**
   Condition Reports for all sanctuaries will follow the same format. Please see the Stellwagen Bank or Fagatele Bay NMS reports as a guide (http://sanctuaries.noaa.gov/science/condition/). Reports will be approximately 25 – 30 pages long (with an additional 10 pages for an Appendix). All reports will include the same basic elements:
      1. Overview
      2. Site History and Resources
      3. Pressures on the Sanctuary
      4. State of Sanctuary Resources
      5. Response to Pressures
      6. References
      7. Appendix – Explanation of the Questions

5. **How will resource condition be quantified?**
   The Condition Report uses a set of 17 questions as a tool to report on the status and trends of sanctuary resources. These questions relate to water, habitat, living resources, and maritime archaeological resources. Please see the Appendix in the Stellwagen Bank NMS report to see the full list of questions (http://sanctuaries.noaa.gov/science/condition/).

6. **Where did the set of 17 questions originate?**
   The questions derive from the National Marine Sanctuary Program mission, and a system-wide monitoring framework (National Marine Sanctuary Program, 2004 http://sanctuaries.noaa.gov/library/national/swim04.pdf) developed to ensure the timely flow of data and information to those responsible for managing and protecting resources in the ocean and coastal zone, and to those that use, depend on, and study the ecosystems encompassed by the sanctuaries. Questions 1-4 relate to Water Quality, questions 5-8 relate to Habitat, questions 9-14 relate to Living Resources, and questions 15-17 relate to Maritime Archaeological Resources.

The questions are general in nature so that they can be asked within any marine ecosystem and at any spatial scale. Much more specific questions are asked at any given marine sanctuary, forming the basis for site monitoring programs. These specific questions are not the focus of the Condition Report, but may be used to help answer the 17 questions posed here.

7. **What are the possible responses for each question?**
Each question will be answered using a "status and trends" reporting system. Each question will be assigned a color to denote status and a symbol to denote the trend.

Status:

Trends: ▲ Conditions appear to be improving.
— Conditions do not appear to be changing.
▼ Conditions appear to be declining.
? Undetermined trend.
N/A Question not applicable.

8. **How is a color and symbol selected?**
The Appendix (Rating Scheme for System-Wide Monitoring Questions) found in the Stellwagen Bank and Fagatele Bay NMS Condition Reports (http://sanctuaries.noaa.gov/science/condition/) will be included in every Condition Report. Its purpose is to clarify the 17 questions and the possible responses for each question. Sanctuary staff and partners are asked to utilize this guidance, as well as their own informed and detailed understanding of the site to make judgments about the status and trends of sanctuary resources.

In the Appendix, following a brief discussion about each question, statements are presented that are to be used to judge the status and assign a corresponding color code. These statements are customized for each question and provide a way to standardize judgments across the sanctuary system.

9. **What information will be given to support each question's answer?**
In the report text will explain the basis for judgment for determining the status and trend. This text will summarize monitoring findings relating to each question. Associated graphs, tables and other images will also be used to support each judgment. In general, preparers should base their judgment of status and trends on changes that have resulted from anthropogenic impacts that can be managed rather than natural drivers that can not be.

10. **How detailed is the report?**
All reports will be fairly high level and should be thought of as executive summaries that summarize the condition of the sanctuaries. The Condition Reports are not the place for presenting the bulk of monitoring data that is taking place at the sanctuary; rather it is a summary of findings from any and all monitoring programs that exist at a site.

11. **How often are the reports revised?**
The Condition Report will be revised every five years, preferable being completed near the beginning of the management plan review process. Sections of the web-based reports may be changed in the interim, as new information becomes available.

12. **Are the reports reviewed?**
Yes, the NMSP, in consultation with other NOAA legal and program staff, has determined that the Condition Reports are appropriately considered as Influential Scientific Information. For this reason, these reports are subject to the review requirements of the White House Office of Management and Budget as outlined in the Final Information Quality Bulletin for Peer Review. More information on this is on the Office of the Chief Information Officer website (http://www.cio.noaa.gov/Policy_Programs/info_quality.html).

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT
Olympic Coast National Marine Sanctuary
115 East Railroad Avenue, Suite 301
Port Angeles, WA 98362-2925

April 1, 2008

Dr. Don McIsaac
Executive Director
Pacific Fishery Management Council
7700 NE Ambassador Place
Suite 101
Portland, Oregon 97220-1364

Dear Dr. McIsaac:

I am pleased to transmit the draft 'Olympic Coast National Marine Sanctuary 2008 Condition Report' to the Pacific Fishery Management Council (PFMC) for your review per our previous discussion. I've also included updated guidance to technical reviewers, including suggestions on how to focus their review to make the best use of their limited time.

We are requesting review comments be submitted by April 25, 2008 to Mr. Liam Antrim (Liam.Antrim@noaa.gov). This will allow sufficient time for sanctuary staff to review and incorporate comments in a revised draft which will undergo peer review to ensure a thorough and scientifically accurate document. A copy of the final report will be provided to PFMC.

I look forward to discussing the draft report with the PFMC in April and am confident that early involvement by PFMC will improve the quality of the document and ensure that future management decisions rely on the best available science. If you have any questions, please contact me at 360-457-6622, Ext 11.

Sincerely,

Carol Bernthal
Sanctuary Superintendent

Attachment 1: Draft OCNMS 2008 Condition Report Charge to Reviewers
Attachment 2: Draft OCNMS 2008 Condition Report

Cc: William Douros, ONMS

Attachment 1: Draft Olympic Coast National Marine Sanctuary 2008 Condition Report, Charge to Reviewers

April 1, 2008

The Office of National Marine Sanctuaries (ONMS) and Olympic Coast National Marine Sanctuary (OCNMS) respectfully requests your review of the draft 'Olympic Coast National Marine Sanctuary 2008 Condition Report'. Sanctuary staff has identified your organization as having particular subject matter expertise, and we believe early review will improve the document.

We are requesting written comments on the draft report be submitted by April 25 to Mr. Liam Antrim (Liam.Antrim@noaa.gov), OCNMS, 115 East Railroad Ave, Suite 301, Port Angeles, WA 98362.

Charge

The sanctuary condition report provides a summary of marine sanctuary resources, pressures (e.g. human impacts), the current state of the sanctuary, and responses to the pressures that threaten the integrity of the marine environment. The primary purpose of the document is to report in a standardized way across all marine sanctuaries on the status and trends of water quality, habitat, living resources and maritime archaeological resources and the human activities that affect them. Resource status is rated on a scale from good to poor, and the timelines used for comparison vary from topic to topic. Trends in the status of resources are also reported, and are generally based on observed changes in status over the past five years, unless otherwise specified. Evaluations of status and trends were made by sanctuary staff, informed by expert opinions solicited from knowledgeable scientists and natural resource managers, as well as interpretation of quantitative and, when necessary, non-quantitative assessments. The OCNMS report will serve as a tool to determine if the OCNMS is achieving its resource protection and improvement goals and as a supporting document in the OCNMS management plan review, scheduled to begin in September 2008. Reports summarizing resource status and trends will be prepared for each marine sanctuary once every five years.

As you review the document, please do so recognizing that the report is much like an executive summary that is based on site specific data that may not be presented in detail within the report. To the extent possible, references and links to existing data are given, and appropriate summary graphics or data will be shown, but original sources are likely to contain much more information than the condition report. The graphics and layout of the report will also be improved in a subsequent draft that will then be peer reviewed. Please focus your comments on the substance of the report text and ratings, rather than on the report layout.

The 17 questions listed in the report and Appendix A are asked of all sanctuaries. The interpretation of the questions by sanctuary staff, and their responses to the questions are standardized according to the descriptions and explanations provided in Appendix A. We are not requesting your review of this portion of the report, as these standards were

established by the original panel of experts assisting in the development of the Sanctuary Wide Integrated Monitoring Program (SWiM).

You are welcome to review as much of the report as time permits, the most substantive sections of the report being Site History and Resources, Pressures on the Sanctuary, State of Sanctuary Resources, and Responses to Pressures. Given your relevant experience and knowledge of the fisheries resources of Olympic Coast National Marine Sanctuary, there are certain questions within the section titled State of Sanctuary Resources for which your review is particularly important. For these, we are interested in your expert opinion of our judgments of resource status and trends, the basis for judgment, and whether you feel that other data could or should have been incorporated into the ratings. We welcome any recommendations you may have regarding additional data or information sources that may improve assessments of resource conditions.

In our opinion, the following questions most likely contain or benefit from information within your area of expertise (please note that additional explanation can be found for each question and rating criteria in Appendix A of the Draft OCNMS Condition Report). If you have limited time for review, we suggest focusing on Questions 9-14 and the Response to Pressures section.

1. **Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality and how are they changing?** The question has to do with multiple stressors, which may include changing environmental conditions that are reflected in fisheries data or in the quality of harvested species.
3. **Do sanctuary waters pose risks to human health and how are they changing?** This question concerns the risk posed to humans by sanctuary waters, and we sometimes include information about shellfish or other closures as evidence of problems.
4. **What are the levels of human activities that may influence water quality and how are they changing?** Though the question concerns the level of human activities that might affect water quality, it would benefit from greater understanding about whether discharges from large vessels, perhaps including fishing vessels, are affecting water quality in the sanctuary.
5. **What are the abundance and distribution of major habitat types and how are they changing?** Among other things, we are interested in any evidence of changing habitat quality resulting from fishing.
6. **What is the condition of biologically-structured habitats and how is it changing?** We seek information on the status and trends of habitats with substantial amounts of biogenic structure.
7. **What are the contaminant concentrations in sanctuary habitats and how are they changing?** We are interested to know whether there may be fisheries data that inform us on whether there are likely to be contaminants in sanctuary habitats.
8. **What are the levels of human activities that may influence habitat quality and how are they changing?** We are interested in learning more about the *levels* of any destructive fishing activities that occur within the sanctuary.

9. **What is the status of biodiversity and how is it changing?** There might be information on biodiversity that comes from the fishing community that would help us respond to this question. Most relevant may be changes that have been observed in food web structure due to altered populations of predators and prey, and extirpations that may have occurred.
10. **What is the status of environmentally sustainable fishing and how is it changing?** This may be the most important question for your input. Note that while it requires information on levels of harvesting and stock status, the responses paired with each color rating try to focus on the extent to which harvesting alters the ecosystem and its ability to withstand the impacts of harvesting.
11. **What is the status of non-indigenous species and how is it changing?** If fisheries data indicate anything about the history of non-indigenous species in OCNMS, it would be helpful to add it to our response on this question.
12. **What is the status of key species and how is it changing?** For purposes of your review, please consider the status of keystone species in the ecosystem, and those that have special protected status.
13. **What is the condition or health of key species and how is it changing?** We are interested in information on the condition/health of the species identified in Question 12, particularly with regard to evidence of stress and their ability to contribute to the next generation.
14. **What are the levels of human activities that may influence living resource quality and how are they changing?** Among other things, this question addresses *levels* of fishing. Your review is therefore critical here.

On behalf of the Olympic Coast National Marine Sanctuary and the Office of National Marine Sanctuaries, thank you for taking the time to review the report.

Olympic Coast

National Marine Sanctuary

Condition Report 2008

NOTE TO REVIEWERS: This is a draft report in which several tasks have not been completed.

1. *Web links are shaded in grey and inserted into the text where "hot links" will eventually be created. In general, web links are not provided as references but sources of further information a reader can pursue. Placement of web links in this draft is not consistent but will be resolved later.*
2. *This draft is not formatted for graphics. Some figure numbering is off due to text editing. Some figures we will try to improve.*
3. *If you note where a graphic can be improved, or a new or better graphic can be inserted, please make recommendations.*
4. *The reference section is not finalized, and some citations may be missing. Feel free to suggest changes to referencing, but be aware this section remains under development.*

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Table of Contents

About this Report

This "condition report" provides a summary of resources in the National Oceanic and Atmospheric Administration's Olympic Coast National Marine Sanctuary, pressures on those resources, current condition and trends, and management responses to the pressures that threaten the integrity of the marine environment. Specifically, the document includes information on the status and trends of water quality, habitat, living resources and maritime archaeological resources and the human activities that affect them. It presents responses to a set of questions posed to all sanctuaries (Appendix A). Resource status of the Olympic Coast sanctuary is rated on a scale from good to poor, and the timelines used for comparison vary from topic to topic. Trends in the status of resources are also reported, and are generally based on observed changes in status over the past five years, unless otherwise specified.

Sanctuary staff consulted with outside experts familiar with the resources and with knowledge of previous and current scientific investigations. Evaluations of status and trends are based on interpretation of quantitative and, when necessary, non-quantitative assessments, and the observations of scientists, managers and users. The ratings reflect the collective interpretation of the status of local issues of concern among sanctuary program staff and outside experts based on their knowledge and perception of local problems. The final ratings were determined by sanctuary staff. *NOTE: Before public release, this report will be peer reviewed and will comply with the White House Office of Management and Budget's peer review standards as outlined in the Final Information Quality Bulletin for Peer Review.*

This is the first attempt to describe comprehensively the status, pressures and trends of resources at Olympic Coast National Marine Sanctuary. Additionally, the report helps identify gaps in current monitoring efforts, as well as causal factors that may require monitoring and potential remediation in the years to come. The data discussed will enable us to not only acknowledge prior changes in resource status, but will provide guidance for future management as we face challenges imposed by such potential threats as oil spills, invasive species, commercial development, climate change, and underwater noise pollution.

Summary and Findings

TO BE DRAFTED

National Marine Sanctuary System and System-Wide Monitoring

The National Marine Sanctuary System manages marine areas in both nearshore and open ocean waters that range in size from less than one to almost 140,000 square miles. Each area has its own concerns and requirements for environmental monitoring, but ecosystem structure and function in all these areas have similarities and are influenced by common factors that interact in comparable ways. Furthermore, the human influences that affect the structure and function of these sites are similar in a number of ways. For these reasons, in 2001 the program began to implement System-Wide Monitoring (SWiM). The monitoring framework (National Marine Sanctuary Program 2004) facilitates the development of effective, ecosystem-based monitoring programs that address management information needs using a design process that can be applied in a consistent way at multiple spatial scales and to multiple resource types. It identifies four primary components common among marine ecosystems: water, habitats, living resources and maritime archaeological resources.

By assuming that a common marine ecosystem framework can be applied to all places, the National Marine Sanctuary System developed a series of questions that are posed to every sanctuary and used as evaluation criteria to assess resource condition and trends. The questions, which are shown on pages vii and viii and explained in Appendix A, are derived from both a generalized ecosystem framework and from the National Marine Sanctuary System's mission. They are widely applicable across the system of areas managed by the

sanctuary program and provide a tool with which the program can measure its progress toward maintaining and improving natural and archaeological resource quality throughout the system.

Similar reports summarizing resource status and trends will be prepared for each marine sanctuary approximately every five years and updated as new information allows. The information in this report is intended to help set the stage for the management plan review process. The report also helps sanctuary staff identify monitoring, characterization and research priorities to address gaps, day-to-day information needs and new threats.

TEXT BOX

Olympic Coast National Marine Sanctuary

- *Designated as a national marine sanctuary in 1994.*
- *The sanctuary extends 135 miles along the Washington Coast from about Cape Flattery to the Copalis River. Fifty six of these miles are shared with Olympic National Park and include some of the last remaining wilderness coastline in the lower 48 states.*
- *29 species of marine mammals and over 100 species of seabirds spend at least part of their lives in the sanctuary.*
- *Three national wildlife refuges, collectively called the Washington Island National Wildlife Refuges, are located within the sanctuary. These refuges are part of the WA Maritime National Wildlife Refuge Complex and protect over 600 named and unnamed offshore rocks, seastacks and islands.*
- *The sanctuary has sustained human communities for at least 6,000 years.*
- *The sanctuary lies within the traditional fishing areas for four coastal Indian tribes, the Makah, Quileute, and Hoh Tribes and the Quinault Indian Nation.*
- *Over 150 documented shipwrecks have occurred within the area of the sanctuary.*
- *The seaward boundary of the sanctuary varies from about 25 to 45 miles offshore. This covers the continental shelf as well as parts of three major submarine canyons. Sanctuary waters include many types of crucial marine habitat including nearshore kelp beds, subtidal reefs, rocky and sandy intertidal zones, submarine canyons, rocky deep sea habitat, and plankton-rich upwelling zones, all of which support the sanctuary's rich biodiversity.*

Olympic Coast National Marine Sanctuary Condition Summary Table

Good	Good/Fair	Fair	Fair/Poor	Poor	Undet.

Condition Summary: The results in the following table are a compilation of findings from the "State of Sanctuary Resources" section of this report. (For further clarification of the questions posed in the table, please see Appendix A.)

Trends:
- ▲ Conditions appear to be improving.
- — Conditions do not appear to be changing.
- ▼ Conditions appear to be declining.
- **?** Undetermined trend.
- **N/A** Question not applicable.

#	Questions/Resources	Rating	Basis for Judgment	Description of Findings	Sanctuary Response
WATER					
1	Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality?	?	Hypoxic conditions may be increasing in frequency and spatial extent in nearshore waters.	Selected conditions may preclude full development of living resource assemblages and habitats, but are not likely to cause substantial or persistent declines.	Management focuses on spill and dumping preventative measures, including relocating ship traffic lanes offshore, tracking ships, enhancing spill response assets in the region, and reducing wastes discharged from ships; moored instruments track nearshore water quality; periodic shipboard surveys to investigate physical, chemical and biological linkages
2	What is the eutrophic condition of sanctuary waters and how is it changing?	—	No suspected human influence on HABs or eutrophication in the sanctuary	Conditions do not appear to have the potential to negatively affect living resources or habitat quality.	
3	Do sanctuary waters pose risks to human health?	—	Naturally occurring HABs result in periodic shellfish closures	Selected conditions that have the potential to affect human health may exist but human impacts have not been reported.	
4	What are the levels of human activities that may influence water quality and how are they changing?	—	Threat of oil spills from vessels	Some potentially harmful activities exist, but they do not appear to have had a negative effect on water quality.	
HABITAT					
5	What is the abundance and distribution of major habitat types and how is it changing?	?	Prior disturbance by bottom-tending gear on hard substrates; short-term impacts from fishing gear and cable installation on soft substrates	Selected habitat loss or alteration has taken place, precluding full development of living resource assemblages, but it is unlikely to cause substantial or persistent degradation in living resources or water quality.	Sanctuary and partners map and characterize deep habitats and the extent of human impacts and conveys information to fisheries managers; large areas have been closed to fishing that uses bottom contacting gear to protect sensitive habitats; negotiated reburial of exposed fiber optic cable; began marine debris removal efforts
6	What is the condition of biologically structured habitats and how is it changing?	?	Damage by bottom-tending gear in some deep biogenic habitats	Selected habitat loss or alteration may inhibit the development of living resources, and may cause measurable but not severe declines in living resources or water quality.	
7	What are the contaminant concentrations in sanctuary habitats and how are they changing?	—	Prior studies indicate low levels of contaminants	Contaminants do not appear to have the potential to negatively affect living resources or water quality.	
8	What are the levels of human activities that may influence habitat quality and how are they changing?	▲	Decrease in bottom-tending fishing, and presumably impacts to hard bottom habitats	Selected activities have resulted in measurable habitat impacts, but evidence suggests effects are localized, not widespread.	

LIVING RESOURCES					
9	What is the status of biodiversity and how is it changing?	▲	Ecosystem-level impacts caused by historical depletion of fish, marine mammals, high order predators, and keystone species.	Selected biodiversity loss may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity.	Sanctuary works with partners to detect non-indigenous species and conducts regular intertidal monitoring; wide area closures by fisheries management authorities to allow populations to recover; working with Finavera and state, federal, and tribal representatives to develop monitoring plans for wave energy pilot project
10	What is the status of environmentally sustainable fishing and how is it changing?	?	Overexploitation of some groundfish species has led to wide area closures	N/A	
11	What is the status of non-indigenous species and how is it changing?	▼	Invasive *Sargassum* and *ascidian* distrubutions are expanding	Non-indigenous species exist, precluding full community development and function, but are unlikely to cause substantial or persistent degradation of ecosystem integrity.	
12	What is the status of key species and how is it changing?	?	Depleted population levels for Common Murres, sea otters, and numerous rockfish, with differing recovery rates	The reduced abundance of selected keystone species may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity; or selected key species are at reduced levels, but recovery is possible.	
13	What is the condition or health of key species and how is it changing?	?	Diseases in sea otters, uncertain recovery	The condition of selected key resources is not optimal, perhaps precluding full ecological function, but substantial or persistent declines are not expected.	
14	What are the levels of human activities that may influence living resource quality and how are they changing?	▲	Commercial and recreational fishing has decreased due to closures.	Selected activities have resulted in measurable living resource impacts, but evidence suggests effects are localized, not widespread.	
MARITIME ARCHAEOLOGICAL RESOURCES					
15	What is the integrity of known maritime archaeological resources and how is it changing?	?	Deepwater wrecks stable; shallow wrecks subject to environmental degradation; lack of monitoring to determine trend	The diminished condition of selected archaeological resources has reduced, to some extent, their historical, scientific, or educational value, and may affect the eligibility of some sites for listing in the National Register of Historic Places.	Need to conduct inventories and monitoring, and to assess possible impacts of sea level rise on coastal archaeological resources
16	Do known maritime archaeological resources pose an environmental hazard and how is this threat changing?	—	Historic wrecks did not carry substantial quantities of hazardous cargoes	Known maritime archaeological resources pose few or no environmental threats.	
17	What are the levels of human activities that may influence maritime archaeological resource quality and how are they changing?	?	Unauthorized salvaging, fishing activities, and cable installations offshore	Selected activities have resulted in measurable impacts to maritime archaeological resources, but evidence suggests effects are localized, not widespread.	

Site History and Resources

Overview

The Olympic Coast National Marine Sanctuary spans 3,310 square miles of marine waters off Washington State's rugged Olympic Peninsula coast (Figure 1). Extending seaward 25 to 45 miles (40 to 72 km), the sanctuary covers much of the continental shelf and the heads of three major submarine canyons. The sanctuary borders an undeveloped coastline, enhancing protection provided by the 56-mile-long (90 km) wilderness of the Olympic National Park's coastal strip, as well as more than 600 offshore islands and emergent rocks within the Washington Islands National Wildlife Refuges. Located in a nutrient-rich upwelling zone and comprised of a multitude of marine habitats, the sanctuary is home to numerous marine mammals and seabirds, diverse populations of kelp and other macroalgae, and diverse fish and invertebrate communities.

Figure 1. The Olympic Coast sanctuary is located off the rugged Olympic Peninsula of Washington State and encompasses 3,310 square miles of ocean from the shoreline to a depth of over 1,400 meters. (Map: Olympic Coast sanctuary)

Designated in 1994, the sanctuary's mission is to protect the Olympic Coast's natural and cultural resources through responsible stewardship, to conduct and apply research to preserve the area's ecological integrity and maritime heritage, and to promote understanding through public outreach and education.

Early Exploration and Settlement

The Olympic Coast has sustained human communities for at least 5,000 years and possibly much longer. http://olympiccoast.noaa.gov/living/history_and_culture/welcome.html Prehistoric sites provide a glimpse of some early cultures that were centered on ocean or river-dependent hunting, gathering, fishing and whaling activities (Figure 2). Artifacts from one site, the Late-Prehistoric Ozette archaeological site near Cape Alava, provide a window into the daily life of that culture immediately before European contact. Recent research on earlier sites confirms maritime-adapted cultural practices of offshore fishing and whaling dating at least 4,000 years before present. Today, the Makah, Quileute, and Hoh tribes and Quinault Indian Nation carry their heritage forward by continuing their roles as natural resource managers and stewards of traditional culture.

TEXT BOX: Coastal Tribes of the outer coast of Washington - (from south to north)

Quinault Indian Nation	The Quinault Indian Nation consists of the Quinault and Queets tribes and descendants of five other coastal tribes. The Quinault Indian Reservation, located in the southwest corner of the Olympic Peninsula, includes 37 kilometers (23 miles) of Pacific coastline and covers 84,271 hectares (208,150 acres) of forested land. http://209.206.175.157/
Hoh Indian Tribe	The Hoh Reservation consists of 179 hectares (443 acres) located 45 kilometers (28 miles) south of Forks at the mouth of the Hoh River. The reservation has about one mile of beach front between the mouth of the Hoh River and Ruby Beach. http://www.npaihb.org/member_tribes/tribe/hoh_tribe/
Quileute Indian Tribe	Surrounded on three sides by The Olympic National Park, the Quileute Reservation is located on 240 hectares (594 acres) along the Pacific Ocean and on the south banks of the Quillayute River and includes the town of LaPush. http://www.quileutetribe.org/7.html http://www.npaihb.org/member_tribes/tribe/quileute_tribe/
Makah Nation	Located in the northwestern most corner of the contiguous US, the Makah Reservation consists of 11,007 hectares (27,200 acres) and is bounded by the Pacific Ocean and the Strait of Juan de Fuca. It includes the town of Neah Bay. Over 405 hectares (1,000 acres) of the land bordering the Pacific Ocean have been reserved as a Wilderness Area. The Makah are part of the Nootkan culture group, which includes two other tribes in British Columbia, Canada. http://www.makah.com/index.html http://www.npaihb.org/member_tribes/tribe/makah_tribe1/

Figure 2. Human presence on the Olympic Coast predates historical records and attests to these cultures' long and intricate relationship with the marine environment. (Photo: Olympic Coast sanctuary)

Juan de Fuca, a pilot on a Greek ship, reported visiting a Northwest Passage that emptied into the Pacific Ocean in 1592. For the next 200 years, Spain, England, France and Russia all sent explorers to confirm his report and lay claim to the region and its riches. De Fuca's visit was never confirmed, however his name was preserved on later English maps and the passage is now known as the Strait of Juan de Fuca (Figure 1).

In 1778, the English explorer Captain James Cook sailed the coast. In 1788, another English sea captain, John Meares, was so impressed by Mount Olympus he named it after the mythical home of the Greek gods. "If that be not the home where dwell the Gods, it is beautiful enough to be, and I therefore call it Mount Olympus," he wrote. The name was made official 14 years later when Captain George Vancouver entered the name on his maps and referred to the whole range as the Olympic Mountains. Although the Spanish built the first European

settlement near Neah Bay in 1792, Spanish influence was short-lived. The settlement was abandoned after only five months when Spain came under the threat of war from Great Britain.

Present day exploration along the Olympic Coast is now often conducted with the intent to learn how to best manage and protect the marine environment. In 1994, the Olympic Coast sanctuary was designated with the overriding objective of providing a comprehensive approach to natural and historical resource management. Sanctuary designation provides a mechanism for assessing and mitigating the impacts of ongoing and future activities in the area. In-depth examination of sanctuary resources provides a greater understanding of the area's ecological balance thereby providing a foundation for better management (NOAA 1993).

http://www.americanparknetwork.com/parkinfo/ol/history/

Geology

The Olympic Coast sanctuary is subject to tectonic forces caused by the combined movements of the large Pacific and North American Plates and the smaller Juan de Fuca Plate. The Juan de Fuca Plate and the Pacific Plate are spreading away from each other at a divergent plate boundary offshore (Figure 3). Slowly, the Juan de Fuca plate is being pressed toward the North American plate in the Pacific Northwest region. Moving at a rate of about 3-4 centimeters per year, the Juan de Fuca Plate plunges beneath the North American Plate. As the denser plate of oceanic crust is forced deep into the Earth's interior beneath the continental plate, a process known as subduction, it encounters high temperatures and pressures that partially melt rock. Some of this newly formed magma rises toward the Earth's surface, forming a chain of volcanoes (within the uplifted Cascade Range) above the Cascadia Subduction Zone. The geologic activity in the area off the Olympic Coast sanctuary gives rise to potential hazards such as volcanic eruptions, earthquakes and associated tsunamis. Tsunamis, long-period sea waves produced by submarine earthquakes or volcanoes, occasionally strike the Washington coast. The Alaskan earthquake of 1964 produced a tsunami that reached a height of almost 13 ft (4m) at Seaview, Washington.

http://vulcan.wr.usgs.gov/Volcanoes/JuanDeFucaRidge/description_juan_de_fuca.html
http://walrus.wr.usgs.gov/tsunami/research1.html
http://www.pnsn.org/HAZARDS/CASCADIA/cascadia_event.html

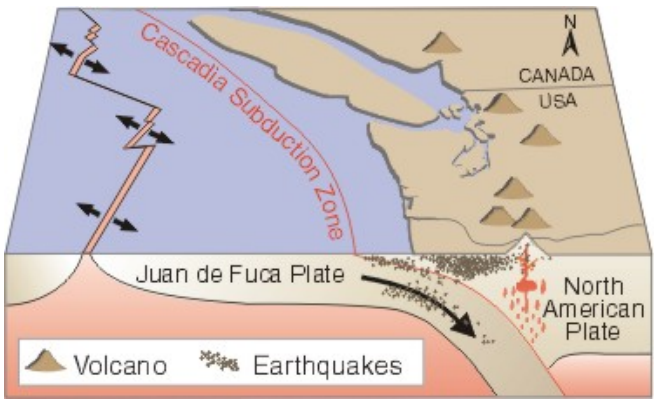

Figure 3. Subduction of the Juan de Fuca Plate under the North American Plate controls the distribution of earthquakes and volcanoes in the Pacific Northwest. (Diagram: USGS)

A continental shelf reaches out from Washington's coast from 8 to 40 miles (13 to 64 km), and provides a relatively shallow (600 feet or 180 meters depth or less) coastal environment within the sanctuary. Several submarine canyons cut into the continental shelf along the western boundary of the sanctuary and the trough of

the Juan de Fuca Canyon winds through the northern portion of the sanctuary to the Strait of Juan de Fuca. In the northern portion of the sanctuary, the sediments on the shelf are largely glacial deposits from the Ice Age, and the shelf slope is steep and jagged. Modern sediments are carried west through the Strait of Juan de Fuca and north from the Columbia River. These materials are generally transported northward by year-round bottom currents and winter storms, and eventually accumulate on the shelf. The majority of the sanctuary seafloor, however, has not yet been adequately mapped or characterized, so a full understanding of sediments and habitat distribution remains elusive (Intelmann 2006).

Broad beaches, dunes, and ridges dominate the coastline from Cape Disappointment, on the north side of the Columbia River mouth, to the Hoh River. Wave action has eroded the shoreline through time and has formed steep cliffs at various places along the coast, and forested hills and sloping terraces are found near river mouths (Figure 4). Between Point Grenville and Cape Flattery, cliffs can rise abruptly 50 to 300 feet (15 to 90 m) above a wave-cut platform that is underwater except during extreme low tides. This wave-cut platform can be almost two miles (3 km) wide in some places. Small islands, sea stacks, and rocks dot the platform's surface.

http://olympiccoast.noaa.gov/living/physical_environment/geo/welcome.html
http://sanctuaries.noaa.gov/science/conservation/hm_olympic.html
http://sanctuaries.noaa.gov/science/conservation/hm_olympic.html

Figure 4. Eroded headlands like Point of Arches demonstrate the eternal dynamic of the sea's forces pounding against the shoreline.

Commerce

The key to opening the northwest coast to European trade in the late 1700s was the fur trade, specifically the profitable sea otter pelts that were obtained from the Indians by English, Russian, Spanish and American fur traders. As the news spread of the great profits to be had in fur trading, sea otter populations dwindled and by the early 1900s, sea otters had been extirpated from the region.

http://olympiccoast.noaa.gov/living/history_and_culture/history/welcome.html

Figure xx. Sea otters were hunted nearly to extinction in the 18th and 19th centuries for their fur. Because of reintroduction efforts in the 1970s to the Pacific Northwest, they are making a slow but steady comeback along the Olympic coast. (Photo: C. Edward Bowlby)

Through the latter part of the 1800s, pioneers moved into the Olympic Peninsula to farm, fish, and cut timber. Like Native Americans, most early settlers chose to settle along the coast. In 1851 Port Townsend became the first permanent American settlement on the Peninsula, providing a gateway for further settlements to the west (Figure 5). Port Angeles, with its harbor, lighthouse, military reservation, customs house, and strategic location on the Strait of Juan de Fuca, was designated by President Abraham Lincoln as a town site in 1862. President Grover Cleveland officially opened the town to settlers in 1891. Today, it is the Peninsula's largest town with a population of 18,400 (in 2000). The town of Forks had European settlers as early as the 1860s and was considered a settlement by the 1870s. People were originally drawn to Forks for gold prospects but timber became the mainstay of the economy of Forks and other west end towns.

http://www.forks-wa-real-estate.com/history.htm

Fishing continues to be an important commercial venture for coastal communities like Neah Bay and La Push. Although the area attracted logging, farming and fishing interests, the rugged western coast and interior of the Peninsula retain significant roadless wilderness. Olympic National Park was established in 1938 and now includes nearly a million acres of mountain, forest, and coastline designated as wilderness. The coastal strip of the Park was added in 1953. The Olympic National Forest was designated 1897 as the Olympic Forest Reserve and now contains 88,265 acres (15% of the total national forest acreage) of designated wilderness.

http://www.fs.fed.us/r6/olympic/faq/ http://www.americanparknetwork.com/parkinfo/ol/history/

Figure 5. In 1851, Port Townsend became the first permanent American settlement on the Olympic Peninsula, providing a gateway to western non-indigenous expansion.

Throughout the period of European settlement on the western Olympic Peninsula, the link between the land and the ocean has shaped history. Early canneries, logging operations and hotels reflected not just the economic opportunities offered by coastal resources, but the hardships imposed by the Olympic Coast's remoteness, such as lack of or limited road transport. Coast-wide trade linked the productive Olympic Peninsula with markets in California, Hawaii, Australia and beyond. In addition, the completion of railroad links across the Continental Divide in both Canada and the United States made the ports of Vancouver, Seattle, Everett, Tacoma and Victoria important sources of grain, timber, gold and other resources for the world's economy.

http://olympiccoast.noaa.gov/living/history_and_culture/welcome.html

Today commerce on the Olympic coast still depends largely on commercial and recreational fishing, logging and tourism. In recent years, the local timber industry and the fishing industries have both been impacted by reduced harvests, and the local economy has struggled. Coastal communities continue to respond to a changing economy by developing innovative enterprises such as value-added wood product manufacturing (local manufacturing rather than export of raw timber) and accommodating the growth of tourism to diversify the economic base.

Water

The Washington outer coast is known for its rough seas and large waves - extreme wave heights ranging from 50 to 90 feet (15 to 27 m) have been recorded on and beyond the continental shelf. Winter storms, traveling across the fetch of the Pacific, gain momentum. As they encounter the shallower continental shelf, the energy is magnified and they pound the coast with the gathered intensity.

http://olympiccoast.noaa.gov/living/ocean_processes/waves_currents/welcome.html

Surface winds generated by atmospheric pressure systems are the main force driving ocean surface circulation off the Pacific Northwest. Spring and summer winds blow generally toward the south and push surface waters southward and offshore. This results in nearshore upwelling of cold, nutrient rich water to the surface (Figure 7). This influx of nutrients enhances plankton communities that are ultimately responsible for the region's productive fisheries. Downwelling tends to occur in the fall and winter months when the winds blow generally toward the north and surface water is forced shoreward. (Oregon Sea Grant 1997). Other physical features also play a role in these movements, however. River plumes, submarine canyons, banks, coastal promontories and offshore eddies influence the magnitude and timing of nutrient delivery to plankton, and may explain why primary productivity is higher along the Washington coast than the Oregon coast (Hickey and Banas 2003).

Note: no Figure 6 in current version of document

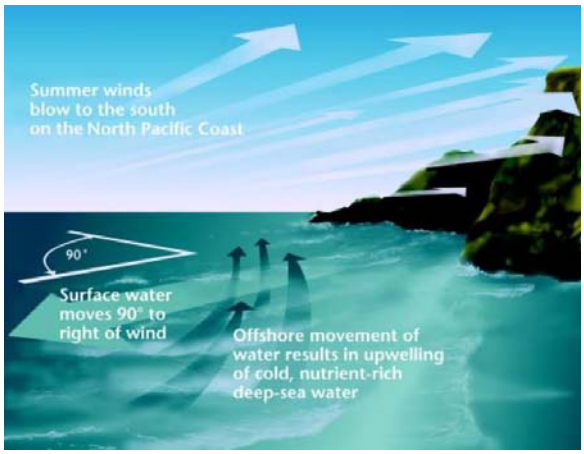

Figure 7. Southward-blowing winds are associated with a net transport of surface waters away from the coastline, resulting in intermittent upwelling. (Image: Oregon Sea Grant)

Habitat

The Olympic Coast sanctuary contains a broad diversity of habitats including rocky shores, sandy beaches, kelp forests, sea stacks and islands, open ocean or pelagic habitats, the continental shelf seafloor and submarine canyons. Along the shoreline, tidepools are formed amid boulders and rocky outcrops that provide both temporary and permanent homes for an abundance of 'seaweeds' (e.g., macroalgae and seagrasses), invertebrate species such as sea stars, hermit crabs, and sea anemones, and intertidal fish. Rocky shores of the Olympic Coast have among the highest biodiversity of all eastern Pacific coastal sites from Central America to Alaska. Nestled between these rocky headlands are numerous sand-covered pocket beaches that host their unique array of intertidal invertebrates and fishes.

Kelp forests form dense stands in nearshore waters, with individual plants reaching up to 20 m in length (Figure 8). The structure of this living habitat alters the physical forces (waves and currents) in the nearshore area and creates a protective environment for fish and invertebrates, from their holdfast base on the seafloor to their canopies at the surface. Sea otters are often seen rafting and resting in and near kelp canopies, while many species and ages of fish find protective habitat among the kelp forests.

Pinnacles (sea stacks) and islands along the coast also provide havens and resting sites for California and Steller sea lions, harbor and elephant seals, and thousands of nesting seabirds. High-relief submerged topographic features such as rock piles serve as fish aggregation areas.

Figure 8. Within the nearshore environment, kelp forests are vital habitat for many species of fish, invertebrates, seabirds and mammals.

A majority of the sanctuary lies over the continental shelf, extends from the nearshore to the shelf break at about the 200 meter contour. The shelf is composed primarily of soft sediment and glacial deposits of cobble, gravel and boulders, punctuated by rock outcrops, and is inhabited by creatures such as flatfish, rockfish, octopuses, brittle stars and sea pens that have adapted to the darkness, cold, and pressure of the seafloor. Sanctuary boundaries extend beyond the edge of the continental shelf and include portions of the Nitinat, Juan de Fuca, and Quinault submarine canyons (Figure 1). The Quinault canyon is the deepest, descending to 4,660 feet (1,420 m) at its deepest point within the sanctuary. Many creatures, such as corals, sponges, crinoids, rockfish, and shrimp, inhabit these areas of physical extremes. The canyons are also dynamic areas where submarine landslides can occur on the steep side walls and canyon bottoms collect sediment deposited from above. They also serve as conduits for dense, cold, and nutrient-rich seawater that is pulled toward shore, where upwelling feeds surface productivity at the base of the food web.

Recent surveys conducted in offshore shelf and canyon habitats have confirmed the presence of hard-bottom substrates that harbor rich invertebrate assemblages, including deep water coral and sponges. In the minds of the general public, such fauna are often thought to be restricted to shallow tropical waters. However, an increasing number of studies around the world have recorded coral and sponge assemblages in deeper, cold-water habitats in both northern and southern latitudes. These living organisms with branching, upright structure are, in turn, habitat themselves for other invertebrates and fish (Whitmire and Clarke 2007). Habitat forming corals and sponges provide hiding places, attachment sites, feeding prospects and breeding and nursery grounds in relatively inhospitable and otherwise featureless environments (Figure 9).

http://olympiccoast.noaa.gov/living/habitats/welcome.html
http://sanctuaries.noaa.gov/science/conservation/mcarthur.html

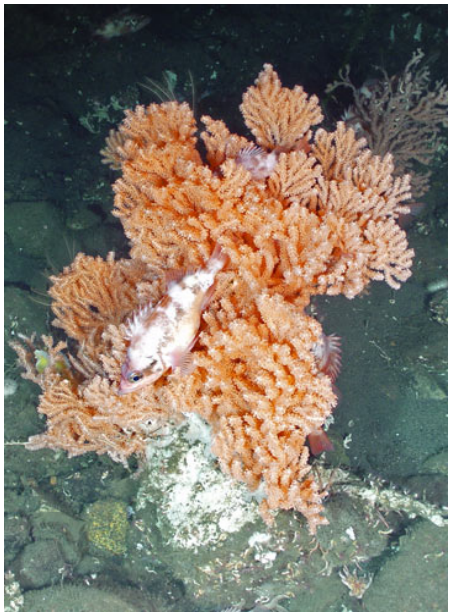

Figure 9. The red tree coral, *Primnoa pacifica* with darkblotched and sharpchin rockfish are colorful inhabitants of deep rocky areas**.** (Source: Olympic Coast sanctuary)

Living Resources

Twenty-nine species of marine mammals have been sighted in the Olympic Coast sanctuary, including seven species of endangered whales. Two species are frequent foragers in the sanctuary, the humpback whale and the orca (also called the killer whale) (Figure 10). Gray whales, which were recently removed from the endangered species list, travel through the sanctuary on their annual migrations between breeding and calving grounds off the Baja Peninsula and summer feeding grounds in the northern Pacific. Sea otters, harbor and elephant seals, and Steller and California sea lions aggregate along the shore and haul out on land at many locations along the coast throughout the year.

http://olympiccoast.noaa.gov/living/marine_wildlife/welcome.html

Figure 10. Most orcas (or killer whales) in the sanctuary belong to resident groups that frequent northern Puget Sound and the Strait of Georgia. Occasionally, wide-ranging oceanic groups (transient orca and offshore orca) visit the region.

Seabirds are the most conspicuous members of the offshore fauna of the Olympic Coast. Sea stacks and islands provide critical nesting habitat for nineteen species of marine birds and marine associated raptors and shorebirds including seven alcid species (murres, puffins, murrelets etc.; Figure 11), three cormorant species,

four gull and tern species, two storm-petrel species, two raptors and one shorebird, the black oystercatcher. Productive offshore waters attract large feeding aggregations of marine birds that breed in other regions of the world but travel great distances to "winter" in sanctuary waters. The sooty shearwater, for example, breeds off New Zealand and Chile in the austral summer and congregates along the Pacific coast in their non-breeding season. Black-footed and Laysan albatross travel far from their breeding grounds in Hawaii and Japan to forage in the eastern Pacific. Nearer to shore, sand and gravel beaches furnish foraging areas for shorebirds, crows, gulls and a host of others. The coastline forms an important migratory pathway for millions of birds that pass through each year, guiding waterfowl, cranes, shorebirds, and raptors toward northern breeding areas during the spring and southward, as winter approaches.

Figure 11. The distinctive Tufted Puffin is a familiar seabird that nests in burrows on remote islands far from any mammalian predators.

Sanctuary waters are inhabited by diverse and abundant fish and invertebrate populations (Figure 12). Commercially important fish and shellfish include at least 30 species of rockfish (including thirteen state species of concern of which three are also federal species of concern), plus Pacific halibut, herring, Pacific cod, Pacific whiting, lingcod, sablefish, 15 or more species of flatfish, Dungeness crab, razor clams, and several species of shrimp. Five species of Pacific salmon (chinook, sockeye, pink, chum, and coho) occur along the outer coast of Washington and breed in the Olympic Peninsula's rivers and streams. Three similar species found in freshwater systems (sea-run cutthroat trout, bull trout, and steelhead) spend portions of their lives in nearshore marine waters. Olympic Coast populations of Ozette sockeye and bull trout were added to the federal list of threatened species in 1999. Nearshore habitats of the sanctuary are important for salmon that spawn in adjacent streams. The sanctuary also encompasses the migration corridor of both juvenile and adult salmonids from California, Oregon, and British Columbia, and from other rivers in Washington. Sharks, albacore and yellowfin tuna, sardines, mackerel, anchovies and other migratory species also are found in the sanctuary seasonally. These fast-moving fishes are important resources for tribal and non-tribal fishers.

Figure 12. Nearly every surface in the rocky intertidal zone is used by something, and space is at a premium. Predatory ochre sea stars search for mussels among communities of green sea anemones and rockweed.

Intertidal habitats challenge inhabitants with extreme temperature, salinity, and oxygen fluctuations along with powerful physical forces such as sand scouring and wave action. Invertebrate communities in rocky intertidal zones are some of the richest on the west coast and include a wide diversity of sea stars, sea urchins, nudibranchs, chitons and polychaetes. Macroalgae or seaweeds are also extremely diverse in the region with an estimated 120 through to occur within the sanctuary rocky intertidal zone (Dethier 1988). Sandy intertidal areas host sand-dwelling invertebrates, and several notable fish species including starry flounder, staghorn sculpin, sand lance, sand sole, surfperch, and sanddab. Surf smelt spawn at high tide on sand-gravel beaches where surf action bathes and aerates the eggs. Rocky intertidal habitats hold another roster of residents: tidepool sculpins, gunnels, eelpouts, pricklebacks, cockcombs, and warbonnets, to name few.

In the deeper areas of the sanctuary (e.g., greater than 250 ft or 80 m) investigations are beginning to reveal stunning colonies of brightly colored, cold-water corals and sponges. These unique assemblages include soft corals such as gorgonian species, stony corals (e.g., *Lophelia sp.*), giant cup corals (e.g., *Desmophyllum sp.*) and at least 40 species of sponges (Brancato et al. 2007). The distribution of such deep-water communities, as well as their species richness and basic biology, are unknown but are currently under scientific investigation.

Maritime Archaeological Resources

Native and Prehistoric Maritime Heritage

The earliest dated archaeological site on the Washington Coast occurs adjacent to the sanctuary on the Makah Indian Reservation, establishing human presence for the last 5,000 years. Although complex geological and climatic factors have changed the shoreline due to tectonic uplift and global sea level rise, it is evident that humans have occupied the coastal zone and adapted to changing habitats over time. The recent investigation of paleoshoreline sites on the Makah Reservation reveals high sea-stand village sites inland along the Sooes and Waatch river valleys, in some cases greater than ten meters above current sea level and miles from the current ocean shore (Wessen 2003). These sites reveal complex interactions with marine resources of the period and yield important clues to large-scale ocean and climate regimes, marine wildlife and fish populations, habitat distribution and cultural patterns of marine resource use. Late Prehistoric cultural patterns are particularly well documented. The Makah Cultural and Research Center in Neah Bay houses a collection of artifacts from the Ozette archaeological site, a Makah village that was partially buried by a mudslide nearly 500 years ago and excavated in the 1970s. Items used for research and display include whaling, seal hunting, and fishing gear.

Other tangible records of prehistoric human occupation include petroglyphs, both above the intertidal zone and within it, and canoe runs, or channels cleared of boulders to facilitate landing of dugout watercraft. Research and preservation of coastal native languages, traditional cultural properties, traditional practices of song, dance and activities like whaling also enhances awareness in native and non-native peoples alike of the region's rich ocean-dependent heritage. The recent resurgence of the canoe culture in the annual "Tribal Journeys" celebration transfers knowledge and understanding of coastal culture to new generations.

http://www.makah.com/mcrchome.htm
http://sanctuaries.noaa.gov/maritime/expeditions/3000_expedition.html

Historic Maritime Heritage

The combination of fierce weather, isolated and rocky shores, and thriving ship commerce have, on many occasions, made the Olympic Coast a graveyard for ships. More than 180 shipwrecks have been documented in the vicinity of the Olympic Coast, yet only a few have been investigated by modern survey techniques (Figure 13). There are few recorded shipwrecks prior to the mid-nineteenth century and no verified wrecks during the eighteenth century. The number of vessel losses increased significantly as Puget Sound developed into an

economic center and as Victoria, British Columbia, developed on the north side of the Strait of Juan de Fuca in the 19th century. Ship losses were predominantly weather-related, and included founderings, collisions, and groundings. Many ships simply disappeared, their last known location recorded by the lighthouse keeper at Tatoosh Island before they disappeared into watery oblivion (Figure 14).

Figure 13. Known shipwrecks in the Olympic Coast sanctuary. (Map: Olympic Coast sanctuary)


Figure 14. Tatoosh Island marks the treacherous entrance to the Strait of Juan de Fuca, the passageway for ships bound to major ports in the Pacific Northwest.

Historic structures on land, while technically outside of sanctuary boundaries, remain important tangible fragments of the past that inform of human values for the ocean. These include historic lighthouses at Tatoosh and Destruction islands, lifesaving station remnants at Waadah Island and LaPush, wartime defense sites at Cape Flattery and Anderson Point, and sites of coastal patrol cabins scattered along the Olympic Coast. Homesteads, resorts, graves, and memorials also reflect a human dimension to the coast now largely reclaimed by time, the forest, or the sea.

http://channelislands.noaa.gov/shipwreck/ocnms.html

Pressures on the Sanctuary

Human activities and natural processes both affect the condition of natural and archaeological resources in marine sanctuaries. This section describes the nature and extent of the most prominent human influences upon the Olympic Coast National Marine Sanctuary.

Commercial Development

With advances in technologies and changes in our society's needs come proposals for new projects, many of which could not have been anticipated at the time of the sanctuary's designation and are not addressed in the existing management plan. The design of these developments and their potential impacts must be carefully considered to assess their compatibility with the sanctuary's primary goal of resource protection.

Fiber Optic Telecommunications

In 1999-2000, a pair of trans-Pacific fiber optic telecommunication cables, the Pacific Crossing-1 system (PC-1), was laid across the northern portion of the Olympic Coast sanctuary en route from Mukilteo, WA to Japan. Submarine cable installation involves substantial seafloor disturbance as a plow cuts several feet into the substrate to bury and protect the cable and to avoid entanglement with anchors, fishing gear or organisms. Although successful cable burial was reported, surveys of the PC-1 cables in the sanctuary conducted in 2000 revealed that substantial portions of each cable were not buried at a sufficient depth to avoid risks, and in many places the cables were unburied and suspended above the seafloor. In this condition, the cables could be physically damaged by fishing trawl gear and require repairs that could repeatedly disturb seafloor communities. Additionally, where unburied and suspended, the cables pose a serious safety concern for fishers employed in bottom contact fisheries who could snag gear on an exposed cable, a risk that limits access of Native American tribal fishers to portions of their treaty-reserved fishing grounds. In light of these risks, the cable owners agreed to recover and re-lay the cables in the sanctuary, an effort that was completed in late summer 2006 (NOAA 2005, Tyco 2006)

http://sanctuaries.noaa.gov/library/national/pcl_ea.pdf

Proposed Ocean Wave Energy Project

Another project proposal, the Makah Bay Offshore Wave Energy Pilot Project, has been in development for several years and is currently undergoing environmental review and permitting approvals. In December 2007, this project was issued the first Federal license for an ocean energy project in the U.S. This one megawatt demonstration project would test a novel technology and deliver power to the Clallam County Public Utility District's grid from a renewable, "green" energy source – ocean waves. As proposed, the project includes four interconnected, floating buoys tethered to the ocean floor with a complex anchoring system and a submarine electrical transmission cable laid across the seabed to the shore.

The in-water portion of the project is within Olympic Coast sanctuary boundaries, and the shore-based facilities are on tribal land of the Makah Indian Nation. The development company, Finavera Renewables, has conducted preliminary site evaluation studies and is developing final designs and plans for the installations. Federal, State, and Tribal representatives are working with Finavera to develop maintenance and monitoring plans to mitigate and assess potential environmental impacts of this new technology, including damage to seafloor habitats and threats to marine mammals and seabirds (FERC 2007).

Open-Ocean Aquaculture

NOAA defines aquaculture as "the propagation and rearing of aquatic organisms in controlled or selected aquatic environments for any commercial, recreational, or public purpose" such as commercial production, enhancement of wild fisheries stocks, and recovery of endangered species. In 2001, aquaculture accounted for

about one-third of the world's seafood supply and production is continuing to grow. Some advocates predict that by 2025, over 40% of the world's seafood will be supplied by aquaculture.

To date, marine aquaculture in the Pacific Northwest is mostly concentrated in Washington, where protected coastal sites are abundant in Puget Sound, Willapa Bay, and Grays Harbor. Washington's fish and shellfish farms are among the most innovative and productive in the world, characterized as "high yield through high tech" by the Washington Sea Grant Program. Washington's 2003 shellfish production operations produced 86.062 million pounds, valued at $76.2 million. However, the production is not without challenges because Washington aquaculture is highly regulated and "vulnerable to water-borne disease, pollution and toxic algae blooms" (Washington Sea Grant Program 2003 *in* (Pacific Aquaculture Caucus 2004)).

NOAA's Aquaculture Program is currently exploring possibilities for open-ocean or offshore aquaculture production in federal waters, which include all sanctuary waters more than three miles (5 km) off the Washington coast, a proposal that is controversial with some segments of the public with regard to pathogens and nutrient loading. To date, no projects have been proposed for open-ocean aquaculture projects in the sanctuary. Although sea conditions are dynamic and challenging in the sanctuary, technological developments in anchoring and structural design may make such development feasible in the sanctuary in the future. If projects are proposed for the sanctuary, it will be necessary for sanctuary staff to investigate potential environmental impacts and weigh these against sanctuary goals and mandates while making permitting decisions.

Fishing

Commercial and recreational fishing are important components of the coastal economy and provide valuable food resources to the Northwest and beyond. Fishing occurs within the sanctuary, with commercial; tribal and recreational fishers as significant stakeholders in the health of the fishies. However, some aspects of fishing practices and regulations are under scrutiny from all co-managers for their potential negative impacts to habitat and to ecosystem functions.

In recent years, National Marine Fisheries Service has implemented regulations on the West Coast to restore stocks of overfished species and to prevent physical damage to essential fish habitat. Research by scientists has documented damage to deep coral and sponge communities by bottom contact fishing gear around the world (Fosså et al. 2002, Morgan et al. 2005, Rogers 2004, Morgan et al. 2006). The distribution of existing and historic deep coral and sponge communities in the Olympic coast region is poorly known, as is the extent of impact to those areas.

Rough waters and complex seabed features of the Olympic Coast sanctuary increase the potential for fishing gear entanglement and loss. Abandoned fishing gear can remain for decades, potentially entangling and killing species that encounter the gear. This phenomenon has been named "ghost fishing," where derelict gear continues to fish by attracting, trapping, and killing a wide variety of marine mammals, seabirds, shellfish, and fish. Dead organisms attract other feeding animals thus perpetuating the cycle of unintended mortality. A direct economic impact of ghost fishing is the reduction of fishery stocks otherwise available for commercial and recreational fishers. Accumulations of gear on critical spawning and rearing habitat can significantly impact fishery stocks. Derelict fishing gear also can threaten human safety, restrict other legitimate sanctuary uses, such as regulated fishing, anchoring and operation of vessels, and diminish the aesthetic qualities for activities such as scuba diving.

http://olympiccoast.noaa.gov/protection/derelict/welcome.html

Ballast Water and Invasive Species

Millions of gallons of seawater are routinely carried as ballast aboard oil tankers and other commercial vessels to increase stability. When ships empty their ballast tanks of water from other regions there is a risk of introducing non-native fish and invertebrates, many of which can alter ecosystems in either minor or catastrophic ways. Invasive species can also be introduced via smaller vessels, aquaculture practices, transported on marine debris, and release of captive animals and plants (e.g., aquarium specimens) or through range expansion.

There is widespread recognition that invasive species can affect fisheries, waterways, facilities operating adjacent to waterways, as well as the functioning of natural ecosystems. The introduction of aquatic invasive species into the coastal waters of the Pacific Northwest poses serious economic and environmental threats recognized by resource managers, the aquaculture industry, non-governmental organizations and concerned citizens. Coastal estuaries in Washington provide critical habitat for many commercially important species such as Dungeness crab, shellfish and many marine fish species, including salmonids. Yet, these estuaries are particularly susceptible to rapid development of aquatic invasive species populations. Several established and emerging non-indigenous invaders such as the invasive algae, *Sargassum muticum* and the European green crab*, Carcinus maenas,* threaten both critical habitat and important commercial species in the Pacific Northwest.

http://www.invasivespeciescoalition.org/

Oil Spills

As one of North America's major gateways to Pacific Rim trade, the Strait of Juan de Fuca is one of the busiest waterways in the world, with vessel traffic going to several busy ports in Washington State and Vancouver, British Columbia. More vessel tonnage moves through the northern part of the sanctuary into the Strait of Juan de Fuca than through the combined ports of Los Angeles and Long Beach, California.

Figure 18. Primary transportation routes and quantities of oil transported in Washington State. Figures in thousands of barrels a day. (Source: Washington State Department of Ecology)

Washington is also one of the nation's primary petroleum refining centers. Tank vessels in-bound to Puget Sound are primarily moving crude oil to Washington's refineries. Large quantities of crude oil also come into refineries through the Trans Mountain Pipeline from Canada. Refined products are exported from Washington to other western states primarily through pipelines, barges and tankers. These transportation corridors are at greatest risk to major spills (Figure 18) (Washington State Department of Ecology 1997 http://www.ecy.wa.gov/pubs/97252.pdf). Cargo, fishing, and passenger vessels involved with Pacific Rim commerce also can hold substantial quantities of petroleum product in their fuel tanks.

Oil contamination of marine mammals and seabirds can cause eye irritation, impairment of thermal regulation, loss of buoyancy, toxicity, reproductive abnormalities, and ultimately death. Oil spills can deplete food sources and destroy habitat characteristics essential for survival. A spill could wipe out at least one generation of a population, and in a worst case scenario, extinguish multiple species on a local or regional scale. The state-

endangered sea otter population and many species of seabirds that inhabit or utilize the ocean surface are particularly susceptible to damage from oil in nearshore environments.

Oil spills can have lethal and long-term sub-lethal effects on fish (e.g., behavioral changes, reproductive abnormalities) and can also contaminate fish targeted for human consumption. Some sectors of the fishing and shellfish industries could be shut down for years by an oil spill, causing long-term negative affects on the economy of local tribes and other coastal fishers. Nearshore habitats, critical for survival of juvenile fish, can also be severely impacted by oil spills that smother or poison kelp, sea grasses, and other marine plants. Oiling of intertidal areas can cause significant damage to invertebrates, with negative impacts that can linger for many years (Downs et al. 2002).

The Washington coast endured the effects of several oil spills in recent times, including the 1988 *Nestucca* barge spill, which released 231,000 gallons of fuel oil into waters off Grays Harbor impacting dozens of miles of coastline as far north as Canada, and the 1991 spill from the *Tenyo Maru*, where some 100,000 gallons of diesel fuel spread as far south as Oregon but most heavily impacted the Makah Indian Reservation and Olympic National Park wilderness coast. Although state and federal oil spill prevention and response policies are continually improving, the potential for severe environmental damage remains a strong concern.

http://www.olympiccoast.org/docs4posting/OCAonOilSpills.htm

Increased Human Use

Long time residents as well as day-use visitors are drawn to the many recreational opportunities of the Olympic Coast; sport fishing, kayaking, surfing, wildlife viewing, clamming, and beachcombing are popular coastal pastimes. Such recreational use can sometimes cause unintended pressures to the coastal ecosystem. Motorized as well as non-motorized recreational boaters and sight-seeing pilots can inadvertently disturb wildlife, often with devastating consequences. Although human access to most seabird colonies is restricted by the U.S. Fish and Wildlife Service, WA Maritime Refuge Complex regulations (USFWS 2007), wildlife on the refuge islands is vulnerable to disturbance from low flying aircraft that do not comply with the 2000 foot elevation requirement established by the Olympic Coast sanctuary. Cliff-nesting seabirds abandon their nests if frightened, leaving eggs and nestlings exposed to avian predators. Resting pinnipeds abandon their haulout sites for the water when disturbed, often at a large energetic cost, especially to young animals. Beach users such as bird watchers, dog walkers, ATV users, and surfers can displace foraging migratory birds at important resting and staging areas. Popular intertidal areas show signs of trampling in localized patches.

Watershed alterations from increased land use such as timber harvesting may affect water quality by increasing sediment loads and nutrient runoff. Excessive sediment introduced to the nearshore environment can suffocate benthic marine life and reduce water clarity. Some persistent industrial chemicals, even those no longer in use in this country such as DDT, have found their way into marine food webs and can be detected in tissue samples of higher order predators (Brancato et al. 2006, Ross et al. 2000, Ross 2006). Some are carried from land to sea through watersheds, while others may be transported via air currents.

Garbage and lost fishing gear, particularly those constructed of non-biodegradable products like plastic, constitute what is collectively called marine debris. The amount of marine debris in open-ocean and coastal systems is on the rise. Impacts from marine debris include entanglement and drowning of animals inadvertent ingestion of plastics by mammals, turtles and birds, transfer of diseases from land-based sources to marine wildlife, fowling of active fishing gear, and benthic habitat degradation. Garbage from land-based or ship-based sources can transfer diseases to wild populations.

Military Activities

In or adjacent to the sanctuary the military has designated the Northwest Training Range Complex that includes two Warning Areas (W-237A and W-237B) that are designated training and operating areas for the Pacific Fleet air and surface forces, and two Military Operation Areas (MOA Olympic A and B). Military activities in these areas consist of subsurface, offshore surface and aerial operations (NOAA 1993). Military operations that are exempt from sanctuary regulations include:

- Hull integrity tests and other deep water tests;
- Live firing of guns, missiles, torpedoes, and chaff;
- Activities associated with the Quinault Range including the in-water testing of non-explosive torpedoes; and
- Anti-submarine warfare operations.

The Navy's Underwater Warfare Center operates and maintains the Quinault Underwater Tracking Range located in Navy Operations Area W-237-B. This range is instrumented to track air craft, surface vessels, submarines, and various undersea vehicles. The Navy has proposed expansion of the Quinault Range's area more than 50-fold to support existing and future needs in manned and unmanned vehicle programs development. The proposed geographic expansion would include a surf-zone landing site.

An expansion of naval activities raises concerns about disturbance to birds and mammals from increased activity and noise in the intertidal zone; damage to seafloor habitats and wildlife from cables, anchors, targets, torpedoes, and/or unmanned undersea vehicles; disruption to communication, feeding, and social behaviors of marine mammals and fishes, intentional or accidental discharges of pollutants and garbage in sanctuary waters; interference with tribal fishing and subsistence harvest activities, and restrictions on the ability of sanctuary and affiliated research scientists to conduct research.

http://www-keyport.kpt.nuwc.navy.mil/EIS_Documents.htm

Underwater Noise Pollution

The level of noise pollution in the oceans has increased dramatically during the last 50 years. The primary source of low frequency ocean noise is commercial shipping (National Research Council 2003). Although impacts to wildlife in the Olympic Coast sanctuary have not been documented, underwater noise pollution in other locations has been linked to disturbance and injury. Many marine mammals respond to noise by altering their breathing rates, spending more time underwater before coming up for air, changing the depths or speeds of their dives, shielding their young, changing their song content and durations, and swimming away from the affected area (Richardson et al. 1995). Acute sound intensities may cause marine mammals and other organisms to have temporary or permanent hearing loss. The disorientation and hearing loss may account for some cases in which ships collide with marine mammals that are apparently unaware of the approaching vessel. Most strikes occur in coastal waters on the continental shelf, where large marine mammals concentrate to feed. High levels of noise could also affect predation efficiency for marine mammals that use sound to hunt or capture prey. Underwater noise has also been found to negatively affect social behaviors in fish because many species rely on vocalizations when courting potential mates, and most detect sound vibrations that can be used to localize food or avoid predators (Myrberg 1990). In extreme cases, extensive damage was reported to the sensory epithelia of fish ears with no subsequent repair or replacement of damaged sensory cells (McMauley et al. 2003).

Climate Change

Over the next century, climate change is projected to profoundly impact coastal and marine ecosystems on a global scale with anticipated effects on sea level, temperature, storm intensity and current patterns. At a regional scale, we can anticipate significant shifts in the species composition of ecological communities, rates of primary productivity, sea level rise, and wind driven circulation patterns (Scavia et al. 2002). Rising seawater temperatures may give rise to increased algal blooms, major shifts in species distributions, local species extirpations, and increases in pathogenic diseases (Epstein et al. 1993, Harvell et al. 1999). A better understanding of ocean responses to global scale climatic changes is needed in order to improve interpretation of observable ecosystem fluctuations, such as temperature changes, hypoxic events, and ocean acidity that may or may not be directly coupled to climate change.

http://www.climate.noaa.gov
http://www.usgcrp.gov/usgcrp/Library/nationalassessment/overviewpnw.htm

State of Sanctuary Resources

This section provides summaries of the condition and trends within four resource areas: water, habitat, living resources, and maritime archaeological resources. For each, sanctuary staff and selected outside experts considered a series of questions about each resource area. The set of questions derive from the National Marine Sanctuary System's mission, and a system-wide monitoring framework (National Marine Sanctuary Program 2004) developed to ensure the timely flow of data and information to those responsible for managing and protecting resources in the ocean and coastal zone, and to those that use, depend on, and study the ecosystems encompassed by the sanctuaries. The questions are meant to set the limits of judgments so that responses can be confined to certain reporting categories that will later be compared among all sanctuary sites and combined. Appendix A (Rating Scheme for System-Wide Monitoring Questions) clarifies the questions and presents statements that were used to judge the status and assign a corresponding color code on a scale from "good" to "poor." These statements are customized for each question. In addition, the following options are available for all questions: "N/A" **–** the question does not apply; and "undetermined" **–** resource status has not been determined. In addition, symbols are used to indicate trends: "▲ " **–** conditions appear to be improving; "**▬" –** conditions do not appear to be changing; "▼ " **–** conditions appear to be declining; and "**?**" **–** the trend is undetermined.

This section of the report provides answers to the set of questions for the Olympic Coast sanctuary. Answers are supported by specific examples of data, investigations, monitoring and observations, and the basis for judgment is provided in the text and summarized in the table for each resource area. Where published or additional information exists, the reader is provided with appropriate references and web links.

Water

Water quality within the sanctuary is largely representative of natural ocean conditions, with relatively minor influence from human activities at sea and on land. By conventional measures, marine water quality within the sanctuary is not notably compromised. There are very few point sources of pollution in the vicinity, such as sewage outfalls or industrial discharge sites, to degrade water conditions. Also, the sparse human population has, to date, limited the amounts of nonpoint source pollution – the harmful by-products of everyday activities, such as pathogens from failing septic systems, residues from domestic products, excess nutrients, petroleum combustion byproducts, or hydrocarbons from roads and highways – that might enter the oceanic food web. However, increased sediment loading in rivers from logging and associated road building activities has been a concern.

Although water quality within the sanctuary is currently good, the potential for contamination by petroleum products, pathogens and chemicals is a concern. Four of the five largest oil spills in Washington State history have occurred in or moved into the area now designated as the sanctuary. In the decade before sanctuary designation, two major oil spills released more than 325,000 gallons of petroleum products that impacted marine ecosystems and human communities on the outer Washington coast. Naturally occurring harmful algal blooms can elevate the risk of shellfish poisoning. Recent documentation of widespread hypoxic conditions in nearshore areas off the Oregon and part of the Washington coast appears to result from anomalous weather and oceanographic patterns.

Figure WQS1. MODIS true color image from July 9, 2002. Dark regions in the water are areas of high chlorophyll concentration. Blooms are evident off Washington and Vancouver Island. Sediment laden water is evident as light green water and clearly shows the location of the plume from the Columbia River (Image: Leon M. Delwiche.)(http://www.ecohabpnw.org/)

1. Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality?

Oxygen is a critical element defining ocean habitats. Deep waters on the continental shelf normally have low oxygen concentrations, and resident organisms are adapted to oxygen levels that can be lethal to animals living in near surface and nearshore waters. Further depression of oxygen levels near the deep seafloor and movement of oxygen depleted waters toward shore, however, can stress living communities. Although hypoxia (low oxygen levels or dissolved O_2 below 1.4 ml/L) at other locations is associated with high nutrient loading from land-based sources, off Washington's outer coast it is a function of wind-driven upwelling dynamics and ocean conditions that control the delivery of oxygen-poor, nutrient-rich deep water across the continental shelf (Grantham et al. 2004). Hypoxic conditions severe enough to cause widespread fish and invertebrate mortality were documented off the Washington and Oregon coasts in 2006. Figure WQS1 provides data from the sanctuary's monitoring station off Cape Elizabeth showing hypoxic conditions that persisted close to shore for more than two weeks in July 2006. Other invertebrate and fish mortality events have been observed along Washington's coast, for example in 2001 and 2002, but historic records and oxygen monitoring data are not available to definitively link previous mortality events to hypoxic conditions.

A major oceanographic feature off the eastern Pacific Coast, the oxygen minimum zone, is a layer of deep water along the upper continental slope extending to depths greater than 1000 meters where dissolved oxygen levels are persistently low (Deuser 1975). Analysis of a long term data set, the 50-year data record from the eastern

subarctic Pacific, shows that deep waters beyond the continental shelf, although normally hypoxic, show trends of increased temperature and lower oxygen (Whitney 2006). As this occurs, deep waters transported across the continental shelf and upwelling toward shore may be increasingly depleted of oxygen and may cause more stress to living resources in the sanctuary.

Grantham et al. (2004) described the development of nearshore hypoxic conditions in the Pacific Northwest as "a novel emergence" that may represent a critical link between climate variability and ecosystem sensitivity to such changes. Although there is some historic evidence that hypoxic conditions have occurred along the Oregon and Washington coasts in the past (B. Hickey pers. comm.), a comprehensive set of historic data from Oregon's shelf waters indicates that the severity, geographic extent, and duration of hypoxic conditions off Oregon have increased since 2000, and anoxic conditions (water completely devoid of oxygen) had never been recorded before the 2006 event (Chan et al. 2008).

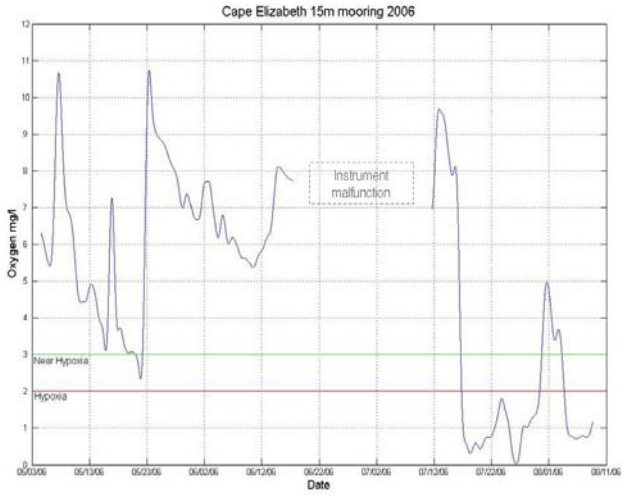

Figure WQS1. Oxygen data taken concurrently with the July 2006 fish kill first reported by Quinault Natural Resources Department. Oxygen was measured at 1m off the bottom at a station off Cape Elizabeth in 15m water depth.

Harmful algal bloom events (HABs) are common in sanctuary waters and can affect wildlife and marine ecosystems as well as human health. Figure WQS2 shows the presence and unpredictability of high domoic acid events at two beaches approximately 25 miles apart on the shores of the sanctuary (domoic acid is a toxin produced by one particular type of harmful algae). Some scientists suspect that HABs off the outer coast are increasing in frequency, but long-term records are not available for confirmation.

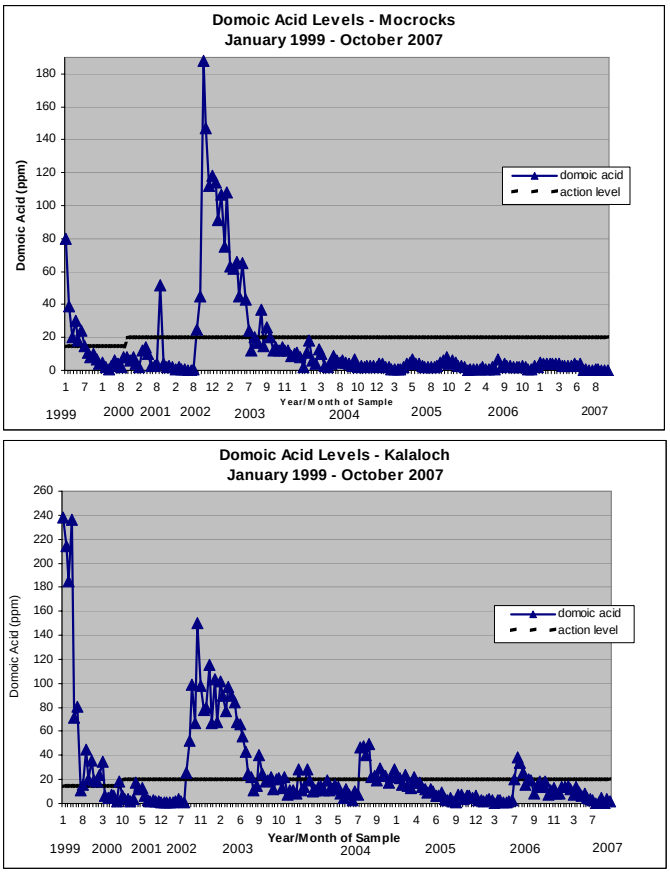

Figure WQS2. Domoic acid levels in razor clams from the Kalaloch and Mocrocks (near Moclips River) razor clam management areas where large recreational razor clam fisheries occur. Shellfish harvesting is closed when tissue levels exceed the action level. (data from WDFW)

Recent evidence of increasing seawater acidity (pH), increases in water temperature, and shifts in oceanographic conditions have been attributed to anthropogenically influenced climate change (Wootton unpublished data, Grantham et al. 2004; Barth et al. 2007, Chan et al. 2008). Such linkages, however, are uncertain and will require more data before they are fully accepted.

Existing levels of contaminants (metals, persistent organic pollutants, hydrocarbons, PCBs) are generally at low levels off the Olympic Coast. Measurements of chemical levels in water, sediment and biota in 2003 at 30 stations in OCNMS as part of the Environmental Monitoring and Assessment Program (EMAP) indicated reasonably good water quality throughout the sanctuary (Partridge 2007).

2. What is the eutrophic condition of sanctuary waters and how is it changing?

Human-caused eutrophication is not a concern in the sanctuary due to the absence of problematic sources of nutrients, such as population centers or significant municipal discharges in or near the sanctuary. EMAP sampling in 2003 indicated that conditions for primary production can be nutrient-limiting in summer months off the Washington coast (Partridge 2007). This would suggest that if nutrient supplies were to increase during that time of year, blooms could be triggered. But because long-term datasets and sufficient instrumentation are lacking, there is not enough information at this time to determine a trend in nutrient concentrations in sanctuary waters.

The Juan de Fuca Eddy system is a naturally-occurring, seasonally intensified water circulation feature covering northern sanctuary waters (Figure WQS3). It covers a broad region beginning roughly 70 km west of Cape Flattery and contains elevated macronutrients levels. Nutrients in this system are derived primarily from upwelling of nutrient-rich deep waters from the California Undercurrent, combined with lesser contributions from the Strait of Juan de Fuca outflow (MacFadyen et al. 2008). The feature's retentive circulation patterns and nutrient supply promote high primary productivity within the eddy, and periodic advection of these water masses toward shore has been identified as a trigger for HABs in sanctuary waters (Foreman et al. 2007, MacFadyen et al. 2008). Consequently, HABs in the Olympic Coast sanctuary are currently considered natural phenomena that are not enhanced by anthropogenic inputs of nutrients or eutrophic conditions.

Figure WQS3. The Juan de Fuca Eddy is west of the Strait of Juan de Fuca and spans the international boundary between U.S. and Canadian waters.

3. Do sanctuary waters pose risks to human health and how are they changing?

The main risk to human health of sanctuary waters is through consumption of tainted shellfish. Shellfish on the outer Washington coast is normally safe for human consumption, yet during HAB events filter feeding organisms, such as hard shelled clams and mussels, can concentrate toxins produced by some species of plankton, rendering them toxic to consumers. Routine monitoring is conducted at selected locations by coastal tribes and Washington State, and shellfish harvest closures are enacted when concentrations exceed action levels for protection of human health. Rapid detection techniques are being sought to enhance the ability to monitor for toxins, but risk of human exposure remains because it can be difficult to reach all subsistence and recreational harvesters on this remote coast.

For centuries, consumers of bivalves in the Pacific Northwest have known about paralytic shellfish poisoning (PSP), which is caused by saxitoxins produced by dinoflagellates. In 1991, domoic acid, a neurotoxin produced by diatoms in the genus *Pseudo-nitzschia*, and which causes amnesic shellfish poisoning (ASP), was first detected in clams on Washington's outer coast. High levels of either toxin have led to multiple restrictions of the popular recreational razor clam harvest and commercial harvest by local Indian tribes (Figure WQS2). For the shoreline adjacent to the sanctuary, Washington State Department of Health (WDOH) records since 1991 indicate 14 shellfish harvest closures based on ASP and nine closures based on PSP concerns. WDOH has received no reports of shellfish poisoning on the outer coast since 1991, although exposures (but no deaths) have been reported from other areas in Washington.

As discussed above, harmful algal blooms in OCNMS are naturally occurring phenomena. With more intensive monitoring in recent years, there is a perception that blooms have increased in frequency. However, there are insufficient data to confirm a trend because monitoring began only in the 1990s (Juan de Fuca Eddy Steering Committee 2004; Trainer 2005; Trainer & Suddeson 2005). If HABs are increasing in frequency, some factors that may contribute include increased advection of offshore waters shoreward as a result of reduced volume of the Columbia Plume (due to dams and water removals), and altered wind and current patterns due to climate change, misdiagnosis of shellfish poisoning in the past, and an inability to detect blooms historically (Juan de Fuca Eddy Steering Committee 2004; Hickey pers. comm.)

Limited bacterial monitoring in marine waters is conducted by WDOH with assistance from coastal tribes in order to assess human health risks in shellfish harvest areas (WA State Department of Health 2008). In addition, Surfrider's Blue Water Task Force volunteers monitored five additional sites in the sanctuary during 2003-2005 (http://www.surfrider.org/whatwedo3c.asp). These data indicate there are no significant concerns regarding bacteria such as fecal coliform, *E. coli* and *Enterococcus* in the sanctuary waters.

4. What are the levels of human activities that may influence water quality and how are they changing?

The northern area of the Olympic Coast sanctuary lies at the western Strait of Juan de Fuca, the major passage for the incoming and outgoing shipping lanes that lead to the Pacific Northwest's major ports - Seattle, Tacoma and Vancouver, British Columbia. Large commercial vessels, including oil tankers and freighters with large fuel tanks, transit through and near the sanctuary, creating a persistent and elevated risk of accidental and catastrophic release of toxic products. An estimated 1.5 billion gallons of oil are transported through the area each year. The risk of spills is generally considered the greatest threat to the sanctuary's water quality – a low probability but high impact threat. Tanker and container traffic occurs daily through all seasons and weather, with about 5,500 freighters and 1,400 tankers transiting the Strait of Juan de Fuca in 2006. (Figure WQS4) These numbers have increased over the past few decades but have been stable since about 2000.

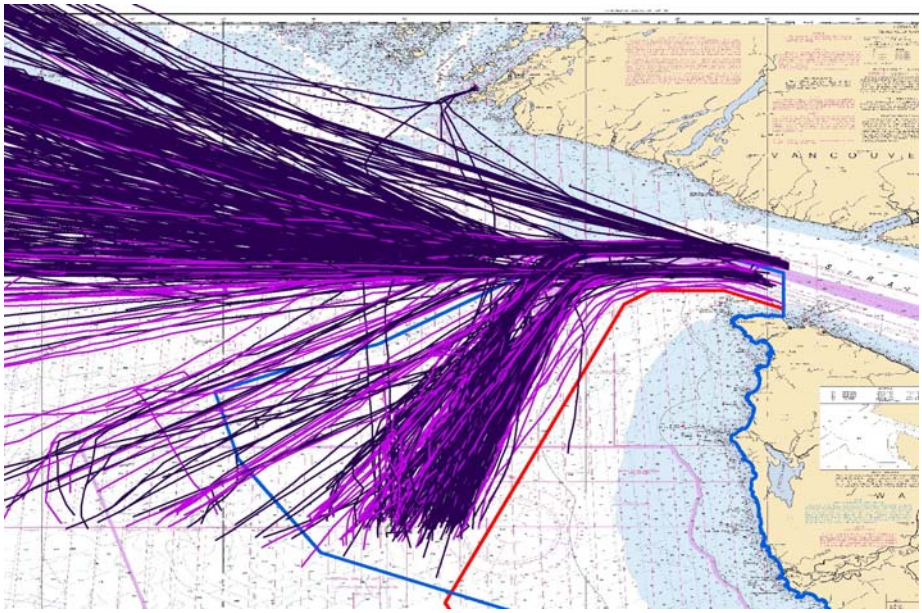

Figure WQS4. Track lines from large commercial vessels transiting the western Strait of Juan de Fuca in June 2007. Purple lines are tanker traffic. Darker lines are freighter traffic. The light blue line is the Olympic Coast National Marine Sanctuary boundary and the red line marks the Area-To-Be-Avoided.

In the previous century, weak environmental regulations allowed logging and road building practices to damage freshwater habitats and systems in the Pacific Northwest. Rivers and creeks in logged watersheds discharging

into marine waters of the outer Washington coast carried elevated burdens of suspended materials that increased turbidity of nearshore marine waters. Although definitive documentation is not available, these conditions may have inhibited growth of macroalgae in areas near river mouths (Devinny & Volse 1978; Dayton et al. 1992; Norse 1994). Logging remains a major industry on the Olympic Peninsula, although harvest levels have declined in the past two decades and improved regulatory oversight of logging practices has reduced inputs of fine particulates into freshwater systems flowing into the sanctuary.

Coastal development adjacent to the sanctuary is sparse, with a few small population centers on tribal reservation lands and growing residential development along the southern shores of the sanctuary. State and county development regulations should minimize impacts of the growing coastal populations on marine water quality.

The following information summarizes assessment by sanctuary staff and subject area experts of the status and trends pertaining to water quality.

Water Quality Status & Trends

Good	Good/Fair	Fair	Fair/Poor	Poor	Undet.

▲ = Improving ▬ = Not changing ▼ = Getting worse
? = Undetermined trend **N/A** = Question not applicable

	Status	Trend	Basis for Judgment
1	Stressors	?	Hypoxic conditions may be increasing in frequency and spatial extent in nearshore waters.
2	Eutrophic Condition	▬	No suspected human influence on HABs or eutrophication in the sanctuary
3	Human Health	▬	Naturally occurring HABs result in periodic shellfish closures
4	Human Activities	▬	Threat of oil spills from vessels

Habitat

Marine habitats of the Olympic Coast sanctuary extend from the intertidal, which is accessible daily during low tides, to the depths of submarine canyons that are only seen by humans via sensors and lenses on remotely or autonomously operated vehicles or submarines. The sanctuary covers a large area with physical and biological complexity to its habitats. Exploration and habitat mapping of the vast majority of the Olympic Coast sanctuary involves carefully planned and costly surveys from large vessels using sophisticated technology. Thus far, the sanctuary has detailed habitat mapping completed for a small portion of its area, while information on the remainder lacks resolution and specificity. As a result, generalizations about the Olympic Coast sanctuary's habitats are difficult to make. The following discussion focuses on available information wherever possible, but also includes speculative analysis based on habitats from similar areas and impacts to these habitats documented at other locations.

Olympic Coast sanctuary's habitats, similar to its waters, are relatively uncontaminated by chemicals introduced by human activities. Intertidal and nearshore habitats are not considered substantially altered or degraded. Underwater noise pollution and marine debris do compromise habitat quality, but their impacts in the Olympic Coast sanctuary are not well documented. The most significant concern relates to the long history and intensive

efforts of fisheries using bottom contact gear. Where biologically structured habitats existed on the sanctuary's seafloor, it is likely they have been altered by fishing practices, except perhaps in the roughest of terrain that fishermen avoided. Recovery of biologically structured habitats is expected to occur very slowly, even in the absence of future pressures.

5. What are the abundance and distribution of major habitat types and how are they changing?

With limited exceptions, nearshore and intertidal habitats in the sanctuary are remarkably undisturbed by problems generally associated with human use and development in more urbanized areas, such as shoreline armoring, wetlands alteration, dredging, and land-based construction. The remote location, low levels of human habitation, and protections provided by the wilderness designation of Olympic National Park's coast have allowed these coastal habitats to persist largely intact. At the few locations where shoreline armoring has been employed or where human visitation has focused on intertidal areas for food collection and recreation, there do not appear to be dramatic or widespread impacts (Erickson and Wullschleger 1998 and Erickson 2005).

Data on habitats of the deeper waters of the sanctuary are limited. Only 25 percent of the sanctuary has been characterized through use of modern, high resolution acoustic and imaging methods (Intelmann 2006). Low resolution surveys have revealed a generally wide and featureless continental shelf in the southern portion of the sanctuary dominated by soft substrates with areas of rock outcrop and spires, and the Quinault Canyon. However because high resolution maps do not exist for this area, there may be more complex features along the shelf than presently indicated. The northern portion of the sanctuary is dominated by the Juan de Fuca Canyon and trough, which extends from the Strait of Juan de Fuca to the canyon mouth. The Juan de Fuca Canyon and trough is a complex, glacially carved feature containing a mixture of soft sediments, with significant cobble and boulder patches and scattered large glacial erratics that were deposited during ice retreat. Most, but not all of the trough has been mapped using high resolution methods. No contemporary acoustic or video surveys have been completed for the Nitinat or Juan de Fuca canyons, and only half of the Quinault Canyon has been mapped using multibeam.

The most significant alteration of sanctuary habitats is likely to have resulted from commercial fishing with bottom trawl gear. Known impacts of bottom trawl gear on seafloor habitats from similar areas, in combination with historic fishing patterns in the sanctuary, are evidence that such habitat alterations have likely occurred to some extent. Bottom trawl gear is known to reduce complexity and alter the physical structure of seafloor habitats (NRC 2002). Bottom trawling smoothes sedimentary bedforms, such as sand waves, reduces bottom roughness, can alter the size distribution of surficial features, impact biogenic structures and can roll and move boulders on the seafloor (Auster et al. 1996; Auster and Langton 1999; Norse & Watling 1999; Thrush & Dayton 2002). In deeper waters, monitoring by the sanctuary has shown that the seafloor impacted by submarine cable installations experiences short term habitat disturbance in soft sediments but more persistent physical disturbance in hard substrates, yet the cable trenching covers a very small portion of the sanctuary. Monitoring by the sanctuary has also revealed rolled and displaced boulders as a result of cable trenching and bottom contact commercial fishing gear. Dredging, another fishing technique that causes physical disruption of the seafloor, has not been widely employed in the sanctuary.

National Marine Fisheries Service statistics indicate that the northern waters of the sanctuary were one of the most intensively fished bottom trawl areas along the West Coast of the U.S. (Shoji 1999). Bottom trawl techniques have been employed off the outer coast of Washington since the 1930's. Groundfish landings in Washington, the majority of which were from bottom trawlers, averaged 30 to 40 million pounds from the mid-1950's through about 1980. Beginning in 1966, a large Soviet fleet of factory trawlers began fishing off the U.S. coasts of California, Oregon and Washington. Vessels were large stern ramp trawlers exceeding 250 feet in length that fished mostly on the continental shelf and upper slope at depths ranging from about 300 to 720 feet deep. Their efforts continued through the late 1980's, until 1992 when the foreign fleet was excluded from the U.S. waters within 200 miles of shore.

Although the manner in which data were collected in the past make it difficult to extract precise data for the level of effort by area, there clearly has been significant interaction between the bottom trawl fishery and the sanctuary seafloor for several decades. For example, about 100 trawl vessels landed and sold groundfish on the Washington coast (excluding Puget Sound) between the late 1970's and early 1990's (Shoji 1999). The total hours of trawler fishing effort on the outer coast averaged about 10,000 hours per year between 1989 and 1997 (Shoji 1999). Although bottom trawl effort in different areas has changed over time, analysis of WDFW commercial trawl logbooks between 1989 and 1997 indicates that trawling occurred widely throughout the sanctuary during this period (Figure HS1). Moreover, large footrope gear that allows trawlers to access rockier areas by bouncing the bottom of the trawl net over larger obstructions without tearing nets, was not restricted until 2000 (PFMC 2005). In recent years, fishery management measures that restrict footrope gear size and limit areas open to trawlers have focused trawl effort more toward soft seafloor substrates where gear impacts on the physical habitat are less of a concern. Although detailed information on historic and current conditions in the sanctuary's deep seafloor habitats is limited, the degree and extent of habitat alterations from bottom trawling is a concern based on evidence from similar gear impacts at other locations, both in the Pacific and Atlantic (Auster & Langton 1999; NRC 2002; Thrush & Davton 2002).

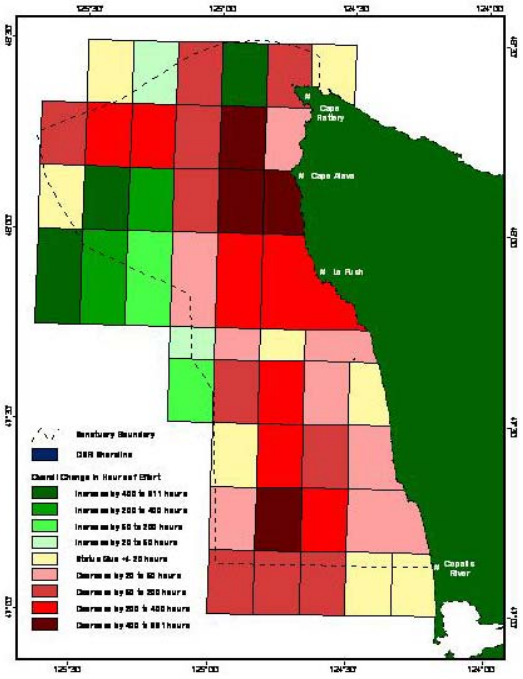

Figure HS1. Composite map of overall change in bottom trawl effort by WDFW block area over 1989-1997 (Shoji 1999)

6. What is the condition of biologically structured habitats and how is it changing?

Biologically structured habitats in rocky intertidal areas include macroalgae and invertebrate communities (e.g., mussel beds) that provide micro habitats for many species of invertebrates and fish. Monitoring conducted by Olympic National Park since 1989 indicates that these habitats are healthy and do not appear to be changing substantially in response to human influences. Large scale disturbances related primarily to extreme winter weather cause periodic damage to mussel beds (Paine and Levin 1981). Coastal ecologists have begun to design studies to better detect changes that may result from effects of global climate change, such as sea level rise, reduced pH, increasing temperatures, and changes in storm frequency and magnitude. Yet local trends in these parameters are uncertain, and no definitive results are yet published.

In nearshore areas, canopy kelp beds form a productive, physically complex, and protected habitat with a rich biological community association of fish, invertebrates, and sea otters. The first historical record for Washington kelp occurred in 1912 (Rigg 1915) as part of the war effort to assess potential sources of potash. Annual monitoring and quantification of the floating kelp canopy has been conducted since 1989 by Washington Department of Natural Resources and in collaboration with the sanctuary since 1995. Although the canopy changes each year, these kelp beds are generally considered stable. In fact, the area covered by floating kelp has been increasing along the outer coast and western portion of the Strait of Juan de Fuca, while it has not changed significantly along the eastern portion of the Strait (Figure HAB1; Berry/Mumford in PSAT 2005; http://www1.dnr.wa.gov/htdocs/aqr/nshr/pdf/floating_kelpbed.pdf). This increase may be due to the growing population of sea otters and subsequent decline in grazing sea urchins or may be influenced by changes in oceanographic conditions. Extensive logging of the Olympic Peninsula, an area of very high rainfall, has markedly increased sediment loads in rivers and coastal waters, coating rocky reefs with layers of silt. Long-term residents along the coast have noted a reduction in kelp beds, which may be associated with siltation of nearshore habitat and reduced light penetration (Norse 1994).

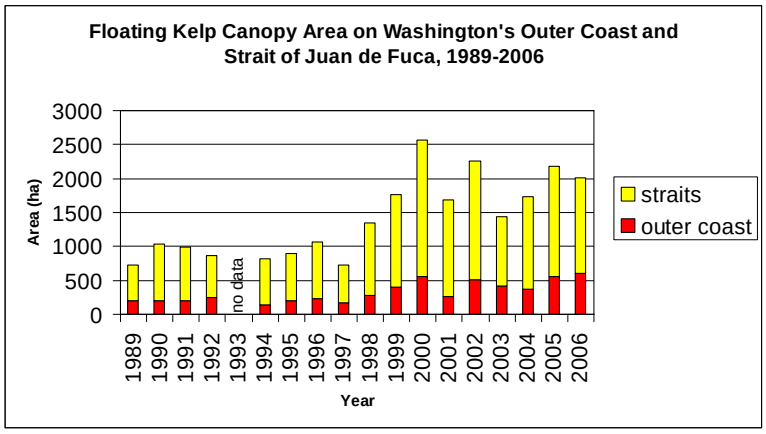

Figure HAB1 Annual floating kelp canopy area since 1989 along the Washington Coast and the Strait of Juan de Fuca. (data from WDNR)

Some deep corals found off the Pacific Coast are designated as "structure forming" because they provide vertical structure above the sea floor that serves as habitat for other invertebrate and fish species (Whitmire and Clarke 2007). Other emergent epifauna, such as sponges, hydroids, and bryozoans also provide living habitat for invertebrates and fishes. These organisms are vulnerable to damage from bottom contact fishing gear, and because many have slow growth and recruitment rates, damage can be long-lasting (Auster & Langton 1999; Norse & Watling 1999; NRC 2002; Thrush & Dayton 2002). Information on the historic distribution and condition of habitat forming corals in the sanctuary is extremely limited, and based on observations compiled from NMFS trawl surveys from which identification of invertebrates was very limited particularly prior to 1980 (Whitmire and Clarke 2007) and occasional observations by west coast research institutions (Etnoyer and Morgan 2003). These data and video surveys conducted more recenty by the sanctuary in limited areas indicate the presence of several habitat-forming species. The paucity of data is indicated by the first discovery in 2004 of *Lophelia pertusa* in the sanctuary (Hyland et al. 2004), a species with high potential as a biogenic habitat producer (Whitmire and Clarke 2007). Surveys condicted since then have documented additional living and dead colonies of *L. pertusa* and several other species of corals and sponges in the sanctuary (Brancato et al. 2007).

Of all fishing gear types used in the region, bottom trawls have the highest severity ranking (in terms of severity and extent of damage) for potential impacts to deep corals. Even one pass of a bottom trawl was shown to have significant impacts on corals in Alaska (Krieger 2001). They are followed in severity ranking by bottom longlines (Morgan and Chuendpagdee 2003). Long line gear can travel significant distances over the seafloor, particularly

during retrieval, snaring or undercutting emergent structures (Whitmire and Clarke 2007). Several recent management measures implemented through the Pacific Fisheries Management Council, such as footrope size restrictions, essential fish habitat designations, and rockfish conservation area trawl closures, will reduce ongoing impacts to such habitats.

The condition of the sanctuary's biologically structured habitats prior to modern fishing activities may never be known. However, we do know that bottom trawl and longline fisheries have been widely practiced in the sanctuary for many years, likely over all but the roughest of seafloor habitats. We also know that the sanctuary waters contain hard bottom habitats that support biogenic structures that are susceptible to damages from these activities. Consequently, we believe it is reasonable to assume that where trawl and longline fisheries have occurred, deep sea biogenic habitats have been degraded and may not quickly recover. Intensive survey effort will be required to determine the extent of detectable damage, and the rate of recovery can only be determined within areas where these practices are no longer allowed.

7. What are the contaminant concentrations in sanctuary habitats and how are they changing?

Sediment contamination levels in the Olympic Coast National Marine Sanctuary are generally low. In 30 sediment samples taken in 2003 as part of the West Coast Environmental Monitoring and Assessment Program (EMAP), there were no PCBs, DDT, or other chlorinated pesticides detected (Partridge 2007). PAHs and metals were found in the sediment throughout the sanctuary, but no concentrations exceeded the Washington State sediment quality standards (Washington State Department of Ecology 1995). At one location, a sediment quality guideline called the Effects Range-Low (ERL) was exceeded for silver, and at four locations the ERL was exceeded for chromium. The ERL is a concentration correlated with a low likelihood of toxicity to biological organisms (Long et al. 1995, O'Connor 2004). Anthropogenic sources for these metals are not known. Given the low level of human development along the shoreline, these conditions are not likely to change in the near future.

Concentrations of contaminants in tissues can provide an integrated measure of bioavailability of compounds that are present at low or variable levels in the marine system. Chemical concentrations were recently measured in a variety of invertebrates and sea otters for a sea otter study and for NOAA's Status and Trends, Mussel Watch Program (Brancato et al. 2006). Contaminant concentrations were found to be low in all organisms, with very few exceptions.

Two potentially significant sources of chemical contaminants in the sanctuary include petroleum releases and atmospheric deposition. Physical evidence, such as tar balls on beaches and oil sheens on water, are occasionally noted in the sanctuary, but persistent and widespread contamination from petroleum has not been documented outside of major oil spills, the most recent of which occurred in 1991. Atmospheric sources of contaminants, however, are a growing regional concern, and increases in this contaminant source can be anticipated primarily associated with growing industrialization of SE Asia.

8. What are the levels of human activities that may influence habitat quality and how are they changing?

The sanctuary's boundaries include intertidal areas of Olympic National Park where habitat quality can be affected by harvesting and trampling by visitors. Park visitation rates have been relatively stable over the past decade, but the shoreline remains a popular destination, with most visitation focused near the few access points where roads or trails approach the coast. Shoreline harvesting by non-tribal visitors is not common, yet evidence of destructive harvest practices may be evident, particularly at easily accessible locations. An except is the popular razor clam digs at Kalaloch and Mocrocks beaches, an activity that does not damage the high energy, sandy beaches where razor clams live. Localized areas of habitat damage have been caused by fish bait harvesting (Erickson and Wullschleger 1998) but regulations have been implemented to minimize this activity. The Park plans to implement harvest closure on approximately 30% of the shoreline, which will further

reduce the minimal pressure experienced at selected mixed gravel/cobble and rocky intertidal habitats (ONP 2008). Trampling and intertidal exploration may degrade intertidal habitats in some areas, but substantial impacts have not been documented (Erickson 2005).

Marine debris may be an increasing problem for the sanctuary, as has been demonstrated elsewhere. For example, the Ocean Conservancy's monitoring program documents more than a 5% increase in debris per year in the US from 1999 through 2005 (Ocean Conservancy 2007). Wildlife impacts from floating marine debris, such as entanglement and ingestion, have been documented in other areas. Recent cleanup efforts on the Olympic Coast have removed significant quantities of marine debris from beaches, an estimated 24 tons in 2007 during a 2-day clean up event, yet debis is continuously deposited on the shores. The decline in nearshore fisheries and growing expense of fishing gear might reduce abandonment of fishing gear in the sanctuary. Surveys in limited portions of the sanctuary have revealed few derelict nets in nearshore areas near Cape Flattery, but in deeper areas abandoned longline gear and netting has been noted that likely will remain for many years.

Land use in upland areas also has the potential to negatively impact nearshore habitats. Chief among these activities is timber harvest in upland areas, with consequent alteration of water runoff and sediment transport regimes in rivers and nearshore areas. Road building and maintenance, runoff from roads, and the development and maintenance of recreational facilities (e.g., campgrounds) and coastal residences all have potential to degrade nearshore habitats and water quality. Coastal development is increasing along the southern shore of the sanctuary, but increased regulatory oversight of construction practices is expected to minimize impacts to marine areas.

The primary activity affecting the deep water habitats of the sanctuary are bottom contact fisheries. In recent years, the area subject to commercial trawling has been significantly reduced in the sanctuary through designation of permanent closures of groundfish essential fish habitat and the creation of temporary Rockfish Conservation Areas where trawlers are excluded for the near future (*INSERT FIGURE?*). Requirements for use of small footrope gear also limits trawling to areas of low "roughness" which tend to be seafloor substrates, such as sand, mud, and gravel, where habitat is less degraded by bottom contact gear. If these area and gear restrictions remain in place over time, biogenic structures may improve, though with their low reproductive rates and patchy distribution of source material, recovery may take decades (Etnoyer & Morgan 2005; Morgan et al. 2005; Whitmire & Clarke 2007).

The US Navy has proposed significant expansion in area and extent of operations for the Northwest Training Range Complex, which covers much of the sanctuary. Although only non-weaponized technologies would be tested, these exercises have the potential to disturb the seabed, introduce pollutants associated with weapons, and produce sounds that could negatively alter the acoustic environment within the sanctuary.

http://www.nwtrangecomplexeis.com/EIS.aspx
http://www.epa.gov/fedrgstr/EPA-IMPACT/2007/July/Day-31/i14784.htm

Underwater noise can act as pollution to acoustically oriented organisms such as some whale and fish species. This noise degrades the underwater habitat. Sources of noise within sanctuary waters are primarily vessel traffic and military activities. The establishment of the Area to be Avoided (ATBA) and high level of compliance by the commercial shipping industry suggests that the risk of pollution and acoustic impacts associated with shipping are reduced in the southern portion of the sanctuary where vessel traffic is directed outside the sanctuary. In northern sanctuary waters, convergence of Pacific Rim shipping routes into the western Strait of Juan de Fuca, vessel traffic lanes, and ATBA boundaries all concentrate large vessels in an area where marine mammal density is relatively high (Calambokidis et al. 2004). Stable levels of shipping traffic in the northern sanctuary over the past five years suggest that noise from ships may remain relatively constant in the near future.

The following information provides an assessment by sanctuary staff and subject area experts of the status and trends pertaining to the current state of marine habitat.

Habitat Status & Trends

Good	Good/Fair	Fair	Fair/Poor	Poor	Undet.

▲ = Improving — = Not changing ▼ = Declining
? = Undetermined trend **N/A** = Question not applicable

	Status	Rating	Basis for Judgment
5	Abundance/Distribution	?	Prior disturbance by bottom-tending gear on hard substrates; short-term impacts from fishing gear and cable installation on soft substrates
6	Structure	?	Damage by bottom-tending gear in some deep biogenic habitats
7	Contaminants	—	Prior studies indicate low levels of contaminants that might be of concern
8	Human Impacts	▲	Decrease in bottom-tending fishing, and presumably impacts to hard bottom habitats

Living Resources

The living resources of the sanctuary are composed of a wide array of species organized into several ecological communities including intertidal, near shore, pelagic and benthic. Community structure is shaped by species-species interactions, such as competition or predation, and physical factors, such as disturbance, upwelling or temperature. Connections between communities are complex when considering species can move between habitats at various stages of their life history or even on a daily basis while foraging or seeking shelter. There are knowledge gaps in the dynamics of ecological communities, and these are areas of active scientific investigation.

Given the complexity of community types and the diversity within each, not all communities or species are discussed in detail. Rather there is a greater focus on selected living resources where a better understanding of function and dynamics exists. There is a greater emphasis on those species that serve as proxy for the health of overall community function.

9. What is the status of biodiversity and how is it changing?

The sanctuary's rocky intertidal community is biologically rich with at least 300 documented species (Suchanek 1979, Dethier 1988), and new species are continuing to be discovered (deRivera et al. 2005). Long-term monitoring conducted by Olympic National Park, partnering with the sanctuary, shows relatively stable trends in biodiversity (Dethier 1995, ONP unpublished data).

Less is known about the historic or current conditions of sub-tidal, open water and deep-sea communities. A historical perspective suggests that many of the large mammal, high-order predators, and keystone species no longer function in maintaining community structure when their stocks were depleted by commercial whaling, sea otter hunting, and fishing (Roman and Palumbi 2003, Springer et al. 2003, Alter et al. 2007), although this topic remains controversial (Trites et al. 2007, Wade et al. 2007). More recently, harbor seal numbers were severely reduced during the first half of the 20th century in Washington State by a state-financed population control program (Jeffries et al. 2003). Impacts of such dramatic population changes on trophic webs, although not well understood, are likely to have occurred. However, such impacts are difficult to estimate in the absence of historical information.

The loss of sea otters in kelp forest ecosystems like those in the sanctuary, can cause cascading trophic impacts to the forest itself due to the loss of predation pressure on herbivorous invertebrates such as the sea urchin (Estes et al. 1989, Estes and Duggins 1995, Kvitek et al. 1998). Sea otters were heavily hunted in the region from the mid 1700s until their extirpation (local extinction) off the Washington coast by 1911 (Lance et al. 2004). Sea otters were reintroduced to Washington in 1969 and 1970 and the population has increased since then, likely causing measurable increases to kelp abundance and distribution (Lance et al. 2004). However, the population is not considered to have yet recovered and is not recovering at the expected rate (Laidre et al. 2002, Lance et al. 2004).

Although species richness (number of species in a community) may be relatively intact as evidenced by few documented local vertebrate species extinctions, species evenness (the relative abundance of each species within a community) has had documented changes. Severe decreases in abundance of a species can impact ecosystem function. For example, the loss of sea otters had profound cascading effects on coastal habitats (Estes and Duggins 1995). Changes in species evenness are exemplified by declining numbers of several locally breeding seabirds including the Common Murre, Tufted Puffin, Marbled Murrelet, Cassin's Auklet and Brandt's Cormorant. Populations of those species are considered declining in the area and are Washington State species of concern. The Marbled Murrelet is also federally threatened and the Tufted Puffin is a federal species of concern. Four species of rockfish found in the sanctuary have been classified as overfished by the National Marine Fisheries Service (NMFS 2006). Nineteen fish species found within the sanctuary are identified as Washington State species of concern, of which eight also have some degree of federal status. Eleven marine mammals, three sea turtles and nine species of marine birds found in the sanctuary are on either federal or state species of concern lists across their range (Washington Department of Fish and Wildlife 2008). These are specific examples of the declining indices of biodiversity within the sanctuary.

Biodiversity within deep water communities off the Washington coast is poorly understood given the logistical challenges of conducting research in this habitat. Due to technological advances in undersea research, censusing and evaluation of ecological integrity of deep-sea communities has only recently begun (Etnoyer and Morgan 2003, Morgan et al. 2006, Brancato et al. 2007, Lumsden et al. 2007). There are indications that deep water sponge and coral communities in the sanctuary have been impacted before many aspects of their basic biology and ecology have been ascertained (Brancato et al. 2007). Overall, there is much that is not known about the species richness and evenness of several important communities within the sanctuary. The importance of biodiversity of ocean ecosystems cannot be discounted when considering it plays an important role in recovery of systems from perturbations (Worm et al. 2006).

10. What is the status of environmentally sustainable fishing and how is it changing?

The major fisheries that occur in the sanctuary target groundfish (bottom trawl and longline), Dungeness crab, pink shrimp, and salmon. These fisheries are managed by state, tribal, federal agencies and a regional fishery councils (Pacific Fisheries Management Council or PFMC; International Pacific Halibut Commission), through cooperative processes. In general, professional fisheries managers are optimistic that sustainable fisheries off the outer coast of Washington are possible under new management regimes following historical stock declines.

The commercial Dungeness crab fishery has an average (1990-2002) ex-vessel value of approximately $19.9 million (http://wdfw.wa.gov/fish/shelfish/crabreg/comcrab/coast/index.htm). There are over 200 Washington coastal commercial Dungeness crab license holders. Washington coastal Dungeness crab landing data back to 1950 shows a large fluctuation in harvest, ranging from a low of 2.5 million pounds in 1981 to a high of 25 million pounds in 2004-05 averaging at 9.5 million pounds. It is believed that this large fluctuation in landings is not a result of harvest patterns, but likely due to varying ocean conditions including, water temperature, food availability, and ocean currents (http://wdfw.wa.gov/fish/shelfish/crabreg/comcrab/coast/index.htm).

A fishery for pink shrimp off Washington peaked in 1988 with landings just over 18 million pounds and about 100 vessels involved in 1990. Within a few years a dramatic decline in local abundance drove many fishers out of the fishery. Since 2000, Washington coastal fishery has been stable, with landings of seven to eight million pounds annually and about 25 fishers participating. Management of the fishery is passive, with no stock assessment or mandatory logbook program in place. Most fishing occurs off the central and southern coast of Washington (http://wdfw.wa.gov/fish/shelfish/shrimp/comm/index.html).

Chinook and coho salmon are the main salmon species managed by PFMC off Washington's outer coast. In odd-numbered years, fisheries are also conducted near the Canadian border for pink salmon, which are primarily of Frasier River origin. In the ocean, chinook from Washington range widely throughout the Pacific Ocean and the Bering Sea. Coho are most abundant in coastal areas from central Oregon to southeast Alaska. Managing ocean salmon fisheries is an extremely complex task, due in large part to the wide oceanic distribution of the salmon. Estimating the size of salmon populations is a challenge for fisheries management. Salmon are affected by a wide variety of natural and human-caused factors in the ocean and on land, including ocean and climatic conditions, dams, habitat loss, urbanization, agricultural and logging practices, water diversion, and predators (including humans). Salmon numbers can vary widely from year to year, and returns can differ significantly from model estimates. Other challenges to a sustainable salmon fishery off the Washington coast include judging the effects of different regional fisheries on salmon stocks; recovering salmon under the Endangered Species Act; dividing the harvest fairly; impacts from salmon aquaculture, competition between wild and hatchery salmon, and restoring freshwater habitat (PFMC 2008).
http://www.pcouncil.org/salmon/salback.html

Over 90 species of groundfish are managed under the PFMC's Groundfish Fishery Management Plan, including over 60 species of rockfish. Beginning in the 1970's, improved understanding of life history characteristics led fisheries scientists to conclude that many of these species were incapable of sustaining high intensity fishing pressure using modern fishing methods (PFMC 2008). In recent years, harvest rates for many species have been reduced repeatedly to account for the improved knowledge regarding the overall productivity of these stocks. New information continues to emerge regarding the significance of diverse age structures and other factors in sustaining groundfish resources and, when appropriate, is incorporated into the stock assessment and review processes that provide the scientific basis upon which management decisions are made.

The complexity of the groundfish stocks makes it difficult to make generalized statements about the sustainability of groundfish fisheries off Washington. Some species have been depleted in the past and recovered quickly (e.g., English sole), while others are rebuilding more slowly (e.g., Pacific ocean perch) (PFMC 2008). Of the 22 species of groundfish that occur in the sanctuary and are managed at the species level, 13 species have stocks that are considered healthy, 3 species are in a precautionary status (<40% of unexploited spawning biomass), and 6 are depleted (<25% of unexploited spawning biomass) (PFMC 2008). The remaining groundfish species are managed in groupings or stock complexes because individually they comprise a small part of the landed catch, and insufficient information exists to develop adequate stock assessments. For depleted species, rebuilding programs are in place, with anticipated stock recovery period ranging from about 10 to 80 years for different species. Further monitoring along with an increased understanding of the life histories, population dynamics and habitat needs of rockfish is needed in order to determine recovery trends. There are some indications that the biomass off Washington of several rockfish species is high compared to Oregon and California. Past NMFS trawl survey data, however, have not been collected and/or analyzed in a manner that allows a scientifically defensible determination that selected groundfish stocks off Washington are more abundant than those off Oregon and California. Moreover, data for some species is sparse, which reduces confidence in modeling results. All these considerations lead to uncertainty about the long-term sustainability of groundfish fisheries as currently practiced off Washington. Additional discussion of groundfish stocks is provided under Question 12.

http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm#07

Management for environmentally sustainable fishing includes consideration of measures such as elimination of overfishing and minimizing habitat damage and loss. They would also include conservation and management practices such as maintaining populations of target species to enable their natural role in ecosystems and to enable sustainable reproduction rates, eliminating the use of fishing gear that creates a high level of bycatch, or the incidental catch of nontarget species, and closing critical feeding, breeding and spawning grounds to protect marine ecosystems. Ecosystem-based fisheries management is a relatively new paradigm in the U.S., and managers are just beginning to define and employ its practices (Zabel et al. 2003; Marasco et al. 2007; PSMFC 2005; http://www.fakr.noaa.gov/npfmc/misc_pub/MarascoPaper705.pdf). A variety of recent fishery management actions off the Washington coast, such as trawl footrope gear restrictions, low rise nets that reduce bycatch, monitoring of bycatch, protection of essential fish habitat (NOAA Fisheries 2006), implementation of stock rebuilding plans, and establishment of temporary area closures (Rockfish Conservation Areas) to promote recovery of species under rebuilding plans, provide hope that depleted stocks can recover and these fisheries can be sustainably practiced.

11. What is the status of non-indigenous species and how is it changing?

Relatively few exotic or non-indigenous species (NIS) have been reported in the sanctuary and, of those, only a few are invasive and therefore threatening to community structure and function. Observations by coastal ecologists from ONP and OCNMS of increased amounts of the invasive brown algae *Sargassum muticum*, the documented range expansion of invasive ascidians (sea squirts) (deRivera et al. 2005), and the encroachment of the invasive green crab to the south of the sanctuary all suggest that negative impacts from non-indigenous species are likely to increase in the future.

The sanctuary's Rapid Assessment intertidal surveys from 2001 and 2002 identified nine non-indigenous invertebrate species (two polychaetes, one amphipod, one bryozoan, four bivalves and one ascidian) and one algal species. A 2005 study of non-indigenous species along the West Coast in marine protected areas using settling plates located on buoys offshore found four NIS (one crustacean and three ascidians) inhabiting OCNMS (deRivera et al. 2005).

Ports as well as marinas have higher numbers of invasive species due to transport by vessels (deRivera et al. 2005). There are no major ports located within sanctuary waters, and the few marinas that exist are relatively small, which may slow the number and severity of species invasions. However, shipping traffic within the sanctuary may provide a vector for NIS through discharge of ballast water. To minimize this risk, Washington State recently strengthened regulations covering ballast water exchange. Ships traveling from outside the Economic Exclusion Zone (EEZ) must exchange ballast water no closer than 200 nautical miles (nm) off shore while ships considered U.S. coastal traffic, including Canadian waters must exchange ballast water no closer than 50 nm offshore. http://groups.ucanr.org/Ballast_Outreach/Laws_and_Regulations/Washington_State.htm There is a need for basic understanding of the spatial and temporal patterns of invasions (deRivera et al. 2005). The necessary information to rigorously evaluate the patterns of coastal invasions is currently lacking.

12. What is the status of key species and how is it changing?

Key species (keystone species, indicator species, sensitive species, and those targeted for special protection) within the sanctuary are numerous, and all cannot be covered here. Emphasis is placed on examples from various primary habitats of the sanctuary.

The sea otter is often considered a keystone species because of the strong top-down influence sea otters have on the nearshore kelp ecosystem. Sea otters are also a key species for the sanctuary because sea otters were extirpated from Washington State by commercial pelt hunters by 1911 and were reintroduced in 1969 and 1970 (Lance et al. 2004). This population has been censused annually since 1989 and has shown increases the past

few years, with a peak of 1,121 animals in 2008 (Jameson and Jeffries 2008). However, the sea otter population remains vulnerable to catastrophic events (e.g. oil spills), and the population rate of increase has been slower than expected. The population is still considered to be below the estimated carrying capacity based on available habitat (Laidre et al. 2002, Lance et al. 2004). The sea otter remains a federal species of concern and an endangered species within Washington State. The sea otter population remains vulnerable because of its small size, limited genetic diversity, exposure to pathogens and risks from spills.

Most if not all nearshore pinniped species along Washington coast (harbor seals, northern elephant seals, California sea lion, Steller sea lion) appear to be stable or increasing in number. These top predators play a significant role in top down influences on the food web. The harbor seal appears to be at or beyond carrying capacity with approximately 3,000 animals using the sanctuary (Jeffries et al. 2003). Steller sea lions remain both a federal and state listed threatened species.

Many cetaceans (whales and dolphins) forage in and move through sanctuary waters. The gray whale, a species that is culturally important to tribes bordering the sanctuary, particularly to the Makah Tribe, has made a significant recovery and is no longer considered endangered across its range (although they are still considered a state sensitive species) (Richardson 1997). Monitoring conducted by the Makah Tribe and the Marine Mammal Laboratory/National Marine Fisheries Service since 1998 suggests that the population is stable and may be increasing (Calambokidis 2007). The humpback whale is a recovering species and is still on the federal and state endangered species lists. Other federal or state endangered cetaceans that use the sanctuary during some of all of their life history are sperm whale, fin whale, sei whale, blue whale and North Pacific right whale. Killer whales are federally and state endangered, and the harbor porpoise is a candidate for state listing.

Seabirds are relatively numerous, conspicuous, and forage across multiple habitat types and trophic levels. For these reasons they are often considered indicators of ocean conditions, and the status of their populations provide insight into ecosystem health (Parrish and Zador 2003, Piatt et al. 2007). Many feed on forage fish, a critical link in the food chain, but one that is difficult to quantify by direct observation. Five marine birds that breed in the sanctuary are on federal and/or state species of concern lists: Common Murre, Marbled Murrelet, Tufted Puffin, Cassins Auklet, and Brandt's Cormorant. Generalities among these seabirds are long-term declines in their population sizes (Wahl and Tweit 2000, Wahl et al. 2005, Raphael 2006); vulnerability to human disturbances such as oil spills, habitat disruption and fisheries bycatch (Piatt et al. 2002, Raphael 2006); and susceptibility to natural disturbances such as El Niño Southern Oscillation (ENSO) events (Wooster and Fluharty 1985, Wilson 1991, Piatt et al. 2002, Wahl et al. 2005). Some population levels do appear to be stabilizing at values lower than historical levels; however, more years of data are needed to determine a trend (Lance and Pearson 2008).

A closer examination of the Common Murre population provides insight into some of the factors affecting the status of all seabirds on the Washington coast. The murre population declined dramatically in 1982 and 1983, coinciding with a severe ENSO and has not recovered to pre-1983 levels since that time (Warheit and Thompson 2003). Aside from other ENSO events, it has been suggested that the population has not recovered due to a combination of oil spills, disturbance at breeding colonies (e.g. historic Naval bombing practices), and gillnet mortality (Warheit and Thompson 2003). Two oil spill events have occurred in recent times on the Washington coast, one in 1988 (the *Nestucca*) and the other 1991 (the *Tenyo Maru*) and in both spills, common murres were a significant proportion of the bird mortality (74% and 73% respectively of the birds recovered were Common Murres (Parrish personal communication). There were 9275 common murre mortalities documented from the *Nestucca* spill (Parrish personal communication) and it was then estimated that 30,000 murres were killed off the outer coast of Washington during that spill (Manuwal et al. 2000). The Tenyo Maru Natural Resources Trustees documented 3,157 common murres killed by that oil spill, which is a minimum estimate of actual mortality, suggesting that a potentially sizable proportion of the total Washington state Common Murre population may have been killed by the *Tenyo Maru* oil spill (The *Tenyo Maru* Oil Spill Natural Resource Trustees. 2000). Although the sanctuary's Common Murre population has shown some signs of recovery

through the 1990s, its population size was greatly diminished relative to pre-spill numbers and has even showed some modest population declines in recent years (Manuwal et al. 2001). At the breeding colony on Tatoosh Island, Common Murre populations have also been affected by in influx of avian predators including Bald Eagles, Peregrine Falcons and nest depredating Glaucous-winged Gulls (Parrish et al. 2001). The multiple stressors affecting the sluggish recovery of Common Murres may be indicative of the challenges facing the long-term recovery of other seabirds.

Indicator species of the deep sea environs are not clearly defined due to limited information about his remote region of the ocean. Very little is known about the status of deep sea coral and sponge communities (Brancato et al. 2007; Whitmire & Clarke 2007). Groundfish assemblages are a key vertebrate guild that may serve as a proxy for the condition of deep sea communities. The status of discrete fish stocks relevant to Washington State is not well defined independently from the west coast assessment effort because these stocks are managed on a coast-wide basis. Groundfish fisheries are also discussed in under Question 10.

13. What is the condition or health of key species and how is it changing?

As indicated above in Question 12, the sanctuary selected sea otters, and certain seabirds and rockfish as key species or indicators of ecosystem health. The condition of health of each is discussed below.

Most wildlife populations in the Olympic Coast sanctuary are relatively healthy and unburdened by contaminants, pathogens or related maladies. There are, however, notable exceptions. The sea otter population has been shown to carry several potentially lethal pathogens. In a study where tissue samples were collected from 30 live sea otters, 80% of the otters tested positive for the distemper viral complex *Morbillivirus* and 60% tested positive for the protozoan *Toxoplasma gondii* (Brancato et al. 2006). No direct negative health effects in the Washington population have yet been documented from these pathogens; however, *Toxoplasma* has been a cause of mortality in California sea otters (Miller et al. 2004). In addition, there was a positive correlation between chemical contaminants such as PCBs and pathogen levels with the later used as a proxy for immunosuppression (Brancato et al. 2006). Furthermore, PCB levels were correlated with a significant reduction of vitamin A stores in the liver, yet overall tissue concentrations of assayed contaminants were relatively low in Washington sea otters (Brancato et al. 2006). Fat soluble contaminants are generally considered to biomagnify or increase in concentration when moving up the food web (Cockcroft et al. 1983). Top predators in the region, such as killer whales, have been shown to carry high contaminant loads (e.g. PCBs and PBDEs) in their blubber (Ross et al. 2000, Ross 2006) though the population effects of such high contaminant loads are unknown.

Sea otter populations were regionally extirpated due to the commercial fur trade in the 18th and 19th centuries. There is reduced genetic variation in the Washington coast sea otter population when compared with ancient sea otter remains, as determined by analysis of DNA sequences (Larson et al. 2002). Reduced genetic variability is generally considered to impart deleterious effects such as reduced fecundity, higher juvenile mortality and reduced capacity to combat environmental stressors (Ralls et al. 1983, Lance et al. 2004). Sea otter populations should be closely monitored for such adverse effects, and to determine when the population crosses the Strait, potentially breeding with the population around Vancouver Island, BC, which could increase genetic variability. At the moment the condition or health of sea otters is stable but bears watching.

Age structure, an important measure of population integrity, has been affected by extractive activities and by unknown causes for some species. Rockfish populations have been shown to have reduced numbers of larger, older fish, a factor that could affect their recovery rate (PFMC 2008). There is a positive relationship between fecundity and age in long-lived Pacific rockfish such as the genus *Sebastes* (Eldridge and Jarvis 1995). Furthermore, larvae of larger, older rockfish are considered of better condition in terms of higher growth rates and ability to withstand starvation (Berkeley et al. 2004). Removals of such long-lived species can have broader ecological impacts (Heppell et al. 2005).

Age structure and mortality rates are also in question in some bird populations on the coast. Common Murres on Tatoosh Island have had documented breeding failures during recent years, partially attributed to observed heavy predation by raptors and gulls, oil spills, but also possibly due to low food supply during critical breeding periods (Parrish et al. 2001, Warheit and Thompson 2003). Because they are long lived, an occasional year of poor productivity may not impact the population significantly, but multiple years or successive years of failure would likely have future impacts on the population. Baseline mortality rates for common murres and other seabirds are currently being examined through the Coastal Observation and Seabird Survey Team (COASST) program, a comprehensive coast-wide program initiated in 1999 to document beach-cast bird trends over time (Hass and Parrish 2000). Recent demographic studies of Marbled Murrelets in the region have indicated that they have had low nesting success in recent years (Raphael and Bloxton 2008) which may inhibit their recovery or at least slow the rate of recovery.

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14. What are the levels of human activities that may influence living resource quality and how are they changing?

Oil spills remain the most serious threat to local populations of marine organisms. Although no major spills have occurred within the sanctuary since the *Tenyo Maru* spill in 1991, some populations, such as the Common Murre, have not yet recovered. The establishment of the Area to be Avoided has helped to keep oil barges, tankers, and other large commercial vessels away from the most biologically sensitive areas and the rescue tug stationed at Neah Bay has averted several hazardous situations. However, because of the high shipping traffic using the Strait of Juan de Fuca, combined with the challenging seas of the eastern North Pacific, the sanctuary still remains at risk from a catastrophic spill.

Fishing continues to affect sanctuary habitats and biota in a number of ways. Bottom contact fishing gear used by commercial fishers can alter benthic communities by removing biogenic structures and/or disturbing infauna. The distribution of deep-sea coral and sponge communities has not yet been quantified or sufficiently mapped within the sanctuary, so it is difficult to determine the extent of overlap between existing biogenic communities and current or historic fishing activity. Industrial fishing tends to target larger, older fish, which alters age structure and can reduce the breeding potential of long-lived species such as certain rockfish species (NRC 2006).

The following information provides an assessment by sanctuary staff and subject area experts of the status and trends of living resources.

Living Resources Status & Trends

Good	Good/Fair	Fair	Fair/Poor	Poor	Undet.

▲ = Improving ▬ = Not changing ▼ = Getting worse

? = Undetermined trend **N/A** = Question not applicable

	Status	Rating	Basis for Judgment
9	Biodiversity	▲	Ecosystem-level impacts caused by historical depletion of fish and marine mammals, high order predators, and keystone species.
10	Extracted Species	?	Overexploitation of some groundfish species has led to wide area closures
11	Invasive Species	▼	Invasive *Sargassum* and *ascidian* distrubutions are expanding
12	Key Species Status	?	Depleted population levels for Common Murres, sea otters, and numerous rockfish, with differing recovery rates
13	Key Species Condition	?	Diseases in sea otters, uncertain recovery
14	Human Activities	▲	Commercial and recreational fishing has decreased due to closures.

Maritime Archaeological Resources

NEEDS INTRODUCTION

Figure MARS1. Olympic Coast National Marine Sanctuary is the graveyard for over 180 documented shipwrecks. Human error, treacherous weather, dangerous reefs and headlands and ship's navigational or operational failures still contribute to this place's hazardous reputation among mariners. The anchor is nearly all that remains of the bark Austria, grounded at Cape Alava in 1887. (Photo: Olympic Coast sanctuary)

15. What is the integrity of maritime archaeological resources and how is it changing?

In general, maritime archaeological resources are not being managed in accordance with the National Historic Preservation Act (NHPA) due to limited funding, and efforts to locate and assess maritime archaeological resources have been extremely limited.

While the Olympic Coast has been the focus of human communities for thousands of years and has figured prominently in Pacific Northwest maritime history, there is no agency-sponsored inventory of submerged maritime archaeological resources in the offshore environment in the sanctuary. The sanctuary's inventory contains information of approximately 180 known vessel losses, and limited efforts to locate specific wrecks have located only a few wrecks.

Due to limited survey effort, few deepwater shipwrecks are known. Of these, only the WWII submarine *Bugarra* has received any survey attention. Archaeological resources in deep offshore waters are generally in a more stable environment because such environments tend to be calmer and have fewer physical and biological processes accelerating ship degradation compared to nearshore sites. Historical and recent bottom trawling is

one probable impact to offshore maritime archaeological resources that has potentially damaged submerged historic resources. Because the majority of wreck locations are unknown, the impacts from historical and recent trawling are unknown. Anecdotal reports have indicated damage from fishing gear or fishing practices such as entanglement and snagging. The development of underwater technologies now affords the public the opportunity to locate and visit deep-water archaeological resources in the offshore environment. As with divers visiting accessible nearshore archaeological sites, the diving community must be educated on the regulations in place in order to protect these non-renewable resources. In the absence of a robust cultural resources education program, the maritime resources may be subject to vandalism, looting or damage.

Shallow shipwrecks are subject to severe environmental degradation resulting from natural processes such as ocean surge, north Pacific storms, strong currents and sea level rise. The *General Meigs* and the *Austria* (Figure XX) are two wrecks that are heavily impacted from natural destruction. However, there is no monitoring of changing conditions taking place.

Figure MAHS2. Wreck of the Austria, lost 1887

The modern shoreline of the Olympic Peninsula contains dozens of late prehistoric archaeological sites that are rich in materials documenting the character of the maritime environment and the use of this environment by the region's native peoples. Nearshore coastal forests adjacent to the sanctuary contain Mid Holocene shorelines and older prehistoric archaeological sites. These older sites are rich in materials documenting the character of maritime paleo-environments, the history of environmental change, and the record of the use of these environments by the region's native peoples. There have already been significant studies of both the late prehistoric and older archaeological sites, but much remains to be learned. To date, most of the effort has focused upon the more recent sites but knowledge of the sites associated with Mid Holocene shorelines is relatively limited. Although some collaborative monitoring of prehistoric sites is currently being conducted by Olympic National Park, the sanctuary and Makah Tribal Historic Preservation Officers (THPO), it is minimal and informal. However, data from other parts of the Northwest Coast suggest that there may be several different types of prehistoric archaeological resources in the sanctuary. Features such as late prehistoric fish traps and canoe runs are known to be present near the sanctuary and examples of either, or both, may be present within it. There is also the possibility that very ancient archaeological sites could be present on inundated Pleistocene and/or Early Holocene shorelines in the sanctuary. Given the absence of direct evidence, it is not possible to address the conditions of such resources (if they are present). However, data from other parts of the Northwest Coast suggest that such resources are likely to be relatively durable but, like the case with the shipwrecks, prehistoric archaeological resources could be adversely affected by wave energy (particularly those in the intertidal zone and shorelines), commercial fishing activities and/or recreational divers. Prehistoric archaeological sites in the intertidal zone and shorelines are also subject to looting and other human disturbance, but little monitoring, education or enforcement takes place.

There is considerable variation in the integrity of the known archaeological resources near the sanctuary. Nearly all of the late prehistoric sites associated with the modern shoreline are actively eroding. Data exist that document the loss of cultural deposits due to shoreline erosion, and it can be anticipated that rising sea levels will accelerate the rate of this loss. There has also been a significant loss of cultural deposits due to development in and near modern shoreline communities. As can be expected, development is less of a factor in the Olympic National Park. Also, although relatively limited, there has been some damage to cultural deposits along the modern shoreline due to vandalism. Finally, while knowledge of the integrity of the older Mid Holocene sites is more limited, the situation with these sites may be somewhat better. Since these sites are mostly located in nearshore forest settings, they are not being impacted by shoreline erosion. To the extent that historic impacts have damaged these sites, it has been from mechanisms such as logging and the construction of logging roads. Finally, given that these sites tend to be located in relatively remote places and are difficult to detect, there are no known cases of damage due to vandalism.

16. Do maritime archaeological resources pose an environmental hazard and how is this threat changing?

The sanctuary's inventory of known maritime archaeological resources suggests that the potential of shipwrecks in the sanctuary to pose an environmental hazard to sanctuary resources is minimal. Therefore, the situation is considered to be good and not changing.

The historic ship wrecks (at least 50 years old) in the sanctuary include both merchant and military vessels that sank during wartime, as well as older peacetime sinkings and groundings. However, for the purposes of wreck removal, salvage, and pollution response, most of the vessels in question would be post 1910 when Navy and commercial vessels began to shift from coal to oil bunkers (Dahl 2001). It is likely that earlier wrecks are no longer intact and did not carry substantial quantities of hazardous cargoes, or fuel oil as cargo.

Given the above criteria that constitute "historic wrecks" with potential to pose an environmental hazard, the sanctuary has 12 vessels in this category. OCNMS Shipwreck Database

Of these 12 vessels, only one, the *General Miegs*, has been identified as a source of oil leakage into the environment (Clark et al. 1975). However, no monitoring is currently taking place. There are occasional reports of mystery spills (oil sheen reported on the water from an unknown source). This can be an indication of a release from a wreck; however, this is not frequent or consistent enough to give a strong indication of a release from a submerged wreck. It is more likely that this is the result of an illegal discharge of oily ballast or other accidental and unreported release from a vessel (Helton 2003).

17. What are the levels of human activities that may influence maritime archaeological resource quality and how are they changing?

The level of human activities that may influence maritime archaeological resource quality in the sanctuary is considered to be fair and the trend is undetermined. This is based on unauthorized salvaging that is taking place in the intertidal zone of the sanctuary and fishing activities and cable installations that are occurring in the offshore zone of the sanctuary.

Prehistoric sites in the intertidal zone and shorelines are subject to erosion – wave action and storm events uncover new materials every year. As resources are unearthed, they are subject to the threat of looting and vandalism. There is little monitoring, enforcement and education taking place to offset this threat.

Historical and recent bottom trawling can potentially impact maritime archaeological resources in the offshore zone of the sanctuary. Incidental damage to resources may occur from impact from bottom contact fishing gear (trawl, longlines, etc.), anchoring, and derelict fishing gear. However, because the majority of wreck locations are

unknown, the impacts from historical and recent trawling are unknown. Recent closures of large areas of the sanctuary to bottom trawling will reduce these threats. The creation of new or larger areas restricting bottom contact gear may indirectly protect historical resources.

Also threatening resources in the offshore zone is the trenching of submerged communication cables. As has been mentioned, the installation and subsequent re-installation of an underwater cable in the sanctuary negatively impacts benthic habitat in the immediate vicinity of the cable, but the impacts are localized along the length of the cable. Maritime archaeological resources can be damaged if they are in the vicinity of the cable trenching.

Other human activities affecting archaeological resources in the sanctuary include:

- With more sophisticated diving technology becoming available (rebreathers, affordable sidescan sonar, etc.), and the allure of treasure or artifacts, some treasure hunters are moving to deeper waters. Any vessel or site could be considered in danger of damage from scavenging or vandalism, but those known in local histories as carrying valuables, such as the steamer *Pacific*, should be located and evaluated soon. The threat of looting or vandalism increases as erosion and human use/access rates increase.
- Human use disturbance due to management activities (placement of wilderness privies) or lack of mitigating measures (use of informal social trails or campsites) potentially impact now land-based sites that were once coastal. This threat is decreasing due to improved interagency consultation.
- Mineral extraction activities (such as oil or gas drilling, or submarine gravel mining). Intertidal maritime cultural resources could be imperiled by beach mining activities (gravel, sand, gold, etc.) as have been proposed in the past (State of Washington 2006). Significant timber cutting or inland mining has the potential to reduce watershed water quality and increase erosion to river and stream mouths, altering or imperiling intertidal and near-shore resources.
- The possibility of installation of offshore power generation facilities.

There is a lack of assessment, monitoring and enforcement on maritime archaeological resources in the sanctuary. However, the situation for archaeological resources on lands immediately adjacent to the sanctuary is somewhat better understood. Sites in these areas are relatively more accessible therefore monitoring is accomplished with more ease. These sites represent a variety of different conditions and are influenced by varying combinations of both natural processes and human activities. As such, some are much more threatened than others. The human activities threatening archaeological sites near the sanctuary are mostly related to development and terrestrial resource extraction (principally logging). Presumably, both types of activities will continue in nearshore areas for the foreseeable future. Shoreline erosion is also a serious threat to the survival of many archaeological sites and this effect will become more severe if sea levels rise continues to occur in the coming decades (Pendleton et al. 2004).

The following information provides an assessment by sanctuary staff and subject area experts of the status and trends pertaining to the current state of the sanctuary's maritime archaeological resources:

Maritime Archaeological Resources Status & Trends

Good	Good/Fair	Fair	Fair/Poor	Poor	Undet.

▲ = Improving — = Not changing ▼ = Getting worse
? = Undetermined trend **N/A** = Question not applicable

	Status	Trend	Basis for Judgment
15	Integrity	?	Deepwater wrecks stable; shallow wrecks subject to environmental degradation; lack of monitoring to determine trend
16	Threat to Environment	—	Historic wrecks did not carry substantial quantities of hazardous cargoes
17	Human Activities	?	Unauthorized salvaging in nearshore, fishing activities and cable installations in offshore

Response to Pressures

The national marine sanctuary program has a mandate to maintain biological communities and protect and restore native habitats, populations, and ecological processes within its boundaries while allowing compatible uses. A sanctuary management plan establishes research, monitoring and resource protection priorities and programs to address key threats or pressures. In addition to guidance provided through the management plan, sanctuary regulations specific to each site establish a range of activities that are prohibited or are authorized through a sanctuary permit if it can be demonstrated that the activity supports a sanctuary management objective and it will not substantially injure sanctuary resources.

In addition to sanctuary authorities, other federal, state, and tribal authorities, regulations, and policies govern the conduct of specific activities within the sanctuary. The nature of overlapping jurisdictions and authorities requires coordination and collaboration between resource managers to achieve marine conservation objectives.

This section describes current responses and research and resource protection initiatives addressing selected pressures. Current responses are based on implementation of the 1994 sanctuary management plan and regulations, as well as specific programs to address threats which have emerged since the 1994 management plan. Strategies to address prioritized threats or pressures will be further evaluated and adapted during the management plan review process, scheduled to begin in September 2008.

WATER QUALITY

Water Quality Monitoring

The sanctuary strives to understand, maintain, and improve water quality within the sanctuary (Figure 24) and regulations prohibit discharges into sanctuary waters. Since 2000, nearshore oceanographic moorings have been deployed to measure water temperature and, as funding has allowed, additional sensors and moorings have been deployed to measure, salinity, dissolved oxygen, currents, plankton density, and other standard environmental parameters (Figure XX). Information from these moorings, as well as data collected from periodic surveys from NOAA vessels, will lead to a better understanding of the links between the physical, chemical, and biological processes in productive nearshore waters and the connections with offshore waters. In turn, these data are useful to federal, tribal, university, and state-sponsored studies of harmful algal blooms, helping to assess potential threats to human health, and to that of birds and other marine mammals. These data are also used to correlate with intertidal invertebrate and algae studies, assist in oil spill response, and improve our understanding of hypoxic conditions that have been measured off the Washington and Oregon coasts in recent years. In an effort to establish baseline levels of persistent organic pollutants (industrial contaminants that remain for decades and can accumulate in organisms) in the ecosystem, the sanctuary has led and collaborated on several projects to measure contaminant levels in sediments, invertebrates, and sea otters, against which future data can be compared.

Figure 24. Water quality data can be collected by lowering electronic monitoring equipment into the ocean to sample a water column profile. The rosette is a series of instruments and sampling chambers on a metal frame, that measure temperature, pressure, salinity, oxygen content, algae content, and other factors. (Photo: Olympic Coast sanctuary)

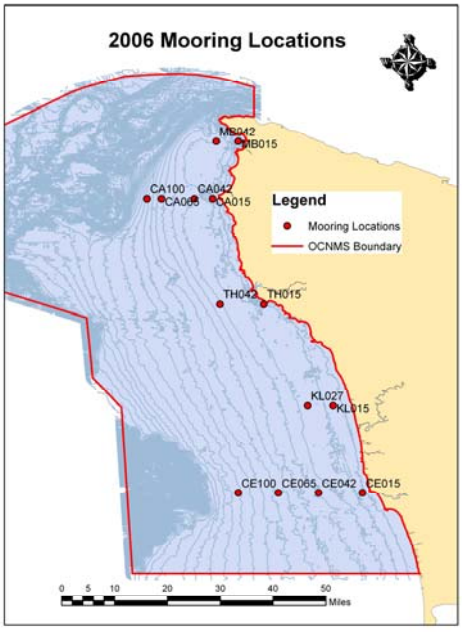

Figure XX. Remote sensors collect information on physical and biological properties of sanctuary waters at thirteen locations. These locations are designed to capture variability in nearshore ocean processes.

Invasive Species Monitoring

The sanctuary has sponsored two seasons of Rapid Assessment (2001 and 2002) of intertidal areas, bringing together a team of taxonomic experts to survey for and identify non-indigenous species (NIS) as well as inventory native species. Those surveys documented 10 non-indigenous invertebrate and algal species and, in a joint study with the Smithsonian Environmental Research Center in 2003, two invasive ascidians and one invasive barnacle were also documented (deRivera et al. 2005). A third Rapid Assessment to cover additional areas of the coastline will be conducted when funding is available. Rigorous monitoring and early detection of NIS are important tools in minimizing the harmful effects of non-native invaders.

The Olympic National Park and sanctuary staff also conduct long-term intertidal monitoring of both sandy and rocky habitats in order to inventory invertebrates and identify trends in populations. This monitoring program, though not specifically designed to address non-indigenous species, serves as an early warning detection program for non-native species that may become invasive (rapidly reproducing, aggressive and/or highly competitive with native species) within the region.

The sanctuary also partners with the Washington State Department of Fish and Wildlife and the Makah Tribe in monitoring for the invasive European green crab at sites in Neah Bay and Makah Bay. This non-native crab competes with native species for habitat and food and has proved quite destructive in other areas of the country. To date, no European green crabs have been detected along the sanctuary coast or in Neah Bay, although green crabs have been found just south of the sanctuary boundary in Willapa Bay and also north of the sanctuary along Vancouver Island, BC, Canada.

Area to Be Avoided Monitoring and Compliance

A catastrophic discharge of oil from a maritime accident poses the single greatest risk to the sanctuary. The Olympic Coast sanctuary worked with the U.S. Coast Guard and the International Maritime Organization to establish an Area to be Avoided (ATBA) as a buffer and provide greater response time for assistance to foundering vessels along this rocky and environmentally sensitive coast (Figure 25). All ships transiting the area and carrying cargoes of oil or hazardous materials, and all ships 1,600 gross tons and larger, are requested to avoid this area.

Since 1998 the sanctuary has been obtaining monthly vessel position files from the Canadian Coast Guard's radar site on Vancouver Island (Galasso 2000). This information is displayed as tracklines on a geographic information system. The data also includes vessel attributes that allows spatial and temporal analysis of behavior and trends, based on vessel characteristics. The sanctuary uses this information to create monthly transit plots of non-complying vessels, which are used as part of an outreach effort to the marine industry. Letters are sent out under signature of the sanctuary Superintendent and the Coast Guard Captain of the Port to non-complying vessels observed within the ATBA. The response by the maritime industry has been very favorable, with an approximated compliance rate of 98.8% in 2007.

http://olympiccoast.noaa.gov/protection/atba/welcome.html

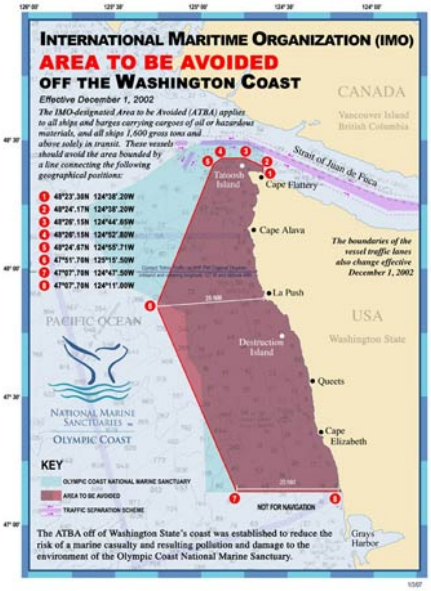

Figure 25. Map of the Olympic Coast sanctuary (in blue) and Area to be Avoided (in red). (Flyer: NOAA Olympic Coast National Marine Sanctuary)

Oil Spill Prevention

The sanctuary works closely with the Makah Office of Marine Safety and Washington Department of Ecology on oil spill response and preparedness by participating in oil spill drills, supporting a rescue tug stationed in Neah Bay and by reviewing proposed legislation, regulations, and documentation. Starting in 1999, Washington State has funded a seasonal rescue tug stationed at Neah Bay to quickly respond to vessels that have lost steerage or power. As of February 2008, the tug has stood by or assisted 40 ships that were disabled or had reduced maneuvering or propulsion capability while transporting oil and other cargo through the sanctuary and along the Strait of Juan de Fuca.

The sanctuary also has developed a site-specific Sanctuaries Hazardous Incident Emergency Logistics Database System (SHIELDS), which is designed to aid in spill response by providing a comprehensive reference and resource data tool.

TEXT BOX

Washington State Department of Ecology – Spill Response Rescue Tug at Neah Bay, WA

- Since 1999, a standby rescue tug has been stationed seasonally, generally October through March, in Neah Bay.
- The rescue tug has responded to 40 incidents of vessels in distress on the outer coast and the western Strait of Juan de Fuca.
- Reasons for tug responses include loss of propulsion, loss of steerage, drift groundings, powered groundings, collisions, broken tow wires, fires, explosions and structural failures.
- During the winter of 2007-8, the rescue tug was called out to assist six vessels in distress.
- Because of the high volume of shipping traffic, the remoteness of the outer coast and difficulty with implementing effective on-water response to a spill, and the potential devastating effects of an oil spill on tribal and federally protected shores, advocates have strongly advocated for permanent, year-round funding for a rescue tug in Neah Bay.
- In March 2008, the Washington State Legislature for the first time approved funding for year-round rescue tug contract services anticipated to extend through June 2009.
- Federal legislation requiring the shipping industry to pay for year-round, standby rescue tug service at Neah Bay has been introduced by Senator Maria Cantwell.

Vessel Discharges

Sewage and graywater discharges from large vessels (300 gross registered tons or more), including cruise ships and container ships are a concern in state and sanctuary waters. In 2004 a Memorandum of Understanding between Washington State, the Port of Seattle, and the cruise ship industry included an agreement to avoid dumping of biosolids (sewage sludge or solids from wastewater treatment systems) inside 12 nautical miles from shore. In 2007, this agreement was expanded to avoid such discharge in all sanctuary waters. This is a significant action because according to Port of Seattle statistics about 150 cruise ship trips between Seattle and Alaska occurred in 2007, and each week-long trip generated about 28,000 gallons of sewage sludge. Nevertheless, cruise ships transiting the Olympic Coast sanctuary are not prohibited from discharging minimally treated sewage, graywater, and blackwater in accordance with state and federal law. Consequently, the rapidly expanding cruise ship industry in the Pacific Northwest may have growing potential to impact sanctuary waters.

http://www.ecy.wa.gov/programs/wq/wastewater/cruise_mou/MOU%203rd%20Amendment%205-25-07%20final.pdf

HABITAT

Habitat Mapping

The sanctuary does not directly manage fisheries within sanctuary waters; however, sanctuary research informs fisheries management entities, particularly on habitats within sanctuary boundaries. Starting in 2000, the sanctuary embarked on a project to create images of the seafloor habitats within the sanctuary, using advanced acoustic and optical technologies to create digital images, and verifying those images using remotely operated vehicles and drop-cameras (Figure 20). The imagery helps to characterize the types, distribution, and abundance of seafloor habitats, and groundtruthing helps to verify classification results, as well as to provide new habitat information. These efforts can support crucial management issues, such as protecting critical habitats, identifying areas of undisturbed deep-sea coral and sponge communities, or examining fishing regulations to aid in the recovery of declining fish populations.

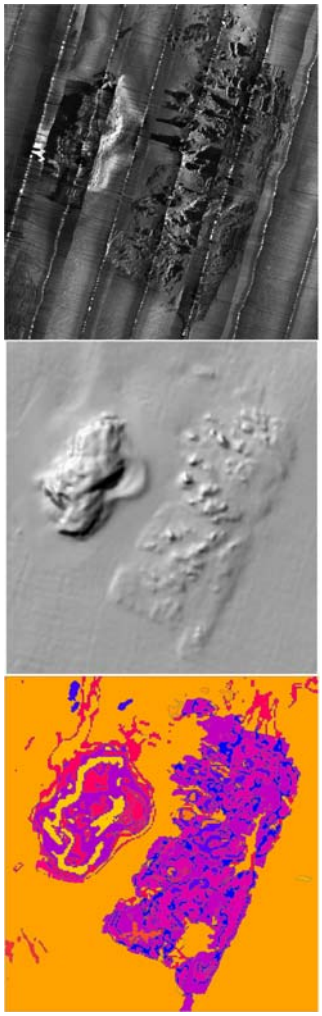

Figure 20. Using texture analysis algorithms, information from side scan sonar imagery (top plate) and multibeam bathymetry (middle plate) are combined to create classified habitat images (bottom plate). (Image: Olympic Coast sanctuary)

Deep Sea Coral Research and Conservation

In 2004 and 2006, sanctuary staff, in partnership with the National Centers of Coastal Ocean Science conducted side-scan and video surveys of offshore habitats. The focus of this initiative was to document the presence of hard-bottom habitats in deep-water areas of the sanctuary and video survey any associated living communities. Hard substrates often harbor diverse assemblages of invertebrates and fish, including corals, sponges, and other extremely slow-growing fauna that are particularly sensitive to human disturbances. Several species of corals and sponges were documented at 14 of the 15 sites surveyed in 2006; sites located both inside and outside of the protective EFH Conservation Area (Olympic 2). Numerous gorgonians, two stony coral species (*Lophelia pertusa* and *Desmophyllum dianthus*) and small patches of the reef building sponge (*Farrea occa*) were found (Figure 22). Some anthropogenic disturbance to these seafloor communities was also documented. Future explorations will continue to improve our understanding of deep coral and sponge habitat, its distribution and ecosystem functions, and potential pressures to that system (Brancato et al. 2007).
http://sanctuaries.noaa.gov/science/conservation/bowlby.html

http://coastalscience.noaa.gov/
http://www.nmfs.noaa.gov/

Figure 22. Stony coral *Lophelia pertusa*, characteristic of deepwater coral assemblages in the North Atlantic but less documented in the Pacific, was recently found in the Olympic Coast sanctuary at several locations.

Derelict Fishing Gear

In 2005, the sanctuary was awarded funds from NOAA's Office of Restoration and Response Marine Debris Program for a pilot project to identify and remove derelict fishing gear in the northern part of the sanctuary, as well as to develop safe operating protocols for gear removal operations while working in the open ocean environment. The pilot project was a partnership with the Makah Tribe with a goal to build capacity in an affected community to conduct future derelict gear removal projects. Multiple target areas were surveyed by sonar and divers, and three abandoned fishing nets and several crab pots were located and recovered.

http://response.restoration.noaa.gov/

Figure 23. Derelict gear is removed from the ocean floor. This net contained numerous dead animals including seabirds, fish, harbor seals, harbor porpoise, and a California sea lion. (Photo: Olympic Coast sanctuary)

Fiber Optic Cable Permit Compliance and Monitoring

In 2006, the Pacific Crossing responded to sanctuary and tribal concerns over improper burial of the Pacific Crossing PC-1 fiber optic submarine telecommunication cables by reinstalling the cable through the sanctuary. The goal of this effort was to minimize risks of interactions with fishing gear, reduce cable damage, and to minimize ongoing impacts to seafloor habitats. Sanctuary regulations generally prohibit seafloor disturbances. Post-installation assessment revealed improved cable burial, yet the cable remained unburied and suspended in

limited areas, which confirms the difficulty of cable burial where the seafloor has boulders, compacted subsurface deposits, and bedrock (Tyco 2006). Under conditions in their sanctuary permit, Pacific Crossing will mitigate risks at these areas through directed outreach to bottom trawl fishers to make them aware of cable locations and burial state and reducing interactions with fishing activities. The sanctuary has also implemented a monitoring program that has provided important information on the rate of seafloor habitat recovery following disturbance associated with cable installation, and to which will support inform future decision-making on similar proposals.

LIVING RESOURCES

Groundfish Protection/Designation of Essential Fish Habitat

Recent significant conservation actions that have taken place within the sanctuary include the establishment of conservation areas to protect groundfish habitat and to minimize the bycatch of overfished species. The Pacific Fisheries Management Commission (PFMC) and NOAA's National Marine Fisheries Service (NMFS) designated multiple areas along the west coast as Essential Fish Habitat (EFH) Conservation Areas with specific fishing restrictions. One unit, the Olympic 2 EFH area closure, is located within the boundary of the sanctuary (Figure 21) and is closed to all types of non-tribal bottom trawl fishing gear but not all types of bottom contact gear, such as longline gear. The EFH Conservation Areas were implemented through amendment 19 to the Pacific Coast Groundfish Fisheries Management Plan and went into effect in 2006. In addition, Rockfish Conservation Areas, or RCAs, are temporary large-scale closed areas that extend along the entire length of the U.S. West Coast. The RCA boundaries approximate particular depth contours that can change during the year and are designed to minimize opportunities for vessels to incidentally take overfished rockfish by eliminating fishing in areas where and when those overfished species are likely to co-occur with more healthy stocks of groundfish. It will be important to monitor the EFH and RCA's to detect changes in physical habitat and groundfish populations.

http://www.nmfs.noaa.gov/habitat/habitatprotection/efh/
http://www.nwr.noaa.gov/Groundfish%2DHalibut/Groundfish%2DFishery%2DManagement/Groundfish%2DClosed%2DAreas/)
http://www.pcouncil.org/groundfish/gffmp/gfa19.html

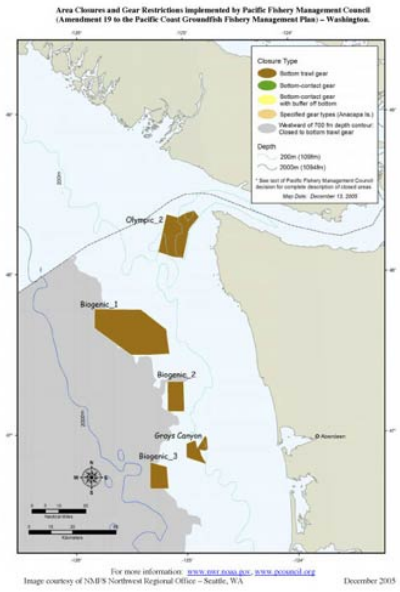

Figure 21. EFH area closures to protect Pacific Coast groundfish habitat - Washington.

Intertidal Habitats
In response to growing concerns about impacts of increased visitation to the shores, sanctuary and Olympic National Park staff cooperated in an effort to examine the threats and opportunities to protect intertidal resources along the Olympic Coast. Science experts and citizen representatives outlined activities that are potentially degrading to intertidal areas and disturbing to wildlife, and identified a set of ecologically significant habitats and a range of potential management actions, including possible establishment of no-harvest areas, or intertidal reserves, to ensure long-term protection of the federally owned shores as human use increases. Intertidal reserves covering roughly 30% of the park's shore were incorporated into the park's Final General Management Plan released in March 2008.

http://parkplanning.nps.gov/projectHome.cfm?parkId=329&projectId=10233

Military Activities
The Navy is in the process of developing its environmental impact assessment for the proposed federal action to expand Navy's Northwest Training Range Complex . This multi-year assessment, which will include opportunities for public input and comment, is expected to be completed in 2009. Sanctuary staff will be active participants in the environmental assessment process to evaluate potential impacts to sanctuary resources and develop appropriate protection measures. There is a proposal for the Navy to expand its testing of non-weaponized equipment in and near the sanctuary.

http://www-keyport.kpt.nuwc.navy.mil/EIS_Documents.htm
http://www.epa.gov/fedrgstr/EPA-IMPACT/2007/July/Day-31/i14784.htm

CLIMATE CHANGE
Changing climatic conditions can not be managed at the level of the sanctuary. However, the sanctuary can assist in documenting the direct effects of climatic changes, by recording through time oceanographic properties such as water temperature and dissolved oxygen levels. Using remote moorings the sanctuary records ocean conditions continuously for the duration of the field season and, with improved equipment and mooring apparatus, could extend monitoring efforts throughout the year. These data can be shared with other researchers such as fisheries biologists to better understand the effects of ocean conditions on these economically important resources. The sanctuary also indirectly monitors responses to climate change in living resources though long-term monitoring of marine birds and mammals, intertidal organisms and rapid assessment of invasive species. Associations between ocean conditions, possibly driven by climate change, and the presence of harmful algal blooms or hypoxic conditions are explored through both sanctuary programs and collaborative efforts that include Olympic Region Harmful Algal Bloom consortium (ORHAB), Ecology and Oceanography of Harmful Algal Blooms (ECOHAB), and Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO).

Coastal archaeological resources may be negatively impacted by rising sea levels. Ideally, these resources would be inventoried and assessed in order to help managers interpret what, if any, management actions could be taken in an effort to preserve critical sites and material. Unfortunately, insufficient funding has prevented the sanctuary from conducting such inventories. Nevertheless, the sanctuary recognizes this need and will continue to attempt to facilitate and conduct these inventories.

MARITIME HERITAGE
ADD IN ELEMENTS OF ACTIVITIES CONDUCTED TO DATE (LIMITED SHIPWRECK INVENTORIES, PALEOSHORELINE WORK, SUPPORT FOR TRIBAL JOURNEYS)

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Concluding Remarks

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Acknowledgements

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http://www.ferc.gov/legal/court-cases/pend-case.asp See AquaEnergy Group, Ltd. v. FERC

http://www.pcouncil.org/groundfish/gffmp/gfa19.html

http://www.ecy.wa.gov/programs/wq/nonpoint/nps_plan.html

http://www.ecy.wa.gov/pubs/0610039.pdf

http://sanctuaries.noaa.gov/special/ATBA/ATBA%20final.pdf

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Additional Resources

American Park Network, History of Olympic National Park: http://www.americanparknetwork.com/parkinfo/ol/history/

Big Eddy International Marine Ecosystem Initiative: http://www.bigeddy.net/

Channel Islands National Marine Sanctuary, Bridging Our Past Through Shipwrecks: http://channelislands.noaa.gov/shipwreck/shiphome.html

Coastal Observation and Seabird Survey Team: http://www.coasst.org/

Ecology and Oceanography of Harmful Algal Blooms: http://www.ecohabpnw.org/

Intergovernmental Policy Council: http://sanctuaries.noaa.gov/news/features/0107_octribes.html

Makah Cultural and Research Center: http://www.makah.com/mcrchome.htm

Makah Tribe: http://www.makah.com/

Marine Conservation Biology Institute: http://www.mcbi.org/

Marine Protected Areas of the United States: http://www.mpa.gov/

NOAA's Climate Program Office: http://www.climate.noaa.gov/

NOAA's National Center Centers for Coastal Ocean Science: http://coastalscience.noaa.gov/

NOAA's National Marine Fisheries Service: http://www.nmfs.noaa.gov/

NOAA's National Marine Fisheries Service Northwest Regional Office: http://www.nwr.noaa.gov/

NOAA's National Marine Sanctuary Program: http://sanctuaries.noaa.gov/

NOAA's Ocean Explorer: http://www.oceanexplorer.noaa.gov/

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Northwest Association of Networked Ocean Observing Systems: http://www.nanoos.org/

Northwest Indian Fisheries Commission: http://www.nwifc.wa.gov/

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Ocean Futures Society: http://www.oceanfutures.org/

Olympic Coast Alliance: http://www.olympiccoast.org/

Olympic Coast National Marine Sanctuary: http://olympiccoast.noaa.gov/

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Oregon State University: Oceanic and Atmospheric Sciences: http://www.coas.oregonstate.edu/

Pacific Fishery Management Council: http://www.pcouncil.org/

Pacific Northwest Seismic Network: http://www.pnsn.org/

Partnership for Interdisciplinary Studies of Coastal Oceans: http://www.piscoweb.org/

Quileute Tribe: http://www.quileutetribe.org/

U.S. Fish & Wildlife Service: Pacific Region: http://www.fws.gov/pacific/

U.S. Geological Survey, Cascades Volcano Observatory: http://vulcan.wr.usgs.gov/

U.S. Geological Survey, Tsunamis and Earthquake Research: http://walrus.wr.usgs.gov/tsunami/

U.S. Geological Survey: http://www.usgs.gov/

Washington Department of Fish and Wildlife: http://wdfw.wa.gov/home.htm

Washington Invasive Species Coalition: http://www.invasivespeciescoalition.org/

Washington Maritime National Wildlife Refuge Complex:
http://www.fws.gov/pacific/refuges/field/WA_maritime.htm

Washington Sea Grant Program: http://www.wsg.washington.edu/

Washington State Department of Ecology: http://www.ecy.wa.gov/

Washington State Department of Ecology: http://www.ecy.wa.gov/

Washington State Department of Natural Resources: http://www.dnr.wa.gov/

Washington State Ocean Policy Work Group: http://courses.washington.edu/oceangov/OPWG.html

Appendix A:
Rating Scheme for System-Wide Monitoring Questions

The purpose of this appendix is to clarify the 17 questions and possible responses used to report the condition of sanctuary resources in "Condition Reports" for all national marine sanctuaries. Individual staff and partners utilized this guidance, as well as their own informed and detailed understanding of the site to make judgments about the status and trends of sanctuary resources.

The questions derive from the National Marine Sanctuary Program mission, and a system-wide monitoring framework (National Marine Sanctuary Program, 2004) developed to ensure the timely flow of data and information to those responsible for managing and protecting resources in the ocean and coastal zone, and to those that use, depend on, and study the ecosystems encompassed by the sanctuaries. They are being used to guide staff and partners at each of the 14 sites in the sanctuary system in the development of this first periodic sanctuary condition report. The questions are meant to set the limits of judgments so that responses can be confined to certain reporting categories that will later be compared among all sites, and combined. Evaluations of status and trends may be based on interpretation of quantitative and, when necessary, non-quantitative assessments and observations of scientists, managers and users.

Following a brief discussion about each question, statements are presented that were used to judge the status and assign a corresponding color code. These statements are customized for each question. In addition, the following options are available for all questions: " N/A" - the question does not apply; and "Undet." - resource status is undetermined.

Symbols used to indicate trends are the same for all questions: "**▲ " -** conditions appear to be improving; "**▬" -** conditions do not appear to be changing; "**▼ " -** conditions appear to be declining; and "**?" –** trend is undetermined.

Question 1 (Water/Stressors): Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality and how are they changing?

This is meant to capture shifts in condition arising from certain changing physical processes and anthropogenic inputs. Factors resulting in regionally accelerated rates of change in water temperature, salinity, dissolved oxygen, or water clarity, could all be judged to reduce water quality. Localized changes in circulation or sedimentation resulting, for example, from coastal construction or dredge spoil disposal, can affect light penetration, salinity regimes, oxygen levels, productivity, waste transport, and other factors that influence habitat and living resource quality. Human inputs, generally in the form of contaminants from point or non-point sources, including fertilizers, pesticides, hydrocarbons, heavy metals, and sewage, are common causes of environmental degradation, often in combination rather than alone. Certain biotoxins, such as domoic acid, may be of particular interest to specific sanctuaries. When present in the water column, any of these contaminants can affect marine life by direct contact or ingestion, or through bioaccumulation via the food chain.

[Note: Over time, accumulation in sediments can sequester and concentrate contaminants. Their effects may manifest only when the sediments are resuspended during storm or other energetic events. In such cases, reports of status should be made under Question 7 – Habitat contaminants.]

Good	Conditions do not appear to have the potential to negatively affect living resources or habitat quality.
Good/Fair	Selected conditions may preclude full development of living resource assemblages and habitats, but are not likely to cause substantial or persistent declines.

Fair	Selected conditions may inhibit the development of assemblages, and may cause measurable but not severe declines in living resources and habitats.
Fair/Poor	Selected conditions have caused or are likely to cause severe declines in some but not all living resources and habitats.
Poor	Selected conditions have caused or are likely to cause severe declines in most if not al, living resources and habitats.

Question 2 (Water/Eutrophic Condition): What is the eutrophic condition of sanctuary waters and how is it changing?

Nutrient enrichment often leads to planktonic and/or benthic algae blooms. Some affect benthic communities directly through space competition. Overgrowth and other competitive interactions (e.g., accumulation of algal-sediment mats) often lead to shifts in dominance in the benthic assemblage. Disease incidence and frequency can also be affected by algae competition and the resulting chemistry along competitive boundaries. Blooms can also affect water column conditions, including light penetration and plankton availability, which can alter pelagic food webs. Harmful algal blooms often affect resources, as biotoxins are released into the water and air, and oxygen can be depleted.

Good	Conditions do not appear to have the potential to negatively affect living resources or habitat quality.
Good/Fair	Selected conditions may preclude full development of living resource assemblages and habitats, but are not likely to cause substantial or persistent declines.
Fair	Selected conditions may inhibit the development of assemblages, and may cause measurable but not severe declines in living resources and habitats.
Fair/Poor	Selected conditions have caused or are likely to cause severe declines in some but not all living resources and habitats.
Poor	Selected conditions have caused or are likely to cause severe declines in most if not all living resources and habitats.

Question 3 (Water/Human Health): Do sanctuary waters pose risks to human health and how are they changing?

Human health concerns are generally aroused by evidence of contamination (usually bacterial or chemical) in bathing waters or fish intended for consumption. They also emerge when harmful algal blooms are reported or when cases of respiratory distress or other disorders attributable to harmful algal blooms increase dramatically. Any of these conditions should be considered in the course of judging the risk to humans posed by waters in a marine sanctuary.

Some sites may have access to specific information on beach and shellfish conditions. In particular, beaches may be closed when criteria for safe water body contact are exceeded, or shellfish harvesting may be prohibited when contaminant loads or infection rates exceed certain levels. These conditions can be evaluated in the context of the descriptions below.

Good	Conditions do not appear to have the potential to negatively affect human health.
Good/Fair	Selected conditions that have the potential to affect human health may exist but human impacts have not been reported.
Fair	Selected conditions have resulted in isolated human impacts, but evidence does not justify widespread or persistent concern.
Fair/Poor	Selected conditions have caused or are likely to cause severe impacts, but cases to date have not suggested a pervasive problem.

Poor	Selected conditions warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts are likely or have occurred.

Question 4 (Water/Human Activities): What are the levels of human activities that may influence water quality and how are they changing?

Among the human activities in or near sanctuaries that affect water quality are those involving direct discharges (transiting vessels, visiting vessels, onshore and offshore industrial facilities, public wastewater facilities), those that contribute contaminants to stream, river, and water control discharges (agriculture, runoff from impermeable surfaces through storm drains, conversion of land use), and those releasing airborne chemicals that subsequently deposit via particulates at sea (vessels, land-based traffic, power plants, manufacturing facilities, refineries). In addition, dredging and trawling can cause resuspension of contaminants in sediments.

Good	Few or no activities occur that are likely to negatively affect water quality.
Good/Fair	Some potentially harmful activities exist, but they do not appear to have had a negative effect on water quality.
Fair	Selected activities have resulted in measurable resource impacts, but evidence suggests effects are localized, not widespread.
Fair/Poor	Selected activities have caused or are likely to cause severe impacts, and cases to date suggest a pervasive problem.
Poor	Selected activities warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts have occurred or are likely to occur.

Question 5 (Habitat/Abundance/Distribution): What are the abundance and distribution of major habitat types and how are they changing?

Habitat loss is of paramount concern when it comes to protecting marine and terrestrial ecosystems. Of greatest concern to sanctuaries are changes caused, either directly or indirectly, by human activities. The loss of shoreline is recognized as a problem indirectly caused by human activities. Habitats with submerged aquatic vegetation are often altered by changes in water conditions in estuaries, bays, and nearshore waters. Intertidal zones can be affected for long periods by spills or by chronic pollutant exposure. Beaches and haul-out areas can be littered with dangerous marine debris, as can the water column or benthic habitats. Sandy subtidal areas and hardbottoms are frequently disturbed or destroyed by trawling. Even rocky areas several hundred meters deep are increasingly affected by certain types of trawls, bottom longlines, and fish traps. Groundings, anchors, and divers damage submerged reefs. Cables and pipelines disturb corridors across numerous habitat types and can be destructive if they become mobile. Shellfish dredging removes, alters, and fragments habitats.

The result of these activities is the gradual reduction of the extent and quality of marine habitats. Losses can often be quantified through visual surveys and to some extent using high-resolution mapping. This question asks about the quality of habitats compared to those that would be expected without human impacts. The status depends on comparison to a baseline that existed in the past - one toward which restoration efforts might aim.

Good	Habitats are in pristine or near-pristine condition and are unlikely to preclude full community development.
Good/Fair	Selected habitat loss or alteration has taken place, precluding full development of living resource assemblages, but it is unlikely to cause substantial or persistent degradation in living resources or water quality.
Fair	Selected habitat loss or alteration may inhibit the development of assemblages, and may cause measurable but not severe declines in living resources or water quality.

Fair/Poor	Selected habitat loss or alteration has caused or is likely to cause severe declines in some but not all living resources or water quality.
Poor	Selected habitat loss or alteration has caused or is likely to cause severe declines in most if not all living resources or water quality.

Question 6 (Habitat/Structure): What is the condition of biologically-structured habitats and how is it changing?

Many organisms depend on the integrity of their habitats and that integrity is largely determined by the condition of particular living organisms. Coral reefs may be the best known examples of such biologically-structured habitats. Not only is the substrate itself biogenic, but the diverse assemblages residing within and on the reefs depend on and interact with each other in tightly linked food webs. They also depend on each other for the recycling of wastes, hygiene, and the maintenance of water quality, among other requirements.

Kelp beds may not be biogenic habitats to the extent of coral reefs, but kelp provides essential habitat for assemblages that would not reside or function together without it. There are other communities of organisms that are also similarly co-dependent, such as hard-bottom communities, which may be structured by bivalves, octocorals, coralline algae, or other groups that generate essential habitat for other species. Intertidal assemblages structured by mussels, barnacles, and algae are another example, seagrass beds another. This question is intended to address these types of places, where organisms form structures (habitats) on which other organisms depend.

Good	Habitats are in pristine or near-pristine condition and are unlikely to preclude full community development.
Good/Fair	Selected habitat loss or alteration has taken place, precluding full development of living resources, but it is unlikely to cause substantial or persistent degradation in living resources or water quality.
Fair	Selected habitat loss or alteration may inhibit the development of living resources, and may cause measurable but not severe declines in living resources or water quality.
Fair/Poor	Selected habitat loss or alteration has caused or is likely to cause severe declines in some but not all living resources or water quality.
Poor	Selected habitat loss or alteration has caused or is likely to cause severe declines in most if not all living resources or water quality.

Question 7 (Habitat/Contaminants): What are the contaminant concentrations in sanctuary habitats and how are they changing?

This question addresses the need to understand the risk posed by contaminants within benthic formations, such as soft sediments, hard bottoms, or biogenic organisms. In the first two cases, the contaminants can become available when released via disturbance. They can also pass upwards through the food chain after being ingested by bottom dwelling prey species. The contaminants of concern generally include pesticides, hydrocarbons, and heavy metals, but the specific concerns of individual sanctuaries may differ substantially.

Good	Contaminants do not appear to have the potential to negatively affect living resources or water quality.
Good/Fair	Selected contaminants may preclude full development of living resource assemblages, but are not likely to cause substantial or persistent degradation.
Fair	Selected contaminants may inhibit the development of assemblages, and may cause measurable but not severe declines in living resources or water quality.
Fair/Poor	Selected contaminants have caused or are likely to cause severe declines in some but not all living

resources or water quality.

Poor	Selected contaminants have caused or are likely to cause severe declines in most if not all living resources or water quality.

Question 8 (Habitat/Human Activities): What are the levels of human activities that may influence habitat quality and how are they changing?

Human activities that degrade habitat quality do so by affecting structural (geological), biological, oceanographic, acoustic, or chemical characteristics. Structural impacts include removal or mechanical alteration, including various fishing techniques (trawls, traps, dredges, longlines, and even hook-and-line in some habitats), dredging channels and harbors and dumping spoil, vessel groundings, anchoring, laying pipelines and cables, installing offshore structures, discharging drill cuttings, dragging tow cables, and placing artificial reefs. Removal or alteration of critical biological components of habitats can occur along with several of the above activities, most notably trawling, groundings, and cable drags. Marine debris, particularly in large quantities (e.g., lost gill nets and other types of fishing gear), can affect both biological and structural habitat components. Changes in water circulation often occur when channels are dredged, fill is added, coastal areas are reinforced, or other construction takes place. These activities affect habitat by changing food delivery, waste removal, water quality (e.g., salinity, clarity and sedimentation), recruitment patterns, and a host of other factors. Acoustic impacts can occur to water column habitats and organisms from acute and chronic sources of anthropogenic noise (e.g., shipping, boating, construction). Chemical alterations most commonly occur following spills and can have both acute and chronic impacts.

Good	Few or no activities occur that are likely to negatively affect habitat quality.
Good/Fair	Some potentially harmful activities exist, but they do not appear to have had a negative effect on habitat quality.
Fair	Selected activities have resulted in measurable habitat impacts, but evidence suggests effects are localized, not widespread.
Fair/Poor	Selected activities have caused or are likely to cause severe impacts, and cases to date suggest a pervasive problem.
Poor	Selected activities warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts have occurred or are likely to occur.

Question 9 (Living Resources/Biodiversity): What is the status of biodiversity and how is it changing?

This is intended to elicit thought and assessment of the condition of living resources based on expected biodiversity levels and the interactions between species. Intact ecosystems require that all parts not only exist, but that they function together, resulting in natural symbioses, competition, and predator-prey relationships. Community integrity, resistance and resilience all depend on these relationships. Abundance, relative abundance, trophic structure, richness, H' diversity, evenness, and other measures are often used to assess these attributes.

Good	Biodiversity appears to reflect pristine or near-pristine conditions and promotes ecosystem integrity (full community development and function).
Good/Fair	Selected biodiversity loss has taken place, precluding full community development and function, but it is unlikely to cause substantial or persistent degradation of ecosystem integrity.
Fair	Selected biodiversity loss may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity.
Fair/Poor	Selected biodiversity loss has caused or is likely to cause severe declines in some but not all

ecosystem components and reduce ecosystem integrity.

Poor	Selected biodiversity loss has caused or is likely to cause severe declines in ecosystem integrity.

Question 10 (Living Resources/Extracted Species): What is the status of environmentally sustainable fishing and how is it changing?

Commercial and recreational harvesting are highly selective activities, for which fishers and collectors target a limited number of species, and often remove high proportions of populations. In addition to removing significant amounts of biomass from the ecosystem, reducing its availability to other consumers, these activities tend to disrupt specific and often critical food web links. When too much extraction occurs (i.e. ecologically unsustainable harvesting), trophic cascades ensue, resulting in changes in the abundance of non-targeted species as well. It also reduces the ability of the targeted species to replenish populations at a rate that supports continued ecosystem integrity.

It is essential to understand whether removals are occurring at ecologically sustainable levels. Knowing extraction levels and determining the impacts of removal are both ways that help gain this understanding. Measures for target species of abundance, catch amounts or rates (e.g., catch per unit effort), trophic structure, and changes in non-target species abundance are all generally used to assess these conditions.

Other issues related to this question include whether fishers are using gear that is compatible with the habitats being fished and whether that gear minimizes by-catch and incidental take of marine mammals. For example, bottom-tending gear often destroys or alters both benthic structure and non-targeted animal and plant communities. “Ghost fishing” occurs when lost traps continue to capture organisms. Lost or active nets, as well as lines used to mark and tend traps and other fishing gear, can entangle marine mammals. Any of these could be considered indications of environmentally unsustainable fishing techniques.

Good	Extraction does not appear to affect ecosystem integrity (full community development and function).
Good/Fair	Extraction takes place, precluding full community development and function, but it is unlikely to cause substantial or persistent degradation of ecosystem integrity.
Fair	Extraction may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity.
Fair/Poor	Extraction has caused or is likely to cause severe declines in some but not all ecosystem components and reduce ecosystem integrity.
Poor	Extraction has caused or is likely to cause severe declines in ecosystem integrity.

Question 11 (Living Resources/Invasive Species): What is the status of non-indigenous species and how is it changing?

Non-indigenous species are generally considered problematic, and candidates for rapid response, if found, soon after invasion. For those that become established, their impacts can sometimes be assessed by quantifying changes in the affected native species. This question allows sanctuaries to report on the threat posed by non-indigenous species. In some cases, the presence of a species alone constitutes a significant threat (certain invasive algae). In other cases, impacts have been measured, and may or may not significantly affect ecosystem integrity.

Good	Non-indigenous species are not suspected or do not appear to affect ecosystem integrity (full community development and function).
Good/Fair	Non-indigenous species exist, precluding full community development and function, but are unlikely to cause substantial or persistent degradation of ecosystem integrity.

Fair	Non-indigenous species may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity.
Fair/Poor	Non-indigenous species have caused or are likely to cause severe declines in some but not all ecosystem components and reduce ecosystem integrity.
Poor	Non-indigenous species have caused or are likely to cause severe declines in ecosystem integrity.

Question 12 (Living Resources/Key Species): What is the status of key species and how is it changing?

Certain species can be defined as "key" within a marine sanctuary. Some might be keystone species, that is, species on which the persistence of a large number of other species in the ecosystem depends - the pillar of community stability. Their functional contribution to ecosystem function is disproportionate to their numerical abundance or biomass and their impact is therefore important at the community or ecosystem level. Their removal initiates changes in ecosystem structure and sometimes the disappearance of or dramatic increase in the abundance of dependent species. Keystone species may include certain habitat modifiers, predators, herbivores, and those involved in critical symbiotic relationships (e.g. cleaning or co-habitating species).

Other key species may include those that are indicators of ecosystem condition or change (e.g., particularly sensitive species), those targeted for special protection efforts, or charismatic species that are identified with certain areas or ecosystems. These may or may not meet the definition of keystone, but do require assessments of status and trends.

Good	Key and keystone species appear to reflect pristine or near-pristine conditions and may promote ecosystem integrity (full community development and function).
Good/Fair	Selected key or keystone species are at reduced levels, perhaps precluding full community development and function, but substantial or persistent declines are not expected.
Fair	The reduced abundance of selected keystone species may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity; or selected key species are at reduced levels, but recovery is possible.
Fair/Poor	The reduced abundance of selected keystone species has caused or is likely to cause severe declines in some but not all ecosystem components, and reduce ecosystem integrity; or selected key species are at substantially reduced levels, and prospects for recovery are uncertain.
Poor	The reduced abundance of selected keystone species has caused or is likely to cause severe declines in ecosystem integrity; or selected key species are a severely reduced levels, and recovery is unlikely.

Question 13 (Living Resources/Health of Key Species): What is the condition or health of key species and how is it changing?

For those species considered essential to ecosystem integrity, measures of their condition can be important to determining the likelihood that they will persist and continue to provide vital ecosystem functions. Measures of condition may include growth rates, fecundity, recruitment, age-specific survival, tissue contaminant levels, pathologies (disease incidence tumors, deformities), the presence and abundance of critical symbionts, or parasite loads. Similar measures of condition may also be appropriate for other key species (indicator, protected, or charismatic species). In contrast to the question about keystone species (#12 above), the impact of changes in the abundance or condition of key species is more likely to be observed at the population or individual level, and less likely to result in ecosystem or community effects.

Good	The condition of key resources appears to reflect pristine or near-pristine conditions.
Good/Fair	The condition of selected key resources is not optimal, perhaps precluding full ecological function, but

substantial or persistent declines are not expected.

Fair	The diminished condition of selected key resources may cause a measurable but not severe reduction in ecological function, but recovery is possible.
Fair/Poor	The comparatively poor condition of selected key resources makes prospects for recovery uncertain.
Poor	The poor condition of selected key resources makes recovery unlikely.

Question 14 (Living Resources/Human Activities): What are the levels of human activities that may influence living resource quality and how are they changing?

Human activities that degrade living resource quality do so by causing a loss or reduction of one or more species, by disrupting critical life stages, by impairing various physiological processes, or by promoting the introduction of non-indigenous species or pathogens. (Note: Activities that impact habitat and water quality may also affect living resources. These activities are dealt with in Questions 4 and 8, and many are repeated here as they also have direct effect on living resources).

Fishing and collecting are the primary means of removing resources. Bottom trawling, seine-fishing, and the collection of ornamental species for the aquarium trade are all common examples, some being more selective than others. Chronic mortality can be caused by marine debris derived from commercial or recreational vessel traffic, lost fishing gear, and excess visitation, resulting in the gradual loss of some species.

Critical life stages can be affected in various ways. Mortality to adult stages is often caused by trawling and other fishing techniques, cable drags, dumping spoil or drill cuttings, vessel groundings, or persistent anchoring. Contamination of areas by acute or chronic spills, discharges by vessels, or municipal and industrial facilities can make them unsuitable for recruitment; the same activities can make nursery habitats unsuitable. Although coastal armoring and construction can increase the availability of surfaces suitable for the recruitment and growth of hard bottom species, the activity may disrupt recruitment patterns for other species (e.g., intertidal soft bottom animals) and habitat may be lost.

Spills, discharges, and contaminants released from sediments (e.g., by dredging and dumping) can all cause physiological impairment and tissue contamination. Such activities can affect all life stages by reducing fecundity, increasing larval, juvenile, and adult mortality, reducing disease resistance, and increasing susceptibility to predation. Bioaccumulation allows some contaminants to move upward through the food chain, disproportionately affecting certain species.

Activities that promote introductions include bilge discharges and ballast water exchange, commercial shipping and vessel transportation. Releases of aquarium fish can also lead to species introductions.

Good	Few or no activities occur that are likely to negatively affect living resource quality.
Good/Fair	Some potentially harmful activities exist, but they do not appear to have had a negative effect on living resource quality.
Fair	Selected activities have resulted in measurable living resource impacts, but evidence suggests effects are localized, not widespread.
Fair/Poor	Selected activities have caused or are likely to cause severe impacts, and cases to date suggest a pervasive problem.
Poor	Selected activities warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts have occurred or are likely to occur.

Question 15 (Maritime Archaeological Resources/Integrity): What is the integrity of known maritime archaeological resources and how is it changing?

The condition of archaeological resources in a marine sanctuary significantly affects their value for science and education, as well as the resource's eligibility for listing in the National Register of Historic Places. Assessments of archaeological sites include evaluation of the apparent levels of site integrity, which are based on levels of previous human disturbance and the level of natural deterioration. The historical, scientific and educational values of sites are also evaluated, and are substantially determined and affected by site condition.

Good	Known archaeological resources appear to reflect little or no unexpected disturbance.
Good/Fair	Selected archaeological resources exhibit indications of disturbance, but there appears to have been little or no reduction in historical, scientific, or educational value.
Fair	The diminished condition of selected archaeological resources has reduced, to some extent, their historical, scientific, or educational value, and may affect the eligibility of some sites for listing in the National Register of Historic Places.
Fair/Poor	The diminished condition of selected archaeological resources has substantially reduced their historical, scientific, or educational value, and is likely to affect their eligibility for listing in the National Register of Historic Places.
Poor	The degraded condition of known archaeological resources in general makes them ineffective in terms of historical, scientific, or educational value, and precludes their listing in the National Register of Historic Places.

Question 16 (Maritime Archaeological Resources/Threat to Environment): Do known maritime archaeological resources pose an environmental hazard and how is this threat changing?

The sinking of a ship potentially introduces hazardous materials into the marine environment. This danger is true for historic shipwrecks as well. The issue is complicated by the fact that shipwrecks older than 50 years may be considered historical resources and must, by federal mandate, be protected. Many historic shipwrecks, particularly early to mid-20th century, still have the potential to retain oil and fuel in tanks and bunkers. As shipwrecks age and deteriorate, the potential for release of these materials into the environment increases.

Good	Known maritime archaeological resources pose few or no environmental threats.
Good/Fair	Selected maritime archaeological resources may pose isolated or limited environmental threats, but substantial or persistent impacts are not expected.
Fair	Selected maritime archaeological resources may cause measurable, but not severe, impacts to certain sanctuary resources or areas, but recovery is possible.
Fair/Poor	Selected maritime archaeological resources pose substantial threats to certain sanctuary resources or areas, and prospects for recovery are uncertain.
Poor	Selected maritime archaeological resources pose serious threats to sanctuary resources, and recovery is unlikely.

Question 17 (Maritime Archaeological Resources/Human Activities): What are the levels of human activities that may influence maritime archaeological resource quality and how are they changing?

Some human maritime activities threaten the physical integrity of submerged archaeological resources. Archaeological site integrity is compromised when elements are moved, removed, or otherwise damaged. Threats come from looting by divers, inadvertent damage by scuba diving visitors, improperly conducted archaeology that does not fully document site disturbance, anchoring, groundings, and commercial and recreational fishing activities, among others.

Good	Few or no activities occur that are likely to negatively affect maritime archaeological resource

	integrity.
Good/Fair	Some potentially relevant activities exist, but they do not appear to have had a negative effect on maritime archaeological resource integrity.
Fair	Selected activities have resulted in measurable impacts to maritime archaeological resources, but evidence suggests effects are localized, not widespread.
Fair/Poor	Selected activities have caused or are likely to cause severe impacts, and cases to date suggest a pervasive problem.
Poor	Selected activities warrant widespread concern and action, as large-scale, persistent, and/or repeated severe impacts have occurred or are likely to occur.

GROUNDFISH ADVISORY SUBPANEL REPORT ON OLYMPIC COAST NATIONAL MARINE SANCTUARY (OCNMS) "CONDITION REPORT"

The Groundfish Advisory Subpanel (GAP) reviewed the Olympic Coast National Marine Sanctuary (Sanctuary) condition report. The focus was on the section relating to habitat. That section carried all of the sanctuary issues related to fishery management.

It was noted that the various conditions related to Pacific Fishery Management Council authority were rated either unknown, not changing or improving. It is viewed by the GAP as a comprehensive report and indicative that the Sanctuary is achieving its resource and protection improvement goals.

In several references to fishing impacts within the sanctuary it was noted that the sanctuary response was listed as to consult with partners and fishery managers as a first step. This is an apparent attempt to stay within the authorities of the two statutes involved (Magnuson-Stevens Fishery Conservation Act and National Marine Sanctuary Act). We find this collaborative philosophy an encouraging one and hope that it remains into the future. The GAP is receptive to working with the Sanctuary on future fishery management planning.

PFMC
04/10/08

HABITAT COMMITTEE REPORT ON OLYMPIC COAST NATIONAL MARINE SANCTUARY "CONDITION REPORT"

The Habitat Committee (HC) reviewed the Olympic Coast National Marine Sanctuary's (OCNMS) condition report. Although the report was distributed too late to provide meaningful review, sharing this document with the Council at this early point in the OCNMS management plan review process is beneficial. Such early communication bodes well for future collaboration between the OCNMS and the Council. The HC acknowledges the benefits of completing this report as a lead-in to establishing baselines and for the management plan review process, and appreciates that the OCNMS is the first sanctuary to use the condition report as a starting point for the management plan review process.

Due in part to the short review time, the HC is uncertain whether the discussions in the report are detailed enough to support the conclusions provided. The HC believes the final document will be of great interest to the Council. The HC believes the Council should strive to engage in the sanctuary's management plan review process, and to do so, both agencies must understand each other's timelines in order to improve coordination. The HC would be willing to assist with further review and comment on the condition document, but we are not sure if that is a feasible option given the short timeline. We reiterate that there is a need to improve coordination between the National Ocean Service, NMFS, and the Council, such as improving synchronization of schedules.

PFMC
04/08/08

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON OLYMPIC COAST NATIONAL MARINE SANCTUARY (OCNMS) CONDITION REPORT

A request was made to the Scientific and Statistical Committee (SSC) to review the scientific merits of the Condition Report that is under development by the Olympic Coast National Marine Sanctuary (OCNMS). The Council specifically requested review of portions of the report that pertain directly to fisheries management. OCNMS Superintendent Carol Bernthal and Dr. Stephen Gittings from the Office of the National Marine Sanctuary Program gave a short presentation and asked the SSC for feedback on data resources, rating descriptions, and our thoughts on 3 of 17 status evaluation questions: sustainable fishing, key species status, and human activities affecting living resources. OCNMS is using this opportunity to establish consultation with the Council early in their process, which may eventually lead to changes in the Condition Report prior to external peer review.

Condition Reports for all Sanctuaries are a new requirement of the National Marine Sanctuary Program. They will be updated every five years to identify data gaps, prioritize monitoring needs, and evaluate progress toward meeting Sanctuary goals. The Condition Report questions, format, performance measures and scoring system to evaluate condition are established and not subject to change.

A full analysis of the content of the document was not possible due to late delivery of the document and lack of specific performance metrics. However, the SSC has comments on the process leading to the status evaluations as well as the content of condition factor number 10.

Comments on the process:

1. The report is comprehensive in scope and considers many critical aspects of Sanctuary condition.
2. Some of the available fisheries data for the region have been incorporated, although National Marine Fishery Service survey and fishery data were not fully utilized.
3. The process is not transparent. Status evaluations are based on expert opinion. Qualitative condition “scores” and general trends are ultimately determined by the OCNMS staff. It is not clear how experts were chosen or how many contributed to each status evaluation.
4. Methodology based on expert opinion, without a good sense of how data inform that opinion, is not a scientific process.
5. Workshops on particular issues such as fisheries status and impacts may improve the process of data integration and status evaluation.

Comments on report content:

The OCNMS requested SSC guidance on Question 10, "What is the status of environmentally sustainable fishing and how is it changing?" The OCNMS gives the condition and trend of sustainable fishing practices an "Undetermined" rating.

1. This is one of few condition indicators that can be quantified based on available fisheries data.
2. The term "ecosystem integrity" is not defined or quantified.
3. Trend evaluation largely depends on the baseline used for evaluation. In the past 5 years most groundfish stocks show indications of improvement and fisheries management directed at sustainability and habitat protection have clearly improved.
4. The SSC disagrees with the final statement of this section of the report (Agenda Item I.2.b, Supplemental OCNMS Draft Condition Report, page 32): "All these considerations lead to uncertainty about the long-term sustainability of groundfish fisheries as currently practiced off Washington (p. 32)."

PFMC
04/09/08